# U.S. Department of the Interior

# Economic Report

# FY 2015

**June 17, 2016**

# Foreword by Secretary Sally Jewell

"We're blessed with natural treasures – from the Grand Tetons to the Grand Canyon; from lush forests and vast deserts to lakes and rivers teeming with wildlife. And it's our responsibility to protect these treasures for future generations, just as previous generations protected them for us." *(President Obama, October 24, 2015)*

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage. We are America's storyteller. We provide scientific information and we honor the country's trust responsibilities to American Indians, Alaska Natives and affiliated island communities. Our lands, waters, ecosystems and cultural and historic resources are engines of prosperity.

The work we do here matters. Energy generated from public lands powers America's homes and businesses; minerals and timber are the building blocks for many products we consume; grazing helps supply food for our families; and the landscapes, recreational opportunities, and shared history that draws Americans to Interior lands support jobs and businesses in communities across the country.

This is the story of the Department, and it is fundamental to our economy. With all we have done to help power America's economy and create jobs, we can do even more with the right policies and investments. Investments in parks, refuges, national conservation lands, and environmental restoration create homegrown jobs that cannot be exported. Wind, solar, and geothermal power from public lands can put Americans to work supplying clean, affordable energy for our future. We can invest in infrastructure to deliver clean water to rural communities in need, while restoring watersheds and lands for future generations.

And while we are creating and supporting jobs across America, we are also investing in our country's future. In FY 2015, we expanded job opportunities at Interior for our country's young people by 120 percent. This past year alone, 23,858 youth were employed by Interior and another 12,530 were employed partnering organizations. Nearly 40 percent of all the youth employed at Interior work with the National Park Service and their partners. We are committed to working with young people to restore America's most special places while inspiring the next generation to be good stewards of our planet.

With innovation and with renewed attention to the benefits of responsible stewardship we can help power our economy and create a lasting foundation for prosperity in America.

# A Message from Kristen Sarri, Principal Deputy Assistant Secretary for Policy, Management and Budget

The Department of the Interior's (DOI) programs, activities, and services make critical contributions to our Nation's economy. They affect millions of Americans by supporting jobs in the United States and injecting billions of dollars into local economies. In FY 2015, the Department's activities created about $170 billion in value added contributions, $300 billion in economic output, and supported an estimated 1.8 million jobs.

To support the Department's mission, the President's budget request for FY 2017 includes $13.4 billion for Interior. Many of the activities discussed in this report feature prominently in the President's FY 2017 Budget. For example, the Budget proposes investing in America's water infrastructure and applying science to address the Nation's water supply challenges, especially in the arid West. The Budget also provides support for onshore energy permitting and oversight on federal lands, with the Bureau of Land Management's (BLM) oil and gas program receiving an estimated 17 percent increase in funding compared to the 2016 enacted level. The funding increase will enhance BLM's capacity to oversee safe, environmentally-sound resource development and ensure a fair return to taxpayers, as BLM implements new regulations and rules, modernizes the automated permitting process, and enhances capability to recruit and retain critical oil and gas personnel.

Investments in America's great outdoors create and sustain millions of jobs and spur billions of dollars in national economic activity through outdoor recreation and tourism. The 2017 Budget proposes full funding for Land and Water Conservation Fund (LWCF) programs at Interior and the Department of Agriculture. This highly successful program reinvests royalties from offshore oil and gas activities into public lands across the Nation. Starting in 2017, the budget proposes to invest $900 million annually into conservation and recreation projects, equal to the amount of receipts deposited in the LWCF each year, through a combination of discretionary ($475 million) and mandatory ($425 million) funding. These investments will conserve lands identified for collaborative, strategic conservation in and near national parks, refuges, and forests; increase access for hunting and fishing; protect historic battlefields; and provide grants to states for close-to-home recreation and conservation projects on non-federal lands. Visitors to these lands spend money in local gateway regions, and these expenditures generate and support economic activity within local economies.

This budget continues to advance development of renewable energy with $97.3 million for clean energy programs. Over the summer of 2015, Interior's offshore wind energy leasing efforts led to beginning construction of the Nation's first offshore wind farm. This first-of-its-kind project provides a model for the future development of offshore wind energy in America.

The budget supports economic development in Indian Country by investing in programs which include natural resources management, conventional and non-renewable energy, grazing, timber and other forestry products, and irrigation water for agricultural activities. These programs contribute $1 billion in annual revenues to tribes and individual Indians, and support almost 100,000 jobs across Indian Country. The Indian Energy Service Center is a specific example of an initiative to increase revenues from energy resources. The Center will expedite the leasing, permitting, and reporting for conventional and renewable energy on Indian lands, and provide resources to ensure development occurs safely, protects the environment, and manages risks appropriately, with technical assistance to support assessment of the social and environmental impacts of energy development. The Center will include staff from the Bureau of Indian Affairs (BIA), Office of Natural Resources Revenue, BLM, and the Office of the Special Trustee – all of which have responsibilities related to tribal energy advancement. Indian Affairs also supports opportunities for Native youth by providing funding for programs that promote academic achievement and cultural identity, and create social and economic opportunities in tribal communities. To support these efforts, the 2017 budget provides $1.1 billion, an increase of over $60 million, for education operations and construction. Through Indian Affairs programs, tribes support community infrastructure, education, and employment opportunities along with other components of long term sustainable development that work to improve the quality of life for their members.

During 2016, the National Park Service celebrates 100 years of preserving and sharing America's natural, cultural, and historic treasures. Spending by visitors to these parks generates and supports a considerable amount of economic activity within park gateway economies. Interior's 2017 budget will make investments to connect a new generation to "America's Best Idea," and to care for and maintain the national parks for the next 100 years. Overall, a total of $560 in current and $300 million in permanent funds will allow the Park Service to make targeted, measurable upgrades to all of its highest priority, non-transportation assets, restoring and maintaining them in good condition.

Visitation to Interior's public lands supported an estimated $26 billion in value added, $45 billion in economic output, and about 396,000 jobs in 2015. This is only one small part of the Nation's outdoor economy. To better understand the value of the outdoor economy to our Nation, the Department of the Interior is partnering with the Department of Commerce's Bureau of Economic Analysis to analyze the impact of outdoor recreation on our nation's economy. Industry estimates show that consumer spending for outdoor recreation is greater than spending on household utilities and pharmaceuticals combined, yet the federal government does not fully quantify these benefits. By producing sound data on the tangible economic impacts of public lands and outdoor industry, we increase our understanding of the benefits that come from investing in them.

This report highlights Interior's commitment to integrating our conservation responsibilities with activities that create income and jobs. Our mission as stewards of our Nation's lands and cultural and natural resources puts us in an ideal position to conserve natural resources, create American jobs, and support communities.

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# Glossary

**Value Added:** Measures the contribution of DOI's activities to the Gross Domestic Product (GDP) of a regional or the National economy. Value added is the difference between DOI's estimated total output (sales or receipts and other operating income) and the cost of any intermediate inputs (consumption of goods and services purchased from other industries or imported).

**Economic Output**: The total estimated value of production of goods and services supported by DOI. Output is the sum of all intermediate sales (business to business) and final demand (sales to consumers and exports).

**Employment**: The total number of jobs supported by DOI-managed activities.

**Activities**: As used to estimate economic contributions, "activities" means the full range of actions associated with facilitating the use of lands and waters managed by Interior. This includes actions undertaken by the Federal government as well as subsequent actions undertaken by private sector individuals and businesses.

## Executive Summary

The U.S. Department of the Interior (DOI, or Interior) plays an integral role in conserving America's natural resources and heritage, honoring our cultures and tribal communities, and supplying the energy to power our future. Interior's people, programs, and responsibilities impact Americans across all 50 States. The Department is the steward of 20 percent of the Nation's lands, managing national parks, national wildlife refuges, and public lands and assisting States, Tribes, and others in the management of natural and cultural resources. Interior grants access to public lands and offshore areas for renewable and conventional energy development—covering roughly a quarter of the Nation's domestic supplies of oil and natural gas—while ensuring safety, environmental protection and revenue collection for the American public. Interior oversees the protection and restoration of surface mined lands and is the largest supplier and manager of water in the 17 Western States, assisting others with water conservation and extending water supplies and providing hydropower resources to power much of the 17 Western States. The Department serves as Trustee to American Indians and Alaska Natives, fulfilling essential trust responsibilities to tribal communities. Interior's Office of Insular Affairs (OIA) carries out the department's responsibilities for U.S.-affiliated Insular Areas, which include the territories of Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands, and three sovereign freely associated states (FAS, which includes the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau). The Department supports cutting edge research in geology, hydrology, and biology, informing resource management and community protection decisions at Interior and across the world.

### Data Visualization

This year's report is paired with a web-based interactive data visualization tool that lets the user customize the contribution analysis by bureau, activity or state. You can view that site at my.usgs.gov/doidv/. NPS has a similar data visualization tool that displays results from the Visitor Spending Effects report by-year. This interactive tool is available at go.nps.gov/vse.

This report represents the seventh in a series of annual economic reports initiated with a preliminary report released by Interior in December 2009.[1]

Although estimates of value added and economic contributions provide important information on the effect of expenditures on outputs from Interior lands in local economies, there are additional economic values—that are not captured in market values—associated with DOI resources which, if measured, would give a more complete accounting of the effects of Interior's activities. For example, the complete accounting of impacts would include the value individuals place on recreation above and beyond their expenditures; contributions to U.S. energy security; preservation of natural habitats and endangered

[1] More detailed treatments of some of the topics addressed in this report are available in the FY 2012 Economic Report: www.doi.gov/sites/doi.gov/files/uploads/FY2012%20DOI%20Econ%20Report%20%28Final%29%202013-09-25.pdf.

species; and opportunities associated with water use. A better understanding of how the services and functions of natural systems and processes help support the welfare and security of our citizens and communities will allow the Department to better execute the important and diverse work of its many missions and goals. Nearly every bureau and office has begun to consider how using an ecosystem services framework could enhance their ability to analyze, display, and communicate trade-offs. While there are established methods for estimating the value of environmental benefits, their estimation is outside the scope of this report.

In FY 2015 production and activities on DOI lands were associated with about $170 billion in value added, about $300 billion in economic output, and supported an estimated 1.8 million jobs. The value of all commodities and other inputs to production associated with Interior's activities decreased over the past year by about 15 percent in nominal terms, from $159 billion in FY 2014 to $135 billion in FY 2015. Much of this change reflects the fall in oil prices from a 2014 average near $100 per barrel, to below $50 per barrel in 2015. Information related to economic contributions, value added, employment, and other economic values associated with Interior's diverse activities is summarized below:

- **Recreation**: In FY 2015, Interior's lands hosted an estimated 443 million visits. The net economic value of a visit to Interior lands varies depending on the activity. For FY 2015, visitation to Interior sites provided an estimated $26 billion in value added, $45 billion in economic output, and supported about 396,000 jobs.
- **Renewable Energy**: In FY 2015, Interior lands and facilities produced 36.1 million MWh of hydropower. Interior lands host renewable power projects for solar (9,761 MW), wind (5,608 MW), and geothermal energy (2,157 MW).[2] In FY 2015, through the BLM and BIA renewable energy programs, Interior approved the installation of 492 MW in new solar power projects on public lands.[3] Renewable energy activities contributed an estimated $3 billion in output and supported 15,000 jobs. In aggregate, generating electricity with renewable energy reduces the amount of electricity supplied by fossil fuel plants, along with the associated emissions, and reduces our Nation's dependence on foreign oil. Market values of power typically do not reflect the adverse environmental and health costs to society associated with fossil fuel pollution or the corresponding benefits to society from substituting cleaner sources of energy.
- **Conservation**: The value added, economic contributions, and employment supported by DOI's conservation-related activities are difficult to measure separately because conservation is often a component of recreation, ecosystem restoration, water management, and even some mineral development activities. Many benefits of nature conservation accruing to households, communities, and economies are not defined with a set of consistent metrics nor are they bought and sold in markets. This creates challenges in the valuation of these goods and services.
- **Restoration:** Every Interior bureau engages in some form of restoration from physical structures to habitat and cultural resources. The Office of Surface Mining Reclamation and Enforcement's (OSMRE) Environmental Restoration program activities improve natural resources and reduce the risk to public health, safety, and general welfare by correcting problems from coal mining on Abandoned Mine Lands (AML). In FY 2015, OSMRE reclaimed or mitigated the equivalent of 12,339 acres of land on 566 projects. Similarly, the Bureau of Land Management's (BLM) AML Program enhances public safety and improves water quality by reducing or eliminating the

[2] Installed capacities as of December 2015.
[3] There were no new approvals for geothermal or wind projects in FY 2015.

effects of past hardrock mining in the western U.S. The AML program utilizes a database to record and track the thousands of AML sites and features within the National System of Public Lands. The Abandoned Mine Site Cleanup Module (AMSCM) currently contains over 94,000 features, such as physical hazards and environmental impacts, associated with 50,500 AML sites. The Central Hazardous Materials Fund (CHF) is the Department's principal source of funds for the cleanup of the most highly contaminated sites located within national parks, national wildlife refuges, and on other Department-managed lands. Since the CHF was established in 1995, it has undertaken response action at more than 69 sites and completed cleanup at 20 sites, recovering a total of $95.2 million and avoiding the approximate cost of $478.3 million in work performed by responsible parties. The DOI Natural Resource Damage Assessment and Restoration (NRDAR) Program works across bureaus to ensure that responsible parties – not taxpayers – bear the cost of restoring resources injured by oil spills or hazardous substance releases around the nation. In FY 2015, the Restoration Program restored or enhanced 46,606 acres and 149 stream/shoreline miles to achieve desired habitat conditions to support trust species conservation.

- **Fossil Fuel Energy:** In FY 2015, Interior-managed lands and waters produced 782 million barrels of crude oil, 5 trillion cubic feet of natural gas, and 421 million tons of coal. Some average prices in FY 2015 included $49/bbl for oil, $3.05/mcf of natural gas, and $10.19 per ton of Powder River Basin coal. Oil and natural gas prices are down significantly from last year ($99/bbl for oil and $4.41/mcf for natural gas). Oil, gas and coal produced from Interior lands provided an estimated $94 billion in value added; an estimated economic output contribution of $166 billion; and an estimated 800,000 jobs. External costs (greenhouse gas emissions, habitat loss, impacts to water quality, etc.) are associated with the development of oil, gas, and coal produced from Interior lands, and with the production and the use of these resources. As a general matter, market prices do not reflect many of these costs. Various regulations and other requirements designed to minimize adverse environmental impacts internalize some (but not all) of these external costs.
- **Non-fuel Minerals**: In FY 2015, Interior lands produced a wide variety of minerals. For example, an estimated that 2.5 million ounces of gold were produced from BLM lands in Nevada; the average price of gold in 2015 was $1,170 per ounce. Non-fuel mineral production was associated with an estimated value added of $6.7 billion; estimated economic output of $13.3 billion; and estimated employment supported about 47,000 jobs. While minerals are generally traded in competitive markets (though some markets may be localized or thin), prices typically do not incorporate certain external costs associated with mining. Moreover, the Federal leasing system does not completely offset these costs, which are primarily associated with the environmental impacts of mining. Various regulations and other requirements designed to minimize adverse environmental impacts help to internalize some but not all of these external costs.

- **Forage and Grazing**: In FY 2015, Interior lands provided access to 10 million animal unit months (AUMs) of forage. Prices for forage vary widely, from $1.69 per AUM fee on BLM-managed lands to $20.20on State and private grazing lands[4]. This production is associated with an estimated $2.3 billion in economic output and supported about 40,000 jobs. The increase from FY 2014 ($1.4 billion in output and 17,000 jobs) is partially due to an updated methodology from BLM that better reflects employment around grazing activities[5]. Value added figures were not readily available for forage and grazing. Forage prices do not fully reflect various ecosystem service values provided by rangelands or the total cost of grazing on Federal lands.
- **Timber**: In FY 2015, about 616,000 mbf (1 mbf = 1,000 board-feet) of sawtimber was harvested on BLM and tribal lands. Approximately 56 percent of the harvest came from lands managed by the Bureau of Indian Affairs (BIA), while the remaining 44 percent came from BLM-managed lands. This timber harvest was associated with about $0.4 billion in value added, provided roughly $1 billion in economic output, and supported about 4,600 jobs. Market prices do not fully reflect changes to various ecosystem service values provided by forest lands. In addition to traditional sawtimber, Interior forestry lands provide various other products including biomass, fuelwood, poles, posts, and a variety of other products (e.g., seeds, Christmas trees, and mushrooms). The economic contributions associated with some of these products were accounted for in this report; while others could not be explicitly analyzed.
- **Water**: Interior stores and delivers water for irrigation, municipal and industrial (M&I), and other uses. The value of water varies widely according to location, type of use and climatic conditions. Interior's irrigation (Reclamation and BIA) and M&I water supply activities are associated with $27 billion in value added; about $48 billion in economic output; and supported an estimated 361,000 jobs. Interior also delivers water to support in-stream flows, wildlife refuges, and other uses that are difficult to value fully and not typically reflected in economic contribution estimates.
- **Scientific Data**: Investments in research and development promote economic growth and innovation, ensure American competitiveness in a global marketplace, and are critical to achieving Interior's mission. Investments in Interior's research and development will improve U.S. strategic mineral supplies, understanding of ecosystem services, water use and availability, and natural hazard preparedness. Much scientific knowledge is difficult to value and monetize in markets, and hence is underprovided by the private sector.
- **Grants/Payments**: Activities related to grant and payment programs administered by Interior provided $6.8 billion in value added; economic contributions of $9.4 billion; and supported employment of 90,000 jobs.[6] Within these totals:
    - Indian Affairs grants to support tribal governments provided value added of $0.8 billion, economic contributions of $1.2 billion, and supported about 9,000 jobs.
    - Grants and payments to Insular areas supported $0.9 billion in valued added and supported employment of about 26,000 jobs. Economic output estimates supported by these grants and payments were not readily available.

[4] BLM increased the federal grazing fee to $1.69 in 2015 and then to $2.11 in 2016, pursuant to the statutory requirements under the Public Rangelands Improvement Act of 1978. However, the 2014 price of $1.35 was used for the contribution analysis due to the timing of the grazing data. Source for private and state grazing fee, USDA (https://www.nass.usda.gov/Charts_and_Maps/Grazing_Fees/gf_am.php)

[5] A detailed explanation of BLM's methodology can be found in the Appendix.

[6] It is possible that grants and payments support some of the economic activity reported for other sectors throughout this report. We have not attempted to correct for this source of potential double-counting.

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# Chapter 1 Introduction and Overview

## Background

The U.S. Department of the Interior's programs have a wide-spread impact across the country. Interior conserves America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future. The Department is the steward of 20 percent of the Nation's lands. Interior manages national parks, national wildlife refuges, and public lands and assists States, Tribes, and others in the management of natural and cultural resources. Interior provides access to public lands and offshore areas for renewable and conventional energy development—covering roughly a quarter of the Nation's domestic supplies of oil and natural gas and 40 percent of domestic coal—and seeks to ensure safety, environmental protection and a fair revenue return for the American public and taxpayers. Interior manages the protection and restoration of surface mined lands. The Department is the largest supplier and manager of water in the 17 Western States, assists others with water conservation and extending water supplies, and provides hydropower resources to power much of the 17 Western States. The Department serves as Trustee to American Indians and Alaska Natives. Interior's Office of Insular Affairs (OIA) carries out the Department's responsibilities for U.S.-affiliated Insular Areas, which include the territories of Guam, American Samoa, the U.S. Virgin Islands, the Commonwealth of the Northern Mariana Islands, and three sovereign freely associated states (FAS, which includes the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau). The Department provides scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

### Renewable Energy

The BLM is proceeding with a solar energy rulemaking process to implement competitive leasing rules for solar energy zones (SEZs). Current regulations limit the competitive process to responding to right-of-way applications. The proposed regulations would promote the use of "designated leasing areas" that include the BLM's SEZs. The rule would establish competitive processes, terms and conditions (including rental and bonding requirements) for solar and wind energy development rights-of-way both inside and outside the designated leasing areas, and provide incentives for leases in designated leasing areas.

As of April 2016, the BLM authorized over 100 wind energy testing sites, and 40 wind energy projects with 5,608 megawatts of capacity, enough to supply the power needs of nearly 2 million homes. In FY 2015, BLM's solar, wind and geothermal activities supported $1.2 billion in output and about 8,300 jobs.

Data continue to indicate a strengthening economic recovery with a stronger outlook for consumption due to income growth and stable prices.[7] Labor markets continue to strengthen.[8] The goods and services provided by the lands managed by DOI helped to support this economic recovery. These goods and services include outputs bought and sold in markets (such as oil and gas) as well as ecosystem goods and services that are not typically bought and sold in markets (such as clean water, recreation, and habitat for fish and wildlife), but which underpin many activities that do have market values. Ecosystems (and their service flows) provide a form of wealth – natural capital – that people depend on for a range of important benefits. Unlike manufactured capital, and human capital (skills), there are limited options for creating new natural capital, though degraded or damaged ecosystems can sometimes be restored. Further, manufactured capital may not be a good substitute for natural capital.

**Improving Ecosystem Services using Geomorphic Reclamation**

When restoring mined lands ("reclamation"), the approach we choose affects long-term benefits for society and the economy. Traditional reclamation approaches may further disturb the stability of the existing natural landforms. Geomorphic reclamation recreates the original surface forms surrounding a mined area, mimicking the drainage patterns of a natural landscape, and avoiding the need for on-going erosion maintenance. Steep rock lined ditches are replaced by meandering streams, and terraced hillsides are replaced by natural-looking slopes designed to convey water without excessive erosion or sediment loading. The end result is a visually appealing site in a stable hydrologic equilibrium that promotes a self-sustaining ecosystem, virtually indistinguishable from the surrounding landscapes. The geomorphic technique, originally developed in 2002 at New Mexico coal mining sites, is now used throughout the country in active and abandoned mine sites. Interior encourages geomorphic reclamation as an approach requiring less maintenance and promoting diverse and natural-looking wildlife habitat. Indiana's Minnehaha Slurry site (near the Minnehaha Fish and Wildlife Area) received a 2015 Abandoned Mine Reclamation Award for well executed geomorphic design.

[7] Annual real GDP increased 2.4 percent between 2015 and 2016. (https://www.bea.gov/newsreleases/national/gdp/2016/pdf/gdp1q16_adv.pdf). Total nonfarm payroll employment rose by 125,000 in March 2016. The annual (unadjusted) average unemployment rate was 6.2% in 2014; it was 5.3% in 2015 (http://data.bls.gov/timeseries/LNU04000000?years_option=all_years&periods_option=specific_periods&periods=Annual+Data). In March 2016, the unemployment was 5.0 percent, and the number of unemployed persons was 8.0 million. GDP, or Gross Domestic Product, is a commonly used measure of economic performance and measures the value of the goods and services produced by an economy. "Real" measures reflect quantities independent of prices, allowing comparison of measures over periods in which prices have changed. GDP represents the market value of all final goods and services produced in a country, i.e., domestic value added which can be shown to be identical to the sum of payments to labor (i.e. salaries, wages and bonuses) plus payments to capital (i.e. production and replacement of existing capital). GDP is an incomplete measure of wellbeing or economic welfare.

[8] See Bureau of Labor Statistics: http://www.bls.gov/news.release/empsit.nr0.htm

Natural resources bought and sold in markets (e.g., oil, minerals, timber, forage, fish, etc.) contribute to a wide range of intermediate and final products. In addition, people value the environment directly even where there is no market for environmental amenities. Furthermore, people may be unaware of the full benefit they receive from these resources.

A better understanding of how the services and functions of natural systems and processes help support the welfare and security of our citizens and communities will allow the Department to better execute the important and diverse work of its many missions and goals. The general concepts associated with ecosystem services are well accepted and nearly every bureau and office has begun to consider how using an ecosystem services framework could enhance their ability to analyze, display, and communicate trade-offs. The scope and magnitude of such consideration however, varies within and among bureaus and offices.

DOI, with USGS in the lead, is working to identify common measures and evaluation techniques to enable managers to apply ecosystem service concepts in a cost effective manner in natural resource management decisions. Incorporating ecosystem services into decision processes can shape how DOI bureaus and offices define problems, formulate solutions, and communicate with stakeholders. Including ecosystem service concepts help bureaus and offices more comprehensively consider the full range of benefits and costs associated with their actions, particularly those that affect the public through changes in ecosystems or natural resources. DOI recognizes that it is important to think about developing and implementing methods that are transparent, reproducible, transferable, scalable and defensible.

**Commemorating the 50th Anniversary of the National Historic Preservation Act**

October 15, 2016, marks the 50th anniversary of the passage of the National Historic Preservation Act. Upon signing the law, President Lyndon Johnson remarked:

*"We have come here this morning to give part of our country back to its people." This law "will help us to preserve for our children the heritage of this great land we call America..."*

Initially driven by concerns over urban renewal and sprawl, the National Historic Preservation Act has resulted in cultural, educational, aesthetic and economic benefits for thousands of communities across America. Each year, millions of visitors to historic sites on our public lands and on tribal lands contribute to the economic well-being of nearby communities. Visitor spending supports economic contributions, employment, and tax revenue. Tens of thousands of visitor education centers, historic buildings, museum collections exhibits, and other important sites listed on or eligible for the National Register of Historic Places maintain cherished local traditions and have become prime destinations for domestic and international visitors.

Some ecosystem services are traded in markets (e.g., commercial fisheries, timber, etc.) and valuation using market prices is relatively straightforward. But many ecosystem services are "public goods" that are not traded in markets; without market prices there is no ready measure of value for these services.[9]

[9] The ecosystem services provided by Interior-managed lands are typically provided free of charge, and people who benefit from ecosystem services may not be directly involved in determining the supply of services. There are numerous empirical studies to assess the value of outdoor recreation and numerous applications of economic

One ecosystem service of particular importance is to land managers is carbon sequestration. The social cost of carbon can help inform decisions regarding carbon sequestration. The social cost of carbon is an estimate of the economic costs associated with a small increase in carbon dioxide ($CO_2$) emissions, conventionally one metric ton, in a given year. This dollar figure also represents an estimate of the value of damages avoided for a small emissions reduction, or an action that will sequester carbon (i.e., the benefit of a $CO_2$ reduction).[10]

Basic scientific knowledge is often not sold in markets, and hence is underprovided by the private sector. Beyond helping Interior bureaus achieve their missions, scientific information (such as that produced by USGS) is an input to production processes and decisions that help promote economic growth and innovation and ensure American competitiveness in a global market. Interior's bureaus are engaged in a variety of activities designed to provide basic research, scientific and technical information, and to transfer technology to decision makers in the public and private sectors. The information produced by Interior is a critical input that helps support private markets, the production processes of private entities, and many public sector decisions.

The USGS has a number of ongoing research efforts that will assist DOI bureaus and offices by providing analytic support to implement ecosystem service analysis. These include:

- An assessment of the various existing toolkits available to value the associated ecosystem services of the San Pedro River. This research project evaluated how effective the various tools could be in evaluating associated ecosystem services under different scenarios. USGS is currently in the process of updating this research given recent changes in some of the tools available.[11]
- Leadership for the Sustaining Environmental Capital (SEC) Initiative, which seeks to develop, integrate, and enhance natural resource management decision support tools, systems and information to better enable managers to account for the benefits the public receives from ecosystem services, and to provide guidance for using ecosystem services information in management decisions. The SEC Initiative consists of three pilot studies (Chesapeake Bay, Pacific Northwest, and Delaware River) and will lay the foundation for identifying common ecosystems service methods, practices, and outputs that may support enhanced decision making. The SEC Initiative will be located online through the SEC Dashboard.

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analysis being used to assess the value of various environmental amenities (access to open space, access to water resources, and local air quality). In general, the analytic approaches used in these studies are either a revealed or stated preference approach (or in some cases a combination).

[10]The most recent estimates published by the Interagency Working Group on the Social Cost of Carbon are an average of $36 per ton of carbon emitted for emissions occurring in 2015. Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. Revised, July 2015. https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf.

[11] http://pubs.usgs.gov/sir/2012/5251/

## The FY 2015 Report

This report represents the seventh in a series of annual reports initiated by Interior in December 2009.[12] The remainder of this chapter presents an overview of the key outputs supported by Department activities. The chapter also provides a summary of Interior's economic contributions, value added, employment supported, and economic values associated with some of the outputs.

The analysis in this year's report reflects the effects of the ongoing drought in many Western States. One way to visualize the impact of the drought in California is to look at the changes in the Bureau of Reclamation's water deliveries to the Central Valley Project (CVP), California (Figure A-1). CVP irrigation deliveries decreased 85 percent over the period from 2012-2015. The reduced irrigation deliveries decreases Interior's economic impact but has not substantially impacted California's agricultural industry as a whole. The value of the agricultural output in the CVP delivery area has remained approximately constant due to greater utilization of groundwater and other surface water sources, as well as changes in cropping patterns. Deliveries for municipal and industrial (M&I) uses in the CVP area decreased 68 percent over the same period. Reduced M&I deliveries decreased Interior's economic contribution but some of these impacts may also have been mitigated via water transfers or water conservation efforts. California's Agricultural production in 2013 accounted for about 2% of California's GDP, about 13% of US agricultural GDP and about 0.3% of US GDP[13].

Drought impacts are expected to reduce estimated 2015 water year surface water delivery for agriculture by 8.7 MAF, resulting in an estimated increase in groundwater pumping of 6 MAF, and net reduction in total irrigation deliveries of about 10% of the total approximate 26 MAF irrigation use in California. Resulting impacts statewide from the 2015 drought are expected to be a loss of about 14% of total State agricultural revenues and about 21,000 jobs. As of March 2, 2016, 63 local Emergency Proclamations from city, county, tribal governments and special districts have been received by the Governor's office and the Association of California Water Agencies has identified hundreds of local water agencies, including municipalities that have implemented water conservation actions.[14] The mitigation strategies identified above are not necessarily all equally available over the long-term. If the drought continues into future years, further crop shifting, conservation efforts, water transfers and land fallowing would be anticipated.

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[12] More detailed treatments of topics from this report are available in the FY 2012 Economic Report.

[13] California Agricultural Statistics Review 2014-2015. GNP data from U.S. Bureau of Economic Analysis, "Table 3. Current-Dollar Gross Domestic Product (GDP) by State, 2014:III-2015:III," bea.gov/regional/index.htm (accessed April 5, 2016).

[14] In past years, total California irrigation deliveries have been around 26 MAF, with 18 MAF from surface water, and 8 MAF from groundwater. An 8.7 MAF drought-related reduction in surface water availability for agriculture implies a 48% reduction. However, due to increased pumping of groundwater, the total reduction in agricultural water use was 2.7 MAF, or about 10% of typical agricultural use. (https://watershed.ucdavis.edu/files/biblio/Economic_Analysis_2015_California_Drought_Executive_Summary.pdf ). The calculations in the text are derived as follows: US agriculture as a percentage of total GDP = 1.21% (http://www.bea.gov/industry/gdpbyind_data.htm, GDP by industry / VA, GO, II); CA GDP in 2013 was $2.2 trillion (http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_Misc.htm); CA as a percentage of US GDP = 2,050,693/15,526,715 = 13.2% (http://bea.gov/newsreleases/regional/gdp_state/2014/pdf/qgsp0814.pdf); CA agriculture as a percentage of CA GDP = 46,651/2,202,678 = 2.12%

This report presents information on: the physical and biological "outputs" supported by Interior activities; and on the economic value added, gross output, and employment supported by Interior:

- *Gross output* (or economic contributions) represents the value of industrial or other production.
- *Value added* nets out the cost of intermediate inputs (i.e., goods and services purchased from other industries or imported that are used as inputs to produce a good or service). This measure is the most appropriate metric when considering Interior's contributions to the Nation's GDP. Of the measures used in the report, value added most accurately captures the dollar-value of Interior-managed resources in the U.S. economy. Value added estimates are not available on a comprehensive basis for all Interior resources; this information is provided where such values are readily available.
- *Employment* represents the estimated annualized number of full and part-time jobs supported by spending related to a particular activity.

Economic contributions—whether measured by labor income, value added, or output—are an incomplete measure of "economic value."[15] Economic contributions measure how programs, expenditures, and investments translate to economic growth, employment, and income. Economic value is defined in terms of relative value, and is equal to the amount an individual or society is willing to give up in other goods and services in order to obtain a good, service, or state of the world. More specifically, the economic value of a resource is the amount that society is willing to pay for the resource (not how much they actually pay for the resource). This report focuses on economic contributions, and offers some discussion of economic values as well.

While this report relied on generally similar methodologies to estimate value added, output and employment, the results are not directly comparable to those of earlier reports due to changes in some of the underlying modeling. Additional information is provided in Appendix A.

## Overview of Outputs Produced and Economic Values

Table 1-1 summarizes the quantities of the key outputs produced by Interior in FY 2015. The table also provides information (where such information is readily available) on the unit economic values for each commodity. This report provides a range of economic values associated with each resource, and reports total production for the year. The table does not associate production with individual unit prices, so the report does not provide a total value for the annual production.

[15] *Economic contributions* do not account for any activity that might occur even without the event or policy. *Economic Impacts* are more narrowly defined as net changes to an economy that would not be seen without the event or policy. *Economic benefits* refer to total net values, which include both market and nonmarket values.

**Table 1-1. Interior-Managed Resources: Production Quantities and Values, FY 2008-FY 2015**

| Commodity [a] | | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 |
|---|---|---|---|---|---|---|---|---|---|
| **Recreation** [b] | *Visits to Interior sites (millions)* | n/a | 415 | 439 | 434 | 417 | 407 | 423 | 443 |
| | *Economic value per visit (2015-$)* | | | | $37 to $64 | | | | |
| **Crude Oil** [c] | *Federal production (millions of barrels)* | 581 | 651 | 724 | 658 | 632 | 671 | 723 | 782 |
| | *WTI - Average price per bbl (2015-$)* | $118.51 | $74.19 | $92.14 | $103.35 | $98.34 | $102.40 | $99.42 | $48.66 |
| **Natural Gas** [d] | *Federal production (trillions of cubic feet)* | 6.8 | 6.7 | 6.6 | 6.1 | 5.7 | 5.2 | 5.1 | 4.9 |
| | *Average wellhead price per thousand cubic feet (2015-$)* | $9.48 | $4.40 | $5.20 | $4.30 | $2.78 | $3.72 | $4.42 | $3.05 |
| **Coal** [e] | *Federal production (millions of tons)* | 471 | 509 | 488 | 478 | 470 | 461 | 420 | 421 |
| | *Average price per short ton subbituminous coal (2015-$)* | $12.64 | $13.62 | $13.99 | $14.88 | $9.43 | $10.91 | $11.83 | $10.19 |
| **Hardrock Minerals – Gold** [f] | *Estimated gold production on Federal lands (2008-2011) and Federal lands in NV (2012-2015) (kg)* | 100,190 | 95,890 | 99,330 | 100,620 | 76,223 | 76,223 | 77,738 | 74,661 |
| | *Average gold price per ounce (calendar year)* | $901 | $1,001 | $1,201 | $1,602 | $1,702 | $1,402 | $1,272 | $1,170 |
| **Forage** [g] | *BLM, AUMs permitted (millions)* | 8.6 | 8.6 | 8.7 | 9.1 | 8.9 | 8.5 | 8.3 | 8.3 |
| | *Price per animal unit month (2015-$)* | | | $1.35 to $20.20 | | | | | |
| **Timber** [h] | *BLM commercial sawtimber harvested (thousand board-feet, mbf)* | 162,902 | 190,504 | 183,558 | 218,467 | 208,943 | 236,889 | 252,689 | 271,501 |
| | *BIA harvested timber (mbf)* | 530,972 | 426,250 | 396,532 | 359,697 | 333,209 | 336,320 | 261,089 | 344,787 |
| | *Total for BLM and BIA (mbf)* | 693,874 | 616,754 | 580,090 | 578,164 | 542,152 | 573,209 | 513,778 | 616,288 |
| | *Average Western OR BLM received price per mbf (2015-$)* | $196.08 | $169.46 | $100.62 | $97.58 | $ 123.17 | $ 128.50 | $154.34 | $188.86 |

(Table continues)

| Commodity [a] | | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 | FY 2014 | FY 2015 |
|---|---|---|---|---|---|---|---|---|---|
| **Electricity Generation** | | | | | | | | | |
| **Hydroelectric** | *Net generation (million MWh)* | 40.8 | 39.5 | 35.8 | 48.6 | 47.5 | 39.8 | 38.0 | 36.1 |
| **Geothermal** [i] | *New approved capacity (MW)* | 0 | 67.5 | 30 | 312 | 70 | 110 | 0 | 0 |
| **Wind** [i] | *New approved capacity (MW)* | 110 | 4 | 150 | 654 | 1815 | 826 | 0 | 0 |
| **Solar** [i] | *New approved capacity (MW)* | 0 | 0 | 2,744 | 1,975 | 489 | 1,000 | 768 | 492 |
| | *Average electricity spot price per MWh* [j] | | | | | | | | |
| | *Mid-Columbia (Northwest)* | $65.08 | $35.70 | $35.94 | $29.13 | $22.25 | $31.97 | $38.59 | $26.00 |
| | *SP-15 (California)* | $79.45 | $38.36 | $40.26 | $36.91 | $34.61 | $42.48 | $51.95 | $36.00 |
| **Water** **Irrigation, and Municipal & Industrial** | *Million acre-feet delivered (estimated)* [k] | n/a | n/a | n/a | n/a | 26.7 | 27.3 | 24.4 | 24.9 |
| | *$ per acre-foot* [l] | | | $0 to $4,500 | | | | | |
| **Ecosystem Services** | Ecosystem services are measured in many different metrics; information on annual flows of these services is not readily available. Because most ecosystem services are not bought and sold in markets, prices are not readily available. | | | | | | | | |
| **Data and Information** | Interior collects and provides public information ranging from satellite data to species counts. This information is a critical input that helps support private markets, the production processes of private entities, and many public sector decisions. Some of the benefits of this information are relatively well quantified, but not all of Interior's major information investments are in fields with mature standardized methods to analyze these benefits. | | | | | | | | |

(Table continues)

| **Notes to Table 1-1** |
|---|
| [a] Unit values are FY 2015 market values or estimated economic value, depending on the commodity. |
| [b] Currently available datasets do not track visitors' activities. Low end estimate is the mean study value for "general recreation"; high end estimate is for "wildlife viewing." This range also includes activities such as sightseeing, camping, picnicking and visiting beaches. Source: John Loomis (2005) "Updated Outdoor Recreation Use Values on National Forests and Other Lands," updated to 2015-$ using consumer price index. |
| [c] Production is based on ONRR production volumes. Includes production on tribal land. Crude oil prices are West Texas Intermediate (WTI) per-barrel spot prices from EIA.gov. WTI is a benchmark price used for indexing crude oil. |
| [d] Production is based on ONRR production volumes. Includes production on Tribal land. Natural gas prices are U.S. wellhead price per mcf from EIA.gov. |
| [e] 2008-2011 coal prices from EIA.gov: http://www.eia.gov/totalenergy/data/annual/pdf/sec7_21.pdf, updated to 2015-$ using the CPI-U; 2015 price data are from ONRR Monthly Market Analysis reports |
| [f] Gold figures for 2008-2011 are estimates of gold production from the Federal estate. Production for 2012-2015 represents production from Federal estate in Nevada based on data from the State of Nevada. |
| [g] The low-end value is the Federal grazing fee; the high-end value is the 11 Western State average rental price for private forage in 2015, as reported by the USDA, National Agriculture Statistics Service. For FY2015, BIA permitted an estimated 2.15 Million AUMs. Historic BIA grazing data are not available. |
| [h] Source: BLM Data. Data include sawtimber harvested for commercial use. Additional sawtimber is harvested from BLM managed lands under the Stewardship Program and Special Forest Products Program. These volumes represent a relatively small proportion of the volume and are not shown in this table. Other wood-based timber products not included in these volumes include biomass, posts, poles, fuelwood, and "other." |
| [i] Source: BLM data. Generation information is not available for these resources. The data represents approved capacity. In FY 2015 there was no new capacity approved. |
| [j] Prices are annual average on-peak. Source: EIA – Electric Market National Overview, Regional Spot Prices. |
| [k] Does not include deliveries for facilities where water users, rather than the Bureau of Reclamation, have operating and maintenance responsibilities. Irrigation-water deliveries make up about 90 percent of total deliveries; M&I deliveries make up about 10 percent. Some Reclamation-supplied water is also delivered for other uses, such as supplying National Wildlife Refuges or supporting instream flows. |
| [l] Values depending on region, end-use, and other circumstances; the high end of the range would be relatively rare. |

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# Chapter 2 Value Added, Output, and Employment Estimates

## Introduction

Table 2-1 presents information on Interior's economic contributions, value added, and employment by activity for FY 2015. Table 2-2 presents contributions by bureau. Economic contributions are a measure of the cumulative effects of spending as it cycles through the economy.[16] Value added is the contribution of an activity to overall Gross Domestic Product (GDP) and equals the difference between an industry's gross output (e.g., sales or receipts and other operating income, commodity taxes, and inventory change) and the cost of its intermediate inputs (including energy, raw materials, semi-finished goods, and services that are purchased from all sources).[17] Employment represents jobs supported in the National economy, above and beyond Interior employees. These economic measures should not be confused with, and do not represent, measures of economic benefits or net economic effects resulting from Interior's implemented activities or policies. The distinction between economic contributions or impacts and economic

### Concepts: Economic Contributions and Benefits

The results of an economic contributions analysis should not be equated to an analysis that measures net economic benefits. Net economic benefits are a measure of the extent to which society is better (or worse) off because of a given policy, program or event. Net economic benefits can include measures of market values and non-market values.

Economic contributions analysis estimates the total output, value added, and jobs supported by a flow of expenditures through the economy. Conversely, an analysis of net economic benefits relies on market-based valuation methods as well as non-market valuation methods to derive monetary estimates of benefits and costs to determine the net economic benefits to society.

There are two elements in the value of any commodity: the market price, and any additional "nonmarket" benefits that aren't reflected in the price. For example, ecosystem services may not be fully reflected in area land prices.

Surveys often show that people are willing to pay more for recreation than they actually spend. Economists call this additional value consumer surplus or net economic value.

[16] For additional information on economic contribution and economic impact analysis, see: Watson, P., J. Wilson, D. Thilmany, and S. Winter. 2007. Determining Economic Contributions and Impacts: What is the difference and why do we care? *The Journal of Regional Analysis and Policy*, 37(2): 140-146.

[17] The components of value added consist of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus. GDP measures the value of the goods and services produced by the U.S. economy in a given time period. The output approach to economic contributions totals up the sale prices at every step of the chain, in effect double-counting the contributions of intermediate goods. The value added approach focuses on the change in sale price at each step, avoiding this double-counting. The measure of output does not account for external costs and benefits not reflected in market prices. The implication of not including these costs is that statistics on gross sales or output may over or understate the actual contribution a given activity or sector makes to the economy. Value added is a more appropriate concept when considering Interior's contributions to the Nation's GDP, though GDP does not fully capture changes in economic welfare. Where possible, this report addresses the economic value of Interior's resources and programs, but the focus of the report remains the economic impacts or contributions of the Department of the Interior.

benefits as well as the limitations associated with an economic contribution analysis are discussed in the FY 2012 Economic Report.[18] Economic welfare costs also are not fully measured by changes in GDP. GDP fails to capture nonmarket values, such as environmental improvement or environmental damages. These can be important components of total economic welfare. GDP can sometimes be misleading: for example, the expenditures incurred in cleaning up an oil spill would increase GDP, however, there is a general recognition that oil spills have substantial negative effects, including economic effects that may or may not be quantified; GDP measures frequently do not capture many of these effects and thus may provide little information about the net economic costs incurred by individuals and society overall.[19]

The Department's economic contributions are a by-product of the Department carrying out its unique mission, which is primarily to manage Federal lands and waters and make investments that conserve and restore natural landscapes and cultural heritages of the Nation. In many cases, increasing goods and services and associated supporting jobs each year ultimately lies with the private sector. Making wise public investments such as investing in landscapes through reclamation and restoration and providing environmental stewardship enables the private sector to sustainably create far more jobs and economic output than would otherwise be possible for generations to come.

Figure 2-1 and Figure 2-2 illustrate the distinction between economic impacts and economic value using a habitat restoration project as an example.

[18] One of the important limitations is that contribution analysis is a static approach and does not incorporate potential price changes over time or other shifts in labor or capital resources as a result of changes in the scale or scope of economic activities. A different type of modeling approach (computable general equilibrium models) would be necessary to incorporate price changes and other economy wide resource shifts. The FY 2012 report can be found at: http://www.doi.gov/ppa/economic_analysis/upload/FY2012-DOI-Econ-Report-Final-2013-09-25.pdf.
[19] In the Department's economic report for FY 2011, Chapter 7 discussed externalities associated with Interior's activities. This chapter is available on the Department's website at http://www.doi.gov/ppa/upload/Chapter-7.pdf.

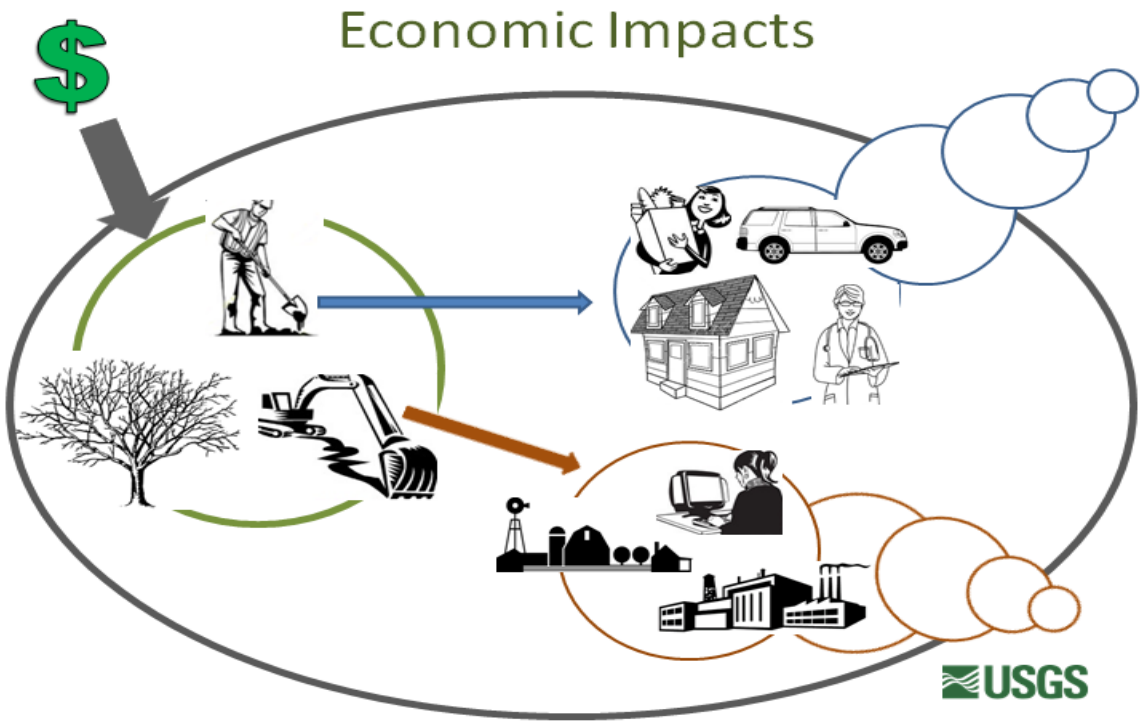


**Figure 2-1. Economic Impacts**

Figure 2-1 illustrates the economic impacts associated with a habitat restoration project. The spending associated with the restoration activities generates successive rounds of spending that ripple through households and businesses. A restoration project (shown on the left side of the figure) involves hiring workers and machinery. The total spent on these and other project costs are the **direct** contributions. Workers spend their salary on things like housing, transportation, healthcare, and food. The stimulus from this worker spending is the **indirect** contribution. The **induced** contributions are the stimulus provided by the project ordering machinery: manufacturers increase their use of labor and material inputs in response to these market signals.

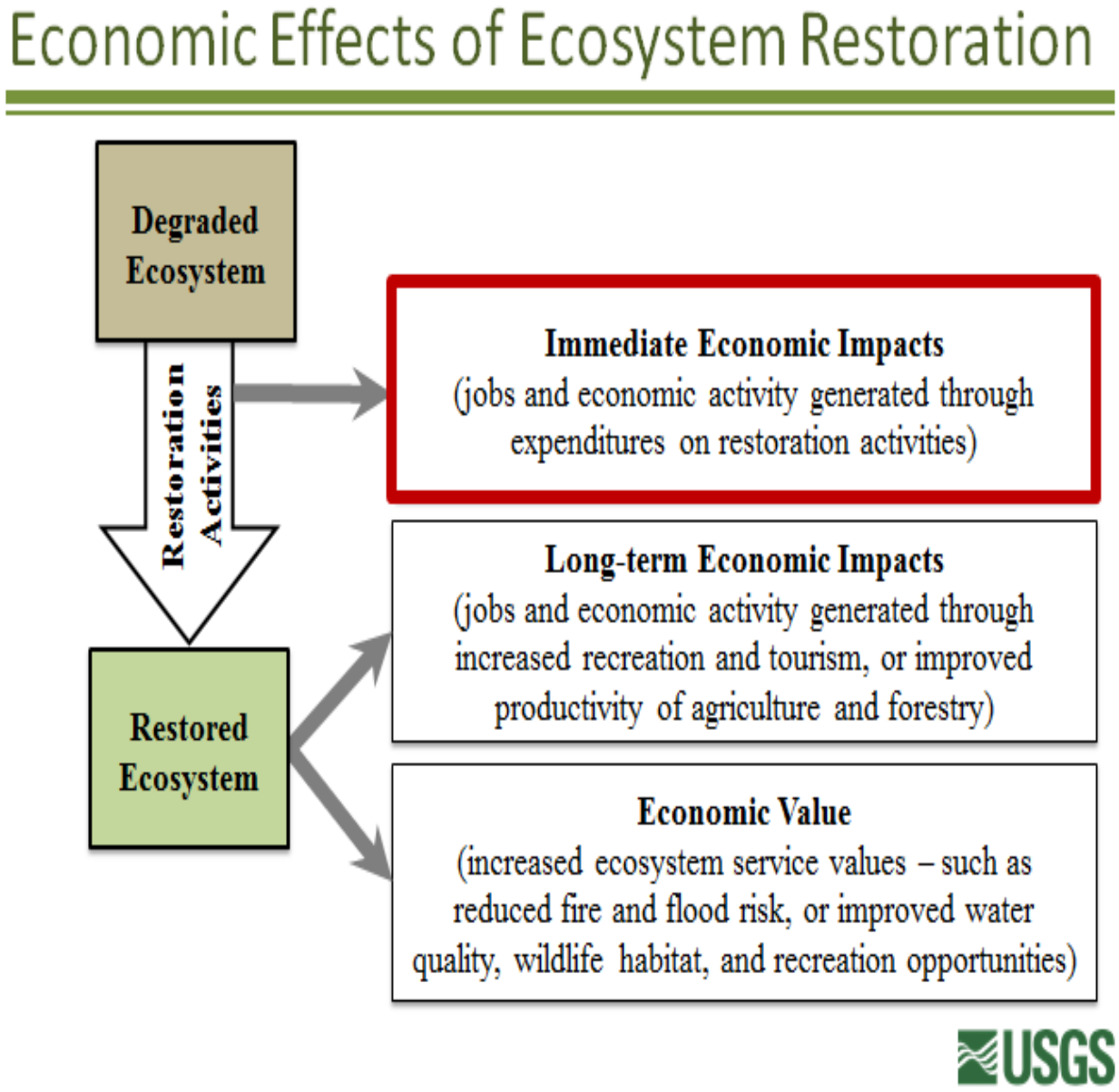


**Figure 2-2. Economic Effects of Ecosystem Restoration**

Figure 2-2 illustrates the longer-term economic values associated with the restoration activities and these values are distinct from the immediate economic impacts.

## Concept: Value Added

| | Standing Trees | Timber | Lumber | Framing | Finished House |
|---|---|---|---|---|---|
| Sale Price | $10 | $100 | $1,000 | $10,000 | $100,000 |
| Input Price | $0 | $10 | $100 | $1,000 | $10,000 |
| Value Added | $10 | $90 | $900 | $9,000 | $90,000 |

The graphic provides a stylized example to illustrate the concept of value added. Trees on a timber lease may ultimately end up as part of a newly constructed house, though there are several supply-chain steps in between. The output approach to economic contributions totals up the sale prices at every step of the chain, in effect double-counting the contributions of intermediate goods. The value added approach focuses on the change in sale price at each step, avoiding this double-counting.

The measure of output does not account for external costs and benefits not reflected in market prices.[20] The implication of not including these costs is that statistics on gross sales or output may over- or understate the actual contribution a given activity or sector makes to the economy. *Value added* is a more appropriate concept when considering Interior's contributions to the nation's GDP, though GDP does not fully capture changes in economic welfare.[21] Where possible, this report addresses the economic value of Interior's resources and programs, but the focus of the report remains the economic impacts or contributions of the Department of the Interior.

[20] In the Department's economic report for FY 2011, Chapter 7 discussed externalities associated with Interior's activities. This chapter is available on the Department's website at http://www.doi.gov/ppa/upload/Chapter-7.pdf

[21] Economic welfare costs also are not fully measured by changes in GDP. GDP fails to capture nonmarket values, such as environmental improvement or environmental damages. These can be important components of total economic welfare. GDP also can sometimes be misleading: for example, cleanup costs from an oil spill would increase GDP, however, this provides little information about the total economic costs incurred by individuals and society overall.

## Value Added and Economic Contributions

DOI's FY 2015 value added and output are estimated to be $167 billion and $296 billion, respectively. The value added and economic contributions are estimated to have supported 1.8 million jobs in FY 2015. The value of all commodities and other inputs to production associated with Interior's activities decreased over the past year by about 15 percent in nominal terms, from $159 billion in FY 2014 to $135 billion in FY 2015. Much of this change reflects the fall in oil prices from a 2014 average near $100 per barrel, to below $50 per barrel in 2015. Changes in value for individual inputs vary significantly across commodities due to changes in commodity prices and production levels. This was clearly the case for oil and gas production in FY 2015. Detailed estimates of value added, economic contributions, and employment estimates are presented in Table 2-1. Some highlights for value added, economic contributions, and employment are presented below.

### National Park Service Socio-economic Monitoring Program

The NPS Social Science Program is in the process of establishing a socioeconomic monitoring program (SEM). This effort will allow for a variety of indicator variables to be tracked over time across the NPS. These results will be reported at park, regional and national levels and provide visitor information currently not available. Approaches for establishing the SEM are under development and expected to be in place to generate information by early 2017.

**Recreation:** An estimated 443 million visits to DOI lands contributed about $26 billion in value added, $46 billion in output, and supported 396,000 jobs.

**Renewable energy:** Activities related to geothermal, wind, and solar energy rights-of-way grants for renewable energy facilities on BLM lands contributed an estimated $1.2 billion in output, and supported about 8,300 jobs. Hydropower contributed about $1.4 billion in value added, $2.2 billion in output, and supported about 6,700 jobs.

New renewable energy generating capacity can reduce the amount of energy generated with conventional fuels. This offers two major sources of cost savings: (1) reduced operating and fuel costs; and (2) reduced greenhouse-gas and particulate emissions. The average wholesale market value is about $40 to $50 per MWh for the marginal generation that an additional unit of renewable energy would displace. Emissions costs can be estimated based on health effects, and by applying estimates of the social cost of carbon.

**Energy from Fossil Fuels:** Activities related to oil, gas, and coal contributed an estimated $94 billion in value added, $166 billion in economic output, and supported 780,000 jobs. Average oil and natural gas prices are down significantly from last year and are reflected in the decreased economic contributions.

**Non-fuel minerals:** Activities related to BLM-managed locatable minerals in Nevada and hardrock leasables in Missouri contributed an estimated $4.2 billion to value added, $8.5 billion in output, and supported about 28,000 jobs. In addition, activities related to salable and other leasable minerals

authorized by the BLM contributed $2.5 billion to value added, $4.9 billion in output, and supported about 19,000 jobs.

**Timber:** Activities related to timber contributed an estimated $0.4 billion in value added, $1.1 billion in output, and supported about 4,600 jobs.

**Forage:** Activities related to forage and grazing on public and Indian land contributed an estimated $2.3 billion in output, and supported about 40,000 jobs. This increase from FY 2014 ($1.4 billion in output and 17,000 jobs) is partially due to an updated methodology from BLM that better reflects employment around grazing activities[22].

**Water:** Interior's irrigation (Reclamation and BIA) and M&I water activities are associated with $27 billion in value added; about $48 billion in economic output; and supported an estimated 361,000 jobs. Activities associated with irrigation alone (both Reclamation and BIA) contributed an estimated $22.3 billion in value added, $40 billion in output, and supported 325,000 jobs. Activities associated with municipal and industrial water contributed about $5 billion in value added, $8 billion in output, and supported 36,000 jobs.

**Grants and payments:** Activities related to major grants and payments contributed an estimated $6.8 billion in value added, $9.4 billion in output, and supported about 90,000 jobs. Indian Affair's support for tribal governments contributed about $0.8 billion in value added, $1.2 billion in output, and supported about 8,800 jobs.[23]

**Insular Affairs:** Interior's activities related to Insular Affairs contributed about $0.9 billion in value added (equivalent to a share of GDP ranging from 2 percent for Guam to 81 percent for Micronesia); and supported about 25,600 jobs.

**Science:** The Department's bureaus have varying levels of involvement with scientific and technical

## Science and Decision Making

The Science and Decisions Center, a small multidisciplinary USGS center, works to increase the use and value of scientific information in decision making through research and applications in five science areas: ecosystem services, decision science, resilience, participatory science, and natural resource economics. Its work in natural resource economics includes valuing ecosystem services and natural resources; valuing the use of scientific information in decision making; multi-resource analyses evaluating benefits and costs for alternative decisions and scenarios; and studies on environmental markets concepts and use. SDC currently is assessing ecosystem services values in the Great Dismal Swamp National Wildlife, Ding Darling National Wildlife Refuge, and in the California Rangelands. SDC is conducting multi-resource analysis proofs-of-concept in the Powder River Basin (WY) and in the Piceance Basin (CO). Work on environmental markets includes assessments of policy, economic, and ecological impacts of biodiversity and habitat markets.

[22] A detailed explanation of BLM's methodology can be found in the Appendix.
[23] It is possible that grants and payments support some of the economic activity reported for other sectors throughout this report. We have not attempted to correct for this source of potential double-counting.

research and innovation, and technology transfer. The economic value associated with these activities is difficult to measure. The FY 2015 enacted budget for the Department of the Interior included $863 million for research and development. Much of the funding was for applied research ($685 million), while basic research and development received $53 million and $89 million, respectively.[24] The U.S. Geological Survey is the largest research and development organization within the Department, both in terms of budget and personnel, and typically accounts for about 80 percent of the Department's R&D budget. The programs supported through these funds greatly advance knowledge and technology, which helps the Department meet its mission objectives. The economic values associated with the production and dissemination of scientific information are only partly incorporated in the market prices of traded goods and services.

The Department's scientific, technical and engineering personnel are engaged in a broad range of cooperative activities to develop and disseminate innovative technologies, including: [25]

- Publishing over 8,900 reports, books, papers, fact sheets, and other publications.
- Collaborating on 826 Cooperative Research and Development Agreements, of which 586 were new in FY 2015. In addition, the Department was engaged in at least 318 other collaborative R&D relationships.
- Disclosure of seven new inventions. In addition, eight patents were filed and three patents were received.
- Managing 20 licenses for inventions and other intellectual property earning over $105,000.

**Sustainable Stewardship**: Sustainable stewardship of natural resources requires strong investments in research and development in science and engineering to inform decision-making. The Department supports cutting edge research in geology, hydrology, biology, and many other fields of science and engineering, informing resource management and community protection at Interior and across the world.

**Youth:** The Department of the Interior works to expand job opportunities, engagement and education for youth on our public lands and to facilitate partnerships and volunteer programs that leverage resources for accomplishing the Department's mission. In FY 2015, Interior's youth programs and partnerships provided 36,388 employment opportunities for people between the ages of 15 and 35 interested in working with Interior and organization partners. This was an increase of about 120% over FY 2014 employment (16,644 jobs). In FY 2015, 23,858 youth were employed by DOI and 12,530 were employed by partners; 14,541 (40%) of these jobs were with the National Park Service (NPS) and their partners. These programs and partnerships enable participating youth to gain valuable work experience to strengthen their skills and knowledge base. Interior bureaus benefit by attracting and retaining qualified employees, especially as youth hires can convert to permanent positions, be promoted to a new position, or receive new job assignments.

[24] https://www.whitehouse.gov/sites/default/files/omb/budget/fy2017/assets/ap_19_research.pdf.
[25] Additional information on technology transfer can be found in the Department of the Interior Annual Report on Technology Transfer FY 2015 Activities. January 2016, www.doi.gov/sites/doi.gov/files/DOI-2015-Tech-Transfer-Annual-Report.pdf

**Table 2-1. Estimated Economic Contributions Resulting from Interior's Activities**

| Category | Direct Economic Contribution (billions, 2015-$) | Total Economic Contributions: Direct + Indirect + Induced[1] (billions, 2015-$) | Value Added (billions, 2015-$) | Total Domestic Jobs Supported |
|---|---|---|---|---|
| DOI Payroll | | | | |
| ~72,000 employees in 2015 | 4.84 | 6.54 | 3.61 | 40,990 |
| Grants & Payments to non-Federal Entities[2] | 4.68 | 9.40 | 6.82 | 89,546 |
| Support for Tribal Governments | 0.52 | 1.17 | 0.78 | 8,830 |
| **Public Resources as Inputs to Production** | | | | |
| Recreation and Tourism | 23.21 | 45.49 | 25.64 | 396,188 |
| Energy | | | | |
| Oil, gas and coal | 74.42 | 165.55 | 94.34 | 776,773 |
| Hydropower | 1.19 | 2.16 | 1.40 | 6,721 |
| Wind Power | 0.01 | 0.05 | n/a | 255 |
| Geothermal | 0.07 | 0.20 | 0.00 | 948 |
| Solar | 0.29 | 0.99 | n/a | 7,076 |
| Locatable Minerals and Hardrock Leasables[3] | 3.57 | 8.48 | 4.20 | 28,413 |
| Salable and Other Leasable minerals | 2.05 | 4.86 | 2.54 | 18,501 |
| Other Production | | | | |
| Irrigation water | 16.46 | 39.85 | 22.33 | 325,392 |
| M&I water | 3.92 | 8.03 | 4.99 | 35,890 |
| Grazing | 0.97 | 2.29 | n/a | 39,601 |
| Timber | 0.39 | 1.051 | 0.37 | 4,630 |
| **Total** | **136.59** | **296.10** | **167.01** | **1,779,754** |

[1] The direct effect is the known or predicted change in the local economy that is to be studied. The indirect effect is the business to business transactions required to satisfy the direct effect. Finally, the induced effect is derived from local spending on goods and services by people working to satisfy the direct and indirect effects.

[2] This category excludes payments via U.S. Treasury.

[3] Contribution estimates are based on production from Federal lands in Nevada (for locatable minerals) and Eastern States (for leasable hardrock minerals primarily in Missouri) only. In addition to Nevada, locatable mineral production from Federal lands exists in many Western States. With the exception of Nevada, information on production by ownership (private, State, or Federal) was not available.

Note: Totals may not add due to rounding. The value added and economic contribution estimates do not capture output or employment effects beyond payroll spending and natural resource production. Bureaus are engaged in various other activities funded by appropriations, e.g., land acquisition, ecosystem restoration, BLM's mine land reclamation, construction, road building, education, etc.

**Table 2-2. Summary of FY 2015 Economic Contributions by Bureau**

| Production Inputs (DOI Activity) | FY 2015 | | | |
|---|---|---|---|---|
| **Bureau** | **Direct Economic Contribution[26]** (billions, 2015-$) | **Total Economic Contribution** (billions, 2015-$) | **Total Value Added** (billions, 2015-$) | **Total Domestic Jobs Supported** |
| **National Park Service** | | | | |
| Recreation[1] | 16.89 | 32.04 | 18.36 | 295,339 |
| **Fish and Wildlife Service** | | | | |
| Recreation | 2.10 | 4.72 | 2.58 | 35,684 |
| **Bureau of Indian Affairs[2]** | | | | |
| Oil, gas and coal | 4.33 | 14.65 | 9.38 | 51,695 |
| Irrigation water | 2.50 | 7.41 | 3.03 | 45,212 |
| Grazing | 0.02 | 0.06 | | 718.45 |
| Timber | 0.04 | 0.27 | 0.09 | 1,182 |
| Other minerals[3] | 0.00 | 0.01 | 0.00 | 20.29 |
| *BIA Subtotal* | 6.91 | 22.39 | 12.51 | 98,828 |
| **Bureau of Land Management** | | | | |
| Oil, gas and coal | 29.50 | 64.50 | 36.64 | 232,983 |
| Geothermal | 0.07 | 0.20 | - | 948 |
| Locatable Minerals and Hardrock Leasable Minerals | 3.57 | 8.48 | 4.20 | 28,413 |
| Salable and Other Leasable Minerals | 2.05 | 4.85 | 2.54 | 18,481 |
| Grazing | 0.95 | 2.23 | | 38,883 |
| Timber | 0.35 | 0.78 | 0.27 | 3,448 |
| Recreation | 2.97 | 5.93 | 3.17 | 43,932 |
| Wind | 0.01 | 0.05 | - | 255 |
| Solar | 0.29 | 0.99 | - | 7,076 |

[26] In some cases the direct economic contribution equals a sales value.

| Production Inputs (DOI Activity) | FY 2015 | | | |
|---|---|---|---|---|
| **Bureau** | **Direct Economic Contribution[26]** (billions, 2015-$) | **Total Economic Contribution** (billions, 2015-$) | **Total Value Added** (billions, 2015-$) | **Total Domestic Jobs Supported** |
| *BLM Subtotal* | 39.74 | 88.02 | 46.82 | 374,419 |
| (Table continues) | | | | |
| **Bureau of Reclamation** | | | | |
| Hydropower | 1.19 | 2.16 | 1.40 | 6,721 |
| Irrigation water | 13.96 | 32.44 | 19.30 | 280,180 |
| M&I water | 3.92 | 8.03 | 4.99 | 35,890 |
| Recreation | 1.25 | 2.81 | 1.53 | 21,233 |
| *BOR Subtotal* | 20.32 | 45.43 | 27.22 | 344,024 |
| **Bureau of Ocean Energy Management/ Bureau of Safety and Environmental Enforcement** | 40.59 | 86.40 | 48.31 | 492,094 |
| ***Subtotal: All Bureau Production Contributions*** | 126.55 | 278.99 | 155.80 | 1,640,388 |

| DOI Budgetary Items | FY 2015 | | | |
|---|---|---|---|---|
| | **Amount** (billions, 2015-$) | **Total Economic Contribution** (billions, 2015-$) | **Total Value Added** (billions, 2015-$) | **Total Domestic Jobs Supported** |
| **Payroll** | | | | |
| National Park Service | 1.37 | 1.85 | 1.02 | 11,576 |
| Fish and Wildlife Service | 0.66 | 0.89 | 0.49 | 5,584 |
| Bureau of Land Management | 0.68 | 0.93 | 0.51 | 5,804 |
| Bureau of Reclamation | 0.40 | 0.54 | 0.30 | 3,367 |
| Bureau of Safety and Environmental Enforcement | 0.07 | 0.10 | 0.06 | 628 |

| DOI Budgetary Items | FY 2015 | | | |
|---|---|---|---|---|
| | **Amount** (billions, 2015-$) | **Total Economic Contribution** (billions, 2015-$) | **Total Value Added** (billions, 2015-$) | **Total Domestic Jobs Supported** |
| (Table continues) | | | | |
| Bureau of Ocean Energy Management | 0.06 | 0.08 | 0.04 | 479 |
| Indian Affairs | 0.47 | 0.64 | 0.35 | 4,019 |
| US Geological Survey | 0.66 | 0.90 | 0.50 | 5,628 |
| Office of Surface Mining Reclamation and Enforcement | 0.04 | 0.05 | 0.03 | 320 |
| Office of Insular Affairs | 0.01 | 0.002 | 0.001 | 11.11 |
| Other Interior Offices | 0.42 | 0.57 | 0.31 | 3,575 |
| ***Subtotal DOI Payroll (~72,000 employees in 2015)*** | 4.84 | 6.54 | 3.61 | 40,990 |
| **Grants, Payments, and Tribal Support** | | | | |
| Grants and Payments to non-Federal Entities[4] | 4.68 | 9.40 | 6.82 | 89,546 |
| Support for Tribal Governments | 0.52 | 1.17 | 0.78 | 8,830 |
| ***Subtotal Grants, Payments and Tribal Support*** | 5.20 | 10.57 | 7.60 | 98,376 |
| **Total DOI Production and Budget** | 134.52 | 296.10 | 167.01 | 1,779,754 |

[1] Recreation sales value and economic contribution estimates include values from U.S. territories.

[2] Does not include sales of renewable energy on tribal land.

[3] Source: BIA data. Due to data limitations, values may not match those reported by ONRR.

[4] Excludes payments via U.S. Treasury.

# Chapter 3 State-Level Estimates

This chapter presents the results of the analysis on a State-by-State basis for value added, output, and employment. Table 3-1, Table 3-2, and Table 3-3 present State-by-State estimates of value added, economic output, and employment.

Figure 3-1 shows the ten States that contribute the largest estimated value added. The components that contribute to this value added include energy production; grants and payments; recreation; and timber and forage production. The State with the largest value added is Texas (about $20 billion in FY 2015), followed by Wyoming (about $12 billion in FY 2015). Most of this value added is related to Federal lands that support onshore or offshore oil and gas production.

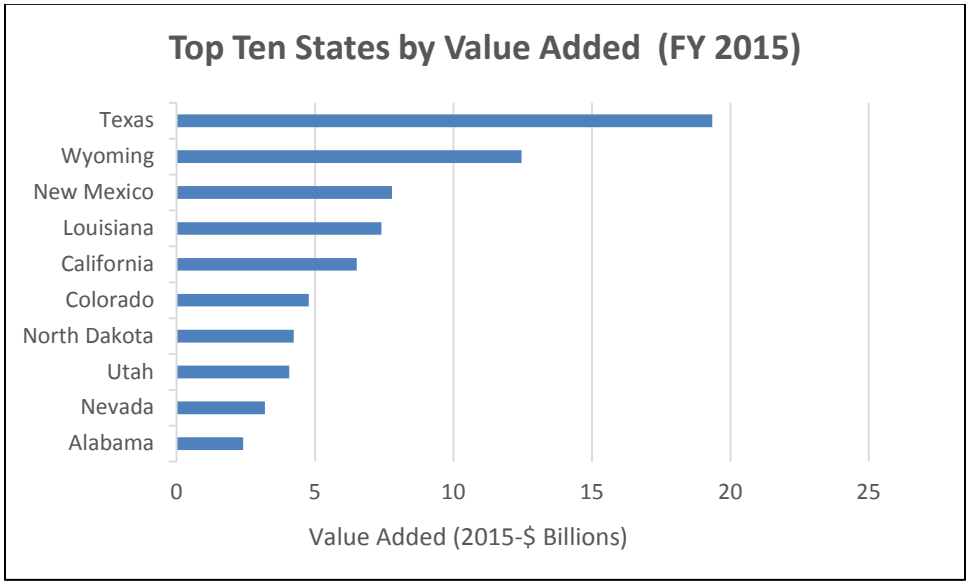


**Figure 3-1. Top Ten States for Value Added in All Sectors (FY 2015, $ billions)**

Figure 3-2 shows the top ten States for value added associated with recreation on DOI lands. . The State with the largest recreation value added is California (almost $2.5 billion in FY 2015), followed by Alaska (about $1.3 billion in FY 2015).

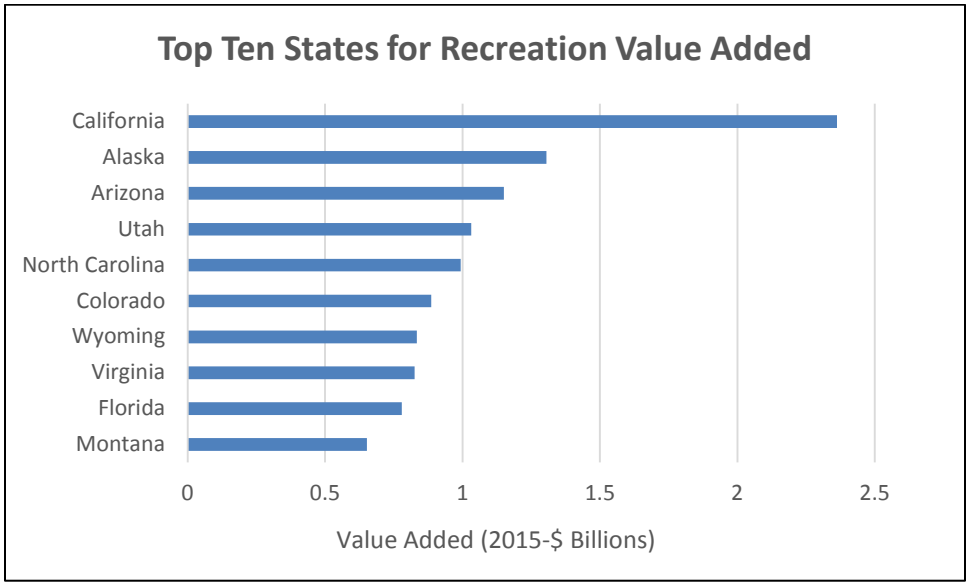


**Figure 3-2. Top Ten States for Value Added in the Recreation Sector (FY 2015, $ billions)**

**Table 3-1. Estimated Value Added Supported by Interior Activities, by Sector and State (FY 2015, $ billions)**

| State | Recreation Value Added[1,2] | Energy & Minerals Value Added[2,3] | Grazing & Timber Value Added[2,4] | Major Grants & Payments Value Added[5] | DOI Payroll Value Added[6] | All Sectors Value Added[7] |
|---|---|---|---|---|---|---|
| Alabama | 0.05 | 2.31 | 0.00 | 0.04 | 0.00 | 2.40 |
| Alaska | 1.31 | 0.63 | 0.00 | 0.10 | 0.06 | 2.10 |
| Arizona | 1.15 | 0.31 | 0.00 | 0.07 | 0.13 | 1.66 |
| Arkansas | 0.13 | 0.18 | 0.00 | 0.03 | 0.01 | 0.36 |
| California | 2.36 | 3.66 | 0.00 | 0.24 | 0.24 | 6.51 |
| Colorado | 0.89 | 3.39 | 0.01 | 0.21 | 0.28 | 4.78 |
| Connecticut | 0.00 | 0.15 | 0.00 | 0.01 | 0.00 | 0.17 |
| Delaware | 0.00 | 0.04 | 0.00 | 0.01 | 0.00 | 0.05 |
| District of Columbia | 0.57 | 0.00 | 0.00 | 0.00 | 0.05 | 0.62 |
| Florida | 0.78 | 1.24 | 0.00 | 0.05 | 0.04 | 2.10 |
| Georgia | 0.33 | 0.62 | 0.00 | 0.03 | 0.03 | 1.01 |
| Hawaii | 0.35 | 0.20 | 0.00 | 0.01 | 0.01 | 0.57 |
| Idaho | 0.22 | 0.20 | 0.00 | 0.05 | 0.06 | 0.53 |
| Illinois | 0.04 | 0.60 | 0.00 | 0.05 | 0.01 | 0.71 |
| Indiana | 0.06 | 0.27 | 0.00 | 0.03 | 0.01 | 0.37 |
| Iowa | 0.04 | 0.12 | 0.00 | 0.02 | 0.00 | 0.19 |
| Kansas | 0.03 | 0.29 | 0.00 | 0.02 | 0.01 | 0.35 |
| Kentucky | 0.08 | 0.27 | 0.00 | 0.05 | 0.01 | 0.41 |
| Louisiana | 0.05 | 7.27 | 0.00 | 0.04 | 0.03 | 7.40 |
| Maine | 0.22 | 0.05 | 0.01 | 0.02 | 0.01 | 0.30 |
| Maryland | 0.19 | 0.72 | 0.00 | 0.02 | 0.02 | 0.95 |
| Massachusetts | 0.41 | 0.28 | 0.00 | 0.02 | 0.04 | 0.75 |
| Michigan | 0.17 | 0.37 | 0.00 | 0.05 | 0.02 | 0.60 |
| Minnesota | 0.08 | 0.24 | 0.01 | 0.05 | 0.03 | 0.41 |
| Mississippi | 0.12 | 1.79 | 0.00 | 0.02 | 0.01 | 1.94 |
| Missouri | 0.20 | 0.29 | 0.00 | 0.04 | 0.02 | 0.55 |
| Montana | 0.65 | 0.49 | 0.00 | 0.10 | 0.05 | 1.30 |
| Nebraska | 0.03 | 0.10 | 0.00 | 0.02 | 0.01 | 0.16 |
| Nevada | 0.49 | 2.59 | 0.00 | 0.05 | 0.05 | 3.19 |
| New Hampshire | 0.00 | 0.05 | 0.00 | 0.01 | 0.00 | 0.07 |
| New Jersey | 0.14 | 0.35 | 0.00 | 0.02 | 0.01 | 0.52 |

| State | Recreation Value Added[1,2] | Energy & Minerals Value Added[2,3] | Grazing & Timber Value Added[2,4] | Major Grants & Payments Value Added[5] | DOI Payroll Value Added[6] | All Sectors Value Added[7] |
|---|---|---|---|---|---|---|
| New Mexico | 0.20 | 6.99 | 0.00 | 0.50 | 0.09 | 7.78 |
| New York | 0.50 | 0.78 | 0.00 | 0.04 | 0.03 | 1.35 |
| North Carolina | 0.99 | 0.64 | 0.00 | 0.04 | 0.02 | 1.69 |
| North Dakota | 0.06 | 4.09 | 0.00 | 0.06 | 0.02 | 4.23 |
| Ohio | 0.14 | 0.60 | 0.00 | 0.04 | 0.01 | 0.79 |
| Oklahoma | 0.07 | 1.02 | 0.00 | 0.04 | 0.03 | 1.16 |
| Oregon | 0.63 | 0.14 | 0.30 | 0.05 | 0.08 | 1.19 |
| Pennsylvania | 0.38 | 0.81 | 0.00 | 0.10 | 0.04 | 1.33 |
| Rhode Island | 0.01 | 0.06 | 0.00 | 0.01 | 0.00 | 0.08 |
| South Carolina | 0.09 | 0.24 | 0.00 | 0.02 | 0.01 | 0.36 |
| South Dakota | 0.21 | 0.05 | 0.00 | 0.03 | 0.03 | 0.32 |
| Tennessee | 0.52 | 0.22 | 0.00 | 0.04 | 0.02 | 0.80 |
| Texas | 0.25 | 18.97 | 0.00 | 0.09 | 0.04 | 19.35 |
| Utah | 1.03 | 2.78 | 0.00 | 0.19 | 0.06 | 4.06 |
| Vermont | 0.00 | 0.03 | 0.00 | 0.01 | 0.00 | 0.04 |
| Virginia | 0.83 | 1.04 | 0.00 | 0.04 | 0.14 | 2.05 |
| Washington | 0.46 | 0.48 | 0.00 | 0.06 | 0.08 | 1.08 |
| West Virginia | 0.05 | 0.13 | 0.00 | 0.05 | 0.02 | 0.25 |
| Wisconsin | 0.06 | 0.23 | 0.03 | 0.04 | 0.02 | 0.39 |
| Wyoming | 0.83 | 10.77 | 0.00 | 0.82 | 0.04 | 12.46 |

[1] Recreation value added based on visitor spending at units managed by BLM, BOR, FWS and NPS.
[2] BIA data are not included in these totals due to lack of State-specific information.
[3] Energy & Minerals value added is based on activities related to onshore and offshore oil and gas, coal, non-metallic minerals, and geothermal, wind, and solar electricity generation. Information related to BIA's mineral activities are not available at the State level.
[4] Timber contributions are based on harvests on BLM and BIA lands. BIA timber contributions are based on BLM's FY 2015 per-ccf contributions for each State. Grazing value added is not available.
[5] Grants and Payments value added include AML, PILT, Royalties and certain other grants (Sport Fish, Wildlife Restoration, State and Tribal Wildlife Grants, LWCF with GOMESA, Historic Preservation, CIAP, CESCF, Preserve America, Save America's Treasures, Refuge Revenue Sharing).
[6] DOI payroll value added is the economic contribution of DOI employees spending their pay.
[7] These totals represent value added supported by energy, minerals, grazing, timber, salaries and grants and payments in each of the 50 States and the District of Columbia. The economic contributions reported in Table 2-1 were estimated using a national-level model that includes interstate “leakages” not captured in State-level models. Therefore, a sum of State totals would not equal the national total.

**Table 3-2. Estimated Total Output Supported by Interior Activities, by Sector and State (FY 2015, $ billions)**

| State | Recreation Total Output[1,2] | Energy & Minerals Total Output[2,3] | Grazing & Timber Total Output[2,4] | Major Grants & Payments Total Output[5] | DOI Payroll Total Output[6] | All Sectors Total Output[7] |
|---|---|---|---|---|---|---|
| Alabama | 0.08 | 4.49 | 0.00 | 0.06 | 0.01 | 4.64 |
| Alaska | 2.20 | 0.87 | 0.00 | 0.13 | 0.10 | 3.31 |
| Arizona | 1.94 | 0.49 | 0.09 | 0.10 | 0.22 | 2.84 |
| Arkansas | 0.25 | 0.33 | 0.00 | 0.05 | 0.01 | 0.64 |
| California | 4.01 | 6.76 | 0.09 | 0.36 | 0.41 | 11.62 |
| Colorado | 1.52 | 5.70 | 0.17 | 0.31 | 0.48 | 8.18 |
| Connecticut | 0.00 | 0.26 | 0.00 | 0.02 | 0.00 | 0.29 |
| Delaware | 0.00 | 0.06 | 0.00 | 0.01 | 0.00 | 0.08 |
| District of Columbia | 0.83 | 0.00 | 0.00 | 0.00 | 0.07 | 0.90 |
| Florida | 1.31 | 2.18 | 0.00 | 0.07 | 0.07 | 3.63 |
| Georgia | 0.57 | 0.94 | 0.00 | 0.05 | 0.06 | 1.62 |
| Hawaii | 0.55 | 0.27 | 0.00 | 0.02 | 0.02 | 0.85 |
| Idaho | 0.44 | 0.41 | 0.43 | 0.08 | 0.10 | 1.46 |
| Illinois | 0.06 | 1.04 | 0.00 | 0.08 | 0.02 | 1.20 |
| Indiana | 0.11 | 0.49 | 0.00 | 0.05 | 0.01 | 0.65 |
| Iowa | 0.06 | 0.21 | 0.00 | 0.04 | 0.01 | 0.32 |
| Kansas | 0.06 | 0.49 | 0.00 | 0.04 | 0.02 | 0.60 |
| Kentucky | 0.15 | 0.42 | 0.00 | 0.08 | 0.01 | 0.65 |
| Louisiana | 0.09 | 15.46 | 0.00 | 0.06 | 0.06 | 15.67 |
| Maine | 0.38 | 0.08 | 0.02 | 0.02 | 0.01 | 0.52 |
| Maryland | 0.30 | 1.01 | 0.00 | 0.03 | 0.04 | 1.37 |
| Massachusetts | 0.66 | 0.47 | 0.00 | 0.03 | 0.06 | 1.21 |
| Michigan | 0.30 | 0.65 | 0.00 | 0.07 | 0.03 | 1.04 |
| Minnesota | 0.15 | 0.43 | 0.04 | 0.08 | 0.05 | 0.74 |
| Mississippi | 0.22 | 3.67 | 0.00 | 0.03 | 0.02 | 3.93 |
| Missouri | 0.35 | 0.47 | 0.00 | 0.06 | 0.03 | 0.91 |
| Montana | 1.30 | 1.06 | 0.29 | 0.15 | 0.10 | 2.90 |
| Nebraska | 0.06 | 0.16 | 0.00 | 0.03 | 0.02 | 0.27 |
| Nevada | 0.84 | 4.99 | 0.23 | 0.07 | 0.09 | 6.21 |
| New Hampshire | 0.01 | 0.08 | 0.00 | 0.02 | 0.01 | 0.11 |
| New Jersey | 0.22 | 0.58 | 0.00 | 0.03 | 0.02 | 0.86 |

| State | Recreation Total Output[1,2] | Energy & Minerals Total Output[2,3] | Grazing & Timber Total Output[2,4] | Major Grants & Payments Total Output[5] | DOI Payroll Total Output[6] | All Sectors Total Output[7] |
|---|---|---|---|---|---|---|
| New Mexico | 0.39 | 12.00 | 0.31 | 0.69 | 0.16 | 13.56 |
| New York | 0.76 | 1.30 | 0.00 | 0.05 | 0.05 | 2.17 |
| North Carolina | 1.76 | 0.97 | 0.00 | 0.06 | 0.03 | 2.81 |
| North Dakota | 0.12 | 6.37 | 0.00 | 0.09 | 0.03 | 6.62 |
| Ohio | 0.25 | 1.05 | 0.00 | 0.07 | 0.02 | 1.39 |
| Oklahoma | 0.13 | 1.87 | 0.00 | 0.06 | 0.05 | 2.11 |
| Oregon | 1.14 | 0.24 | 1.03 | 0.07 | 0.14 | 2.63 |
| Pennsylvania | 0.66 | 1.44 | 0.00 | 0.17 | 0.06 | 2.32 |
| Rhode Island | 0.02 | 0.09 | 0.00 | 0.01 | 0.00 | 0.13 |
| South Carolina | 0.15 | 0.38 | 0.00 | 0.03 | 0.01 | 0.57 |
| South Dakota | 0.39 | 0.08 | 0.02 | 0.04 | 0.06 | 0.59 |
| Tennessee | 0.88 | 0.38 | 0.00 | 0.06 | 0.03 | 1.35 |
| Texas | 0.44 | 33.36 | 0.00 | 0.14 | 0.07 | 34.01 |
| Utah | 1.90 | 4.82 | 0.17 | 0.29 | 0.11 | 7.29 |
| Vermont | 0.00 | 0.05 | 0.00 | 0.01 | 0.00 | 0.07 |
| Virginia | 1.41 | 1.47 | 0.00 | 0.06 | 0.24 | 3.18 |
| Washington | 0.76 | 0.73 | 0.01 | 0.09 | 0.13 | 1.73 |
| West Virginia | 0.08 | 0.23 | 0.00 | 0.09 | 0.03 | 0.43 |
| Wisconsin | 0.11 | 0.42 | 0.09 | 0.06 | 0.04 | 0.72 |
| Wyoming | 1.47 | 16.59 | 0.29 | 1.14 | 0.06 | 19.55 |

[1] Recreation total output is based on visitor spending at units managed by BLM, BOR, FWS and NPS.
[2] BIA data are not included in these totals due to lack of State-specific information.
[3] Energy & Minerals total output is based on activities related to onshore and offshore oil and gas, coal, non-metallic minerals, and geothermal, wind, and solar electricity generation. Information related to BIA's mineral activities are not available at the State level.
[4] Timber contributions are based on harvests on BLM and BIA lands. BIA timber contributions are based on BLM's FY 2015 per-ccf contributions for each State. BLM's grazing contributions are based on a state-specific estimate of jobs supported per 1,000 animal unit months (AUMs). BIA grazing contributions are not available at the State level.
[5] Grants and Payments total output include AML, PILT, Royalties and certain other grants (Sport Fish, Wildlife Restoration, State and Tribal Wildlife Grants, LWCF with GOMESA, Historic Preservation, CIAP, CESCF, Preserve America, Save America's Treasures, Refuge Revenue Sharing).
[6] DOI payroll total output is the economic contribution of DOI employees spending their pay.
[7] These totals represent total output supported by energy, minerals, grazing, timber, salaries and grants and payments in each of the 50 States and the District of Columbia. The economic contributions reported in Table 2-1 were estimated using a national-level model that includes interstate “leakages” not captured in State-level models. Therefore, the sum of State totals will not equal the national total.

Table 3-3 shows estimates of the number of jobs supported in each State; and Figure 3-3 shows the employment supported for the top ten States. In FY 2015, energy production-related activities on Interior lands (and offshore) supported about 191,000 jobs in Texas, and over 89,000 in Louisiana. Figure 3-4 shows the top ten States by recreation-related employment. In FY 2015, recreation on Interior-managed lands supported over 36,000 jobs in California and over 20,000 jobs in Alaska.

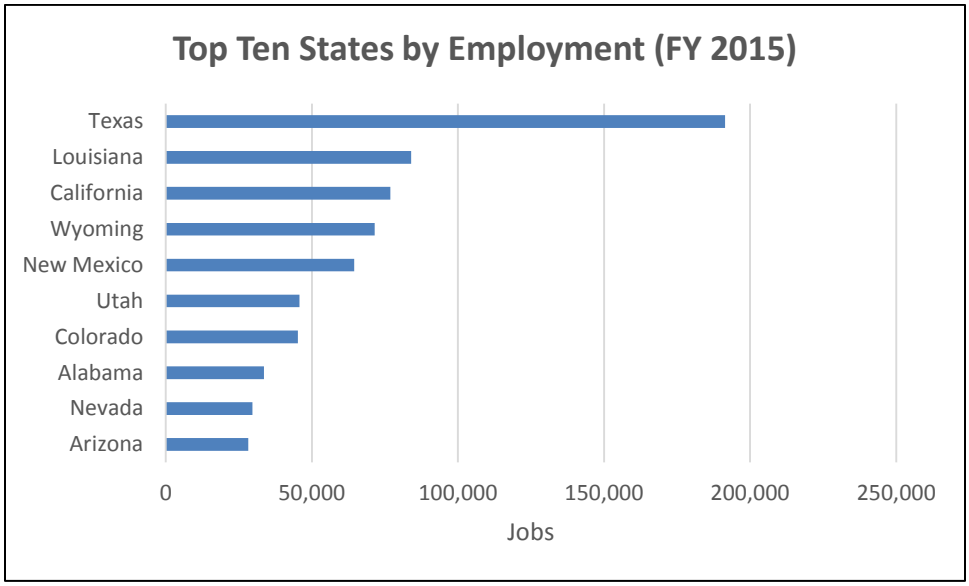


**Figure 3-3. Top Ten States for Jobs Supported in All Sectors**

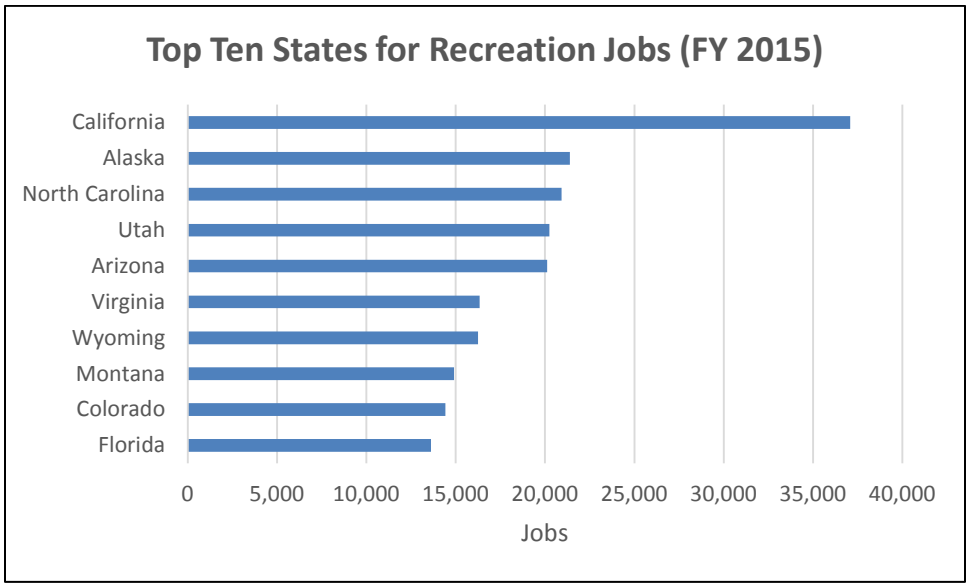


**Figure 3-4. Top Ten States for Jobs Supported in the Recreation Sector**

**Table 3-3. Estimated Total Jobs Supported by Interior Activities, by Sector and State (FY 2015, jobs)**

| State | Recreation[1,2] | Energy & Minerals[2,3] | Grazing & Timber[2,4] | Major Grants & Payments[5] | DOI Payroll[6] | Total[7] |
|---|---|---|---|---|---|---|
| Alabama | 1,023 | 31,881 | 0 | 584 | 65 | 33,553 |
| Alaska | 21,390 | 2,899 | 0 | 1,038 | 718 | 26,045 |
| Arizona | 20,122 | 3,161 | 2,390 | 870 | 1,698 | 28,241 |
| Arkansas | 3,156 | 1,797 | 0 | 504 | 107 | 5,564 |
| California | 37,087 | 33,780 | 998 | 2,302 | 2,723 | 76,889 |
| Colorado | 14,418 | 22,409 | 2,316 | 2,704 | 3,365 | 45,212 |
| Connecticut | 48 | 1,477 | 0 | 138 | 21 | 1,684 |
| Delaware | 51 | 386 | 0 | 112 | 12 | 561 |
| District of Columbia | 7,525 | 0 | 1 | 11 | 409 | 7,946 |
| Florida | 13,624 | 12,433 | 0 | 599 | 556 | 27,212 |
| Georgia | 6,560 | 5,791 | 18 | 478 | 431 | 13,279 |
| Hawaii | 5,275 | 1,679 | 0 | 170 | 162 | 7,285 |
| Idaho | 4,739 | 1,702 | 5,988 | 829 | 883 | 14,141 |
| Illinois | 611 | 5,741 | 0 | 572 | 113 | 7,037 |
| Indiana | 1,389 | 2,673 | 0 | 417 | 107 | 4,586 |
| Iowa | 729 | 1,215 | 0 | 319 | 43 | 2,307 |
| Kansas | 546 | 2,780 | 0 | 359 | 131 | 3,817 |
| Kentucky | 1,798 | 2,512 | 0 | 744 | 108 | 5,163 |
| Louisiana | 932 | 81,905 | 8 | 599 | 488 | 83,933 |
| Maine | 4,521 | 522 | 0 | 243 | 124 | 5,411 |
| Maryland | 3,182 | 6,180 | 0 | 211 | 271 | 9,843 |
| Massachusetts | 6,882 | 2,670 | 0 | 188 | 405 | 10,146 |
| Michigan | 3,370 | 3,683 | 0 | 631 | 216 | 7,900 |
| Minnesota | 1,554 | 2,397 | 0 | 649 | 357 | 4,957 |
| Mississippi | 2,923 | 24,273 | 0 | 308 | 144 | 27,648 |
| Missouri | 4,281 | 2,838 | 107 | 594 | 275 | 8,096 |
| Montana | 14,905 | 4,227 | 3,213 | 1,526 | 865 | 24,735 |
| Nebraska | 727 | 970 | 2 | 281 | 153 | 2,133 |
| Nevada | 7,896 | 17,206 | 3,288 | 555 | 681 | 29,626 |
| New Hampshire | 89 | 492 | 162 | 150 | 45 | 938 |
| New Jersey | 2,331 | 3,351 | 5 | 214 | 152 | 6,053 |
| New Mexico | 4,223 | 43,494 | 8,240 | 7,162 | 1,317 | 64,436 |
| New York | 7,487 | 7,305 | 5 | 348 | 330 | 15,475 |
| North Carolina | 20,923 | 6,006 | 0 | 524 | 251 | 27,706 |
| North Dakota | 1,255 | 21,012 | 24 | 941 | 251 | 23,483 |
| Ohio | 2,972 | 5,813 | 0 | 540 | 141 | 9,467 |
| Oklahoma | 1,289 | 9,396 | 1 | 533 | 361 | 11,580 |
| Oregon | 12,178 | 1,441 | 7,961 | 634 | 1,145 | 23,359 |
| Pennsylvania | 7,633 | 7,845 | 0 | 1,313 | 444 | 17,235 |
| Rhode Island | 253 | 537 | 0 | 118 | 17 | 925 |

| State | Recreation[1,2] | Energy & Minerals[2,3] | Grazing & Timber[2,4] | Major Grants & Payments[5] | DOI Payroll[6] | Total[7] |
|---|---|---|---|---|---|---|
| South Carolina | 1,836 | 2,373 | 0 | 288 | 78 | 4,575 |
| South Dakota | 5,112 | 537 | 275 | 383 | 467 | 6,775 |
| Tennessee | 9,800 | 2,208 | 0 | 586 | 233 | 12,828 |
| Texas | 4,634 | 184,657 | 484 | 1,108 | 478 | 191,361 |
| Utah | 20,252 | 18,011 | 3,967 | 2,654 | 833 | 45,716 |
| Vermont | 58 | 305 | 0 | 136 | 33 | 532 |
| Virginia | 16,346 | 8,847 | 0 | 484 | 1,793 | 27,469 |
| Washington | 7,415 | 4,393 | 371 | 680 | 889 | 13,747 |
| West Virginia | 1,091 | 1,333 | 0 | 811 | 245 | 3,480 |
| Wisconsin | 1,371 | 2,339 | 0 | 579 | 283 | 4,571 |
| Wyoming | 16,250 | 40,037 | 3,300 | 11,345 | 497 | 71,428 |

[1] Recreation jobs are based on visitor spending at units managed by BLM, BOR, FWS and NPS.

[2] BIA data are not included in these totals due to lack of State-specific information.

[3] Energy & Minerals jobs are based on activities related to onshore and offshore oil and gas, coal, non-metallic minerals, and geothermal, wind, and solar electricity generation. Information related to BIA's mineral activities are not available at the State level.

[4] Timber contributions are based on harvests on BLM and BIA lands. BIA timber contributions are based on BLM's FY 2015 per-ccf contributions for each State. Grazing contributions are based on a state-specific estimate of jobs supported per 1,000 animal unit months (AUMs). BIA grazing contributions are not available at the State level.

[5] Grants and Payments jobs include Mineral Revenue Payments, PILT, AML, and certain other grants (Sport Fish, Wildlife Restoration, State and Tribal Wildlife Grants, LWCF with GOMESA, Historic Preservation, CIAP, CESCF, NPS Grants, and Refuge Revenue Sharing).

[6] DOI payroll jobs are the economic contribution of DOI employees spending their pay.

[7] These totals represent jobs supported by recreation, energy, minerals, grazing, timber, salaries and grants and payments in each of the 50 States. The jobs reported in Table 2-1, were estimated using a national-level model that includes interstate “leakages” not captured in State-level models. Therefore, the sum of State totals will not equal the national total.

# Appendix A. Technical Information

This is the seventh Economic Contribution report produced by DOI. While all of the reports relied on the best available data and sound methods, there are changes across years as improved data, methods, and models are identified or become available. When making comparisons of DOI's economic contribution estimates across years, it is important to identify all of the factors that might contribute to estimates changing from one year to the next. These factors can include:

- Changes in land use. These might be due to changes in resource demand or management decisions, or reflect a natural progression in a project's life cycle, such as a shift from construction to operational status.
- Changes in the data describing a resource's annual economic output. These might be due to actual changes in the quantity or price of a good produced, or changes in data collection and assumptions.
- Changes in the economic models that describe the underlying structure of local economies. For most sectors, these models are developed independent of this report. In some cases, new models that better describe individual sectors replaced models used in prior reports. In other cases, the assumptions and data within the models changed significantly from year to year.

## IMPLAN

This analysis primarily employs the widely used I/O software and data system known as IMPLAN for estimating the economic contribution of Interior activities in terms of output (sales), value added, and employment (jobs). In particular, this analysis uses IMPLAN data released in 2013[27]. The underlying data drawn upon by the IMPLAN software is collected by the Minnesota IMPLAN Group (MIG) from multiple Federal and State sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau. Additional information about the IMPLAN modeling software can be found at: http://www.implan.com/.[28]

[27] BLM used 2014 IMPLAN data

[28] The most recent version of IMPLAN (Version 3.0) incorporated a number of changes, with one of the most notable being an improvement in the method used for calculating Regional Purchase Coefficients (RPCs). IMPLAN Version 2.0 had been criticized for its use of non-survey based RPCs, which have been shown to produce higher estimates than survey-based data. IMPLAN Version 3.0 attempts to deal with these criticisms through an improved method for estimating RPCs. The new method uses a gravity model that considers the size and proximity of alternative markets to give an improved estimation of imports and exports than the econometric-based estimates in Version 2.0. A study by Koontz, Loomis, and Winter (2011) showed that the differences in the IMPLAN Version 3.0 software can result in lower estimates of employment and income effects for tourism impacts. A job in IMPLAN is the annual average of monthly reports for that industry. This is the same definition used by CEA, BLS, and BEA nationally. One 12-month job is equivalent to two 6-month jobs. The employment data come from a series of surveys taken multiple times each year. The workers are counted regardless of status, thus jobs are permanent, part-time, temporary and seasonal. The data from the surveys are summed and averaged to obtain an "average annual employment."

## OSMRE

- The majority of the Office of Surface Mining Reclamation and Enforcement's activities related to reclamation of abandoned mine lands are encompassed by funding from the Abandoned Mine Lands (AML) fund. The impact of these funds is captured in the entry for Grants and Programs reported earlier in the report.

## Indian Affairs, BIA, and BIE

- Sales volumes and values for BIA's oil, gas and coal activities are based on data from ONRR.
- Drilling costs for oil, gas, and dry wells were calculated for each State where Indian wells were completed in FY 2015. Costs per well were calculated as the total costs for each type of well (oil, gas, or dry) divided by the total number of completed wells of each type. The cost data were taken from "The Oil & Gas Producing Industry in Your State" (IPAA, October 2012).
- Economic contributions associated with contractual support provided to tribal governments were evaluated by applying State and local government multipliers.
- Irrigation: The Department of the Interior's Bureau of Indian Affairs (BIA) manages 17 irrigation projects on Indian reservations in the Western United States. The overall approach for estimating economic contributions and employment estimates is similar to that used for Reclamation's irrigation activities. Economic contributions and employment estimates were estimated for agricultural activities associated with BIA operated irrigation projects using data from the USDA National Agricultural Statistics Service (NASS). 2012 Census of Agriculture, Volume 2, American Indian Reservations. The Census of Agriculture does not provide complete coverage of all reservations. Irrigated acreage data were combined with average crop revenue per acre for irrigated acreage calculated based on data in the 2012 Agricultural Census. The agricultural revenue values in the Census were indexed to 2015 dollars using the NASS food grain prices received index. The multipliers used were based on IMPLAN grain farming sector. The values reported for Irrigation represent the value of the crops produced using irrigation water supplied by BIA. This value overstates the actual production attributable to BIA, as some level of production would occur without the irrigation water delivered by BIA, and water is only one of many inputs into agricultural production.

## BLM

- The BLM estimates the contributions from oil and gas activities by adding the value of the gross output to drilling costs and then removing inter-industry sales to derive a final demand figure. A multiplier is then applied to final demand to derive the contribution estimates. The rationale for including drilling costs in the initial sum is that drilling costs are not accounted for in the IMPLAN production function for oil and gas extraction. Note that BLM's results are developed independently of BOEM's figures for offshore production, and use a different approach. This complicates a direct comparison between the onshore and offshore analyses. The BLM considers onshore direct output to include 1) oil and gas well drilling, with costs taken from the Independent Petroleum Producers Association report IPAA Oil & Gas Producing Industry in Your State; and 2) oil and gas sales, based on sales volume and sales value for the fiscal year with preliminary sales year data provided by the Office of Natural Resources Revenue (ONRR). Final demand is taken to be the sum of these two items less inter-industry sales.

- BLM uses IMPLAN to estimate the economic contributions associated with salable minerals and other leasable minerals (i.e., other than oil, gas, and leasable hardrock minerals). The method parallels that of oil and gas production described above. Production and unit prices for leasable minerals for the fiscal year are based on preliminary sales year data provided by ONRR. Salable minerals production data for the fiscal year are from BLM's internal database LR2000; commodity price data are based on the USGS annual Mineral Commodity Summaries (MCS). Preliminary FY2015 sales year data on leasable mineral sales volume and value were received from ONRR on 12/11/2015 through a special data request.
- The economic contributions of hardrock mining on the Federal estate were estimated at a national level using an approach similar to the approach used in FY 2013 and FY 2014. The primary limitation in generating useable estimates of hardrock mineral production is identifying the portion coming from Federal lands. These data are generally unavailable. The production estimates from Nevada and Missouri account for the vast majority of production value from Federal lands. USGS's annual MCS provide commodity prices that were used in this analysis.
- For livestock grazing, the BLM developed state-specific economic contribution estimates associated with 1,000 Animal Unit Months (AUMs) – commonly termed response coefficients. An example of a response coefficient is "1,000 AUMs for grazing beef cattle support approximately X direct jobs in state X." These response coefficients were revised this fiscal year using data primarily from the 2012 Census of Agriculture in combination with IMPLAN (2013 data). The results in the prior four DOI Economic Reports used response coefficients derived using data primarily from the 2007 Census of Agriculture, and also from the Census' American Community Survey, in combination with IMPLAN (2007 data). Due to the revisions of the response coefficients, the FY15 economic contribution estimates associated with livestock grazing are not comparable to prior years. The 2012 Census of Agriculture provides information on a specific subset of livestock that best reflects the animals that actually graze on BLM-managed lands – specifically, employment, income, sales, and expense data from operations classified by the North American Industry Classification System (NAICS) as beef cattle ranching and farming (112111) and sheep and goat farming (1124). In addition, the 2012 Census of Agriculture contains information related to self-employment as well as individuals who are unpaid or family laborers. In some areas unpaid or family labor represent a significant component of the labor used to run ranches and farms. The analysis assumes that the grazing operations included in the Census of Agriculture are representative of those operations using public forage from lands managed by the BLM. It is possible that ranchers utilizing public lands have different spending or employment patterns than grazing operations as a whole, but using the Census of Agriculture provides a standard dataset for comparison across states. In addition, because the Census of Agriculture is only available every five years it is assumed that the response coefficients will remain constant from year-to-year. The economic contribution estimates associated with livestock grazing on BLM-managed lands were derived by multiplying response coefficients by the AUMs authorized on bills (associated with leases or permits to graze livestock on BLM managed lands) that were due during a given fee year. Economic contribution estimates in this report are based on the most current data on livestock grazing use on BLM-managed lands - fee year 2014 (3/1/2014 through 2/28/2015).

- Timber value is composed of the sales receipts for harvested sawtimber, sales of Special Forest Products, and stewardship timber sales. Contracts for sawtimber are typically sold at auction, and the BLM receives the agreed payments when timber is actually cut and sold. Special Forest Products include fuelwood, posts, poles, etc. While the sales are negotiated, the BLM tries to follow the stipulation that sale prices will not go below 10 percent of the estimated market value. Stewardship Program timber sales are associated with BLM bartering goods (timber products) for services (land treatments) done by outside contractors. The product value is used to offset the total cost of service work in the contract.
- Estimates reflect economic contribution from commercial sales of timber, primarily wood-based products. The BLM's forestry and woodlands management program also manages public access to a variety of other forestry products including personal use fuelwood (fuelwood gathered by individuals for personal use rather than by companies for commercial resale) and non-wood Special Forest Products (such as Christmas Trees, native seeds, mushrooms, and floral/greenery). Non-wood Special Forest Products from BLM-managed lands generated over $815,000 in sales in FY2015. Personal use fuelwood gathered from BLM-administered lands in FY2015 amounted to about 85,000 CCF. Assuming a market price of $200 per cord (EIA, 2014), the market value of this fuelwood is almost $13.5 million. The BLM collected around $430,000 in permit fees for personal fuelwood collection."
- Economic contributions related to constructing and operating wind, solar, and geothermal energy projects were derived using the Jobs and Development Economic Impact (JEDI) models produced by the National Renewable Energy Laboratory (NREL). Prior to FY 2013, economic contributions associated with geothermal energy development were developed using IMPLAN based on sales volume and value from ONRR and drilling data from BLM. Therefore, the economic contribution estimates for FY 2014 and FY 2015 should not be compared to prior years.
- The significant drop in the market price for oil and gas in 2015 reduced the average effective prices for oil and gas in FY 2015 and thus did effect the calculated economic contribution estimates. While DOI's contribution to the economy may decline, society receives benefits from lower oil and gas prices as consumers have more disposable income to spend elsewhere creating its own economic impacts.

## Reclamation

- FWS trip-related multipliers and average visitor expenditures were used to estimate impacts for Reclamation's recreation activities. The analysis relies on Reclamation visitation data collected during 2010-2013 and applies current expenditures per day, value added, output, and employment multipliers from FWS.
- Prior to FY14, valuations of economic impacts from Reclamation's agricultural water deliveries in the Central Valley Project (CVP) area assumed that all crops grown in the CVP area used only Reclamation water supplies. However, Reclamation's water supply is only supplemental. Therefore, an adjustment was made to the value of CVP crops by comparing the calculated irrigation requirements to Reclamation's actual water deliveries.

- Reclamation is utilizing GIS imagery to document the type and acreage of irrigated crops grown. Some Reclamation projects do not have GIS data and have not been included. GIS acreage from 2015, combined with 2014 State-level yields and prices provided by the USDA, are used to estimate gross crop value. The Reclamation M&I water economic contributions are associated with operating systems for water, sewage, etc. The economic contribution of delivering M&I water was estimated by using total 2005 M&I contract amounts in acre-feet, and multiplying the total amounts by recent average market M&I water rates for major urban areas derived from various studies that the Bureau of Reclamation Technical Services Center combined and analyzed. For the Central Valley Project in California actual M&I delivery data was used in both FY 2014 and 2015.
- The value of hydroelectricity generated at Reclamation facilities was estimated using regional wholesale prices for Reclamation major hydropower production areas as follows: BPA, $0.035/kWh; Parker Davis, $0.009/kWh; Boulder-Hoover, $0.016/kWh; Loveland, $0.041/kWh; Billings, $0.033/kWh; Sacramento, $0.055/kWh; and Salt Lake City, $0.03/kWh.

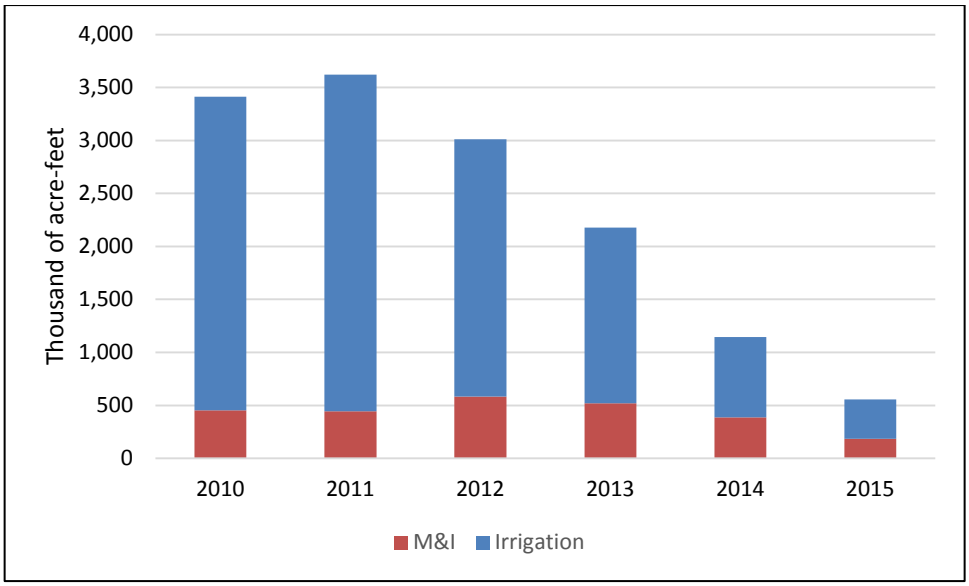


**Figure A-1. Bureau of Reclamation Water Deliveries by Use for Central Valley Project (2009-2015)**

## BOEM and BSEE

- The total FY 2015 economic contributions of oil and gas activity on the federal Outer Continental Shelf (OCS) are less than estimated for FY 2014 ($113 billion in total U.S. output, $64 billion in total value added and 651,000 domestic jobs sustained). This reduced economic impact is the result of low oil prices which persisted throughout the year and the corresponding reduction in government revenues.
- The BOEM maintains an in-house socio-economic impact model, MAG-PLAN, for economic impact analyses to support its lease sale planning duties. MAG-PLAN identifies the industry sectors that contribute to offshore oil and gas activity (e.g., wells drilled, platforms installed, etc.) and calculates the size of the direct impact in each sector.
- The basis for calculating the FY 2015 impacts of OCS oil and gas activity is the sales value of FY 2015 OCS oil and gas production as published by the Office of Natural Resources Revenue.[29]

[29] http://statistics.onrr.gov/ReportTool.aspx

- As shown in Table A-2, the sales value of OCS production in FY 2015 was $40.6 billion. Because different sources of spending generate different degrees of economic impact, we distributed this sales value among industry spending, government revenue, and after-tax profits to enable the calculation of total economic impact and individual State impacts. The portion of industry profits that flow to foreign entities has spending impacts that cannot be separated from those of other U.S. activities that generate income abroad, so we omit any spending impact from this portion of total sales. That leaves $35.6 billion of OCS stimulated direct spending in the U.S. economy, shown in the second column of Table A-2. The rows in Table A 2 identify the individual components that we estimated to arrive at these totals.

**Table A-1. BOEM and BSEE Administered Industry Economic Impact FY 2015**

| | OCS Oil, Gas, and NGL Sales Value ($ millions) | Resulting Direct Domestic Spending ($ millions) | Resulting Total Domestic Output ($ millions) | Resulting Total Domestic Value Added ($ millions) | Domestic Jobs Sustained ('000s) |
|---|---|---|---|---|---|
| Industry Spending | $20,294 | $20,294 | $54,944 | $28,435 | 301 |
| Government Revenue (includes profit and dividend tax revenues) | $8,395 | $8,395 | $14,369 | $10,625 | 94 |
| After-(both profit and dividend) Tax Profits | $11,898 | $6,870 | $17,089 | $9,254 | 97 |
| After-Tax Profits to Rest of World | $5,028 | NA | NA | NA | NA |
| After-Tax Profits remaining in U.S. | $6,870 | $6,870 | $17,089 | $9,254 | 97 |
| Sales Value | $40,587 | $35,559 | $86,402 | $48,315 | 492 |

NB: Totals may not sum due to rounding

- The analysis assumes that direct industry spending (i.e., capital and operating expenditures) was 50 percent of total sales value in FY 2015.[30] BOEM applied MAG-PLAN national multipliers for direct, indirect, and induced spending (a total multiplier of 2.71) to estimate the total domestic output, value added (using a MAG-PLAN industry spending ratio of $1.40 in total value added for every dollar of direct spending), and employment (using a MAG-PLAN ratio of 14.8 total jobs per million dollars of direct offshore oil and gas industry spending).
- Estimated after-tax profits (after both profit and dividend taxes) were estimated to be $11.9 billion. These were distributed across domestic and foreign entities through both dividends and retained earnings. To calculate this distribution, EIA data were used to split profits into retained earnings and shareholders dividends and further to split retained earnings into those that would be spent domestically versus internationally.
- BOEM used Bureau of Economic Analysis, Department of Commerce data to split dividends into those for domestic versus foreign shareholders. Domestic dividends were assigned a 15 percent tax rate and those tax revenues were included with government spending. Of the after-tax domestic dividends we assume, based on two empirical studies, that 25 percent is reinvested and the remainder is spent.
- Government leasing revenues, corporate tax, and dividend tax are all treated together. Using appropriate IMPLAN Federal and state government institutional spending patterns we estimate a composite multiplier 1.72 for total output, a ratio of $1.27 in total value added for every dollar of direct government revenue, and 11.21 total jobs per million dollars in direct spending.
- Additional analysis was required to estimate the distribution of economic impacts by State. BOEM's MAG-PLAN model provides percentages of industry spending economic impacts for each of the five Gulf of Mexico (GOM) States while aggregating the remainder to the "rest of U.S." The five GOM states account for 68% of total OCS generated spending and jobs and 65% of total value added. For the remainder of the U.S., we used State Bureau of Labor and Statistics (BLS) employment data for each of the ten largest MAG-PLAN sectors identified outside of the Gulf States and weighted industry spending accordingly.
- For the government revenue sector, we allocated the spending and job components of grant and revenue sharing programs to the state which receives the funds. We allocated the remaining leasing revenue and tax revenue between states in the proportion in which each receives government funds based on historical Federal funds distributions to states as reported by the Bureau of the Census.[31]
- Note that BOEM's results are developed independently of BLM's figures for onshore production, using a different approach. This complicates a direct comparison between the offshore and onshore analyses. BOEM considers offshore direct output to include several related supporting sectors, including steel product manufacturing, water transportation, air transportation, food supply, etc. Interindustry sales are removed in calculating final demand.

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[30] Previous calculations of the BOEM contribution have estimated this percentage to be 40% of total sales value based on results of our in-house leasing model, IMODEL. However, as the effective sales price of oil has fallen significantly from previous years, this factor was re-evaluated for FY 2015. As such, we determined that 50% of sales value is a more appropriate figure. Based on published estimates, oil companies report a cost savings of approximately 10 percent as a result of lower oil prices. Our new factor of 50% generates a total industry spending approximately 10 percent lower than what was estimated for FY 2014 and provides what we view as a reasonable estimate of FY 2015 industry spending.

[31] U.S. Census Bureau Statistical Abstract Table 467: Federal Funds - - Summary Distribution by State and Island Areas: 2007. http://www.census.gov/compendia/statab/2010/tables/10s0467.xls.

## Grants and Payments

- The total grants and payments included in the report represent all grants and payments for bureaus and Interior-wide programs in FY 2015, including current and permanent Payment in Lieu of Taxes (PILT) payments, mineral revenue payments and all AML grants to States and tribes. The DOI Office of Budget provided State-level data for the grants and payments analyzed in this report.
- The report includes a total of $4.68 billion in grants and payments. The FY 2016 Budget in Brief reports actual FY 2015 grants and payments totaling $4.83 billion. Variances between the two figures can be attributed for certain grant and payment totals to the exclusion of program administration costs in grant awards, Coastal Impact Assistance Program (CIAP) payments made during FY 2015, and payments to support tribal governments.
- Economic contribution estimates use national-level multipliers for the appropriate sectors. The State-level analysis of employment impacts related to grants and payments included in Chapter 3 only includes those categories for which State-level data were available. Including information on impacts of the full array of grant programs and payments would likely increase employment impacts. The State analysis uses State-level multipliers for the appropriate sectors for each grant category.
- Energy and mineral leasing revenues (bonuses, rents, and royalties) disbursed to the U.S. Treasury help fund various government functions and programs through the General Fund of the U.S. Treasury. Royalty payments are divided into offshore and onshore categories. All employment and output impacts for onshore and offshore royalties were included in the category of Energy and Minerals for the national and State-level analyses.
- The State-level analysis includes a preliminary estimation of the impacts of Federal offshore royalty payments (to States via Treasury). Additional details on these calculations are included in the BOEM section above.
- Federal law requires that all monies derived from mineral leasing and production activities on Federal and American Indian lands be collected, properly accounted for, and distributed. For Federal onshore lands, the revenues are generally shared between the States in which the Federal lands are located and the Federal government. In most cases, States receive about 50 percent of the revenues associated with mineral production on Federal public lands within their borders.[32] In the case of American Indian lands, all monies collected from mineral production are returned to the Indian Tribes or individual Indian mineral lease owners. Revenues associated with Federal offshore lands are distributed to several accounts of the U.S. Treasury and certain coastal States with special Federal offshore tracts adjacent to their seaward boundaries. Coastal States, with certain Federal offshore 8(g) tracts adjacent to their seaward boundaries, receive 27 percent of the revenues.
- Mineral revenue payments include receipts for sales in the National Petroleum Reserve – Alaska, Mineral Leasing Associated Payments, National Forest Fund Payments to States, and Payments to States from Lands Acquired for Flood Control, Navigation, and Allied Purposes.
- Grants and Payments include mineral revenue payments to States associated with onshore production, and grant programs funded by offshore leasing and other sources of revenues.
- Land Acquisitions: Output and employment contribution estimates for land acquisition are derived using State and national-level multipliers. It is assumed that 90 percent of funds goes to landowners and 10 percent goes to transaction costs. Much of the money land owners receive is

[32] Alaska is an exception, receiving 50 percent of revenues for production from the National Petroleum Reserve A (NPR-A), and 90 percent elsewhere.

likely to go into savings, be used to pay off loans, or be subject to tax. It is therefore assumed that landowners will spend only 50 percent of funds they receive. These expenditures are modeled as a household income change for households with annual incomes greater than $150,000. The remaining 10 percent of funds are assumed to go to service providers associated with real estate transaction costs or monitoring and administration of easements. Specific services associated with land acquisition could include land appraisal, title examination and legal services, environmental site assessments, and ecological inventory and management planning. IMPLAN sector 440 is used to model the services associated with land acquisition.[33] Temporal issues complicate the analysis, as there may be a delay between the date of the purchase, the date the landowner receives the funds, and the dates the landowner spends the funds. Contributions are typically reported for one year, and only a small portion of the funds received by landowners is likely to be spent in that same year; monitoring expenditures will also often be incurred in perpetuity whereas transaction costs are all up-front. As a simplifying assumption, all landowner expenditures and service fees are assumed to occur in the same year that the transaction takes place.

## Payroll Impacts

- The domestic jobs supported by Interior in Table 2-1 represent additional jobs above and beyond Interior employees.
- For Table 2-1, 2015 payroll data were obtained from Department of the Interior Human Resources data systems. The payroll data include salary data based on the duty-station of all Interior employees through pay period 17.
- DOI payroll contributions are estimated using the IMPLAN Labor Income Change activity. Leakages in this IMPLAN activity include payroll taxes and salaries earned by employees who commute from outside of the local area (and thus primarily spend their salaries outside of the local area). Contributions are based on household spending patterns for a distribution of household income levels. Household spending patterns account for leakages related to personal taxes and savings. For the payroll contributions shown in Table 2-1, a national multiplier was used to estimate the employment contributions of Interior payroll, equaling 8.5 jobs per $1 million.
- For State-level salary effects shown in Tables 3-1 and 3-2, 2015 payroll data and State-level multipliers were used. Since State multipliers do not capture leakages outside of each State, the total of State salary impacts will not equal the national-level salary employment impacts.
- The total salary paid and number of employees for each Bureau does not necessarily reflect FTE data typically reported in budget documents. These data were used to estimate total salary impacts rather than data on total FTE's, which would not have been a complete estimate of total salary impacts of DOI employees.

## Recreation Impacts

- Total recreation economic and employment at the national-level are larger than the sum of the state level contributions because interstate expenditures are leaked from state level models but are included in the national level model.

[33] In previous years, we used Sector 374 (management, scientific, and technical consulting services). The change to Sector 440 is related to IMPLAN's switch to a 536-sector scheme.

- Last year's report did not include data for NPS and FWS units in U.S. territories. This year's report does include these areas in the economic analysis for NPS unites. Visitation data for NPS reported in Table 1-1 includes visitation for all NPS units including U.S. territories. FWS does maintain some visitation data for sites outside of the continental United States, Hawaii, and Alaska, and future analysis could include these areas.
- Visitation and expenditure data sources included the following: FWS Fishing, Hunting, and Wildlife-Associated Recreation Survey; NPS visitor surveys, and data from *2015 National Park Visitor Spending Effects, Economic Contributions to Local Communities, States, and the Nation,* (Cullinane Thomas, et al. 2015). We calculated site-level impacts of visitor spending for BLM sites using Forest Service expenditure data, and for Reclamation expenditures based on the FWS Fishing, Hunting, and Wildlife-Associated Recreation survey. Spending profiles associated with these data sources were used to develop estimates of average expenditures. BLM visitation estimates are from BLM's Recreation Management Information System (RMIS). BLM used results from the U.S. Forest Service's National Visitor Use Monitoring (NVUM) survey to estimate the distribution of visitor types and the associated expenditure profile.
- For the Bureau of Reclamation, most project recreation sites are managed by Reclamation partners, including both Federal and non-Federal entities.
- NPS visitation data are for CY 2015. FWS visitation data are for FY 2015. BLM visitation data are for FY 2013. BOR visitation data are for FY 2012, however the economic contribution estimates for BOR are based on 2011 spending information in 2013-$ (from FWS). Multipliers used for BOR are from the 2008 version of IMPLAN. Multipliers used for NPS and FWS are from the 2013 version of IMPLAN.
- The FWS National Survey of Hunting, Fishing, and Wildlife Associated Recreation State-level data were used to determine the average recreationist's trip spending per day.
- The BOR and FWS recreation valued added figures are based on the ratio of NPS valued added to total output.

## Contributors

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