Jeri Sawyer

PRINCIPAL ECONOMIST/MANAGING PARTNER

Jeri Sawyer is a senior economist with more than 30 years of experience in socioeconomic and regional economic impact analysis; demographic forecasting; and energy, water, health, and agricultural economic analysis. She is highly proficient in the development and utilization of the appropriate data for economic impact analyses modeling using IMPLAN software. Ms. Sawyer is skilled in health economic analysis, using modeling and statistical analysis to provide support to various clients. Her energy economics expertise includes analysis for various types of generation projects, including hydroelectric, wind, and geothermal, as well as utility-level electric load forecasting, renewable energy analysis, and electric rate impact analysis. She has significant agricultural economic proficiency, including crop, livestock, and ranching analysis, as well as water rights analysis.

Qualifications

- MS, Economics,
  Portland State University
- BS, Agricultural Economics,
  Washington State University

Expertise

- Economic Impact Analysis
- Development of decision-making tools
- Demographic, economic and water demand forecasting
- Forecasting model development
- Benefit Cost Analysis
- Energy economic analysis
- Agricultural economic analysis
- Health economics

GREENE ECONOMICS

Relevant Projects

Economic Impact Analysis

Recycling

Recycling Economic Impact Analysis, Salt Lake County – Salt Lake County, Utah

Ms. Sawyer is providing economic impact analysis for the recycling industry in Salt Lake County, Utah. This project includes gathering and compiling publicly available data; developing a survey and interviewing industry participants to gather additional data; and using IMPLAN software to analyze the direct, indirect, and induced economic impacts in the study area of Salt Lake County. She serves as project manager, compiling data, using IMPLAN software, and analyzing the results to assess the economic impacts to the county from this industry.

Economic Impact Analysis of Recycling Industry, State of Colorado – Colorado

Ms. Sawyer developed an economic impact analysis for the recycling industry in Colorado. She was responsible for project management, compiling existing and additional data, using IMPLAN software to analyze the results to develop economic impacts for each county and for the state as a whole, and documenting the process and results in a comprehensive report for public distribution.

Economics of High-Grade Paper with Recycled Content for Magazine Use, National Geographic – United States

Ms. Sawyer conducted research and provided analysis for the long-term use of high-quality recycled paper for magazine printing, including the current and projected worldwide supply of and demand for high-grade recycled paper, to assess possible constraints on the nationwide supply.

Economic Development

Westside Employment Center Economic Feasibility Study, Port of Moses Lake, Washington

Ms. Sawyer was on a team to determine the economic feasibility for the Westside Employment Center (WEC), an undeveloped area owned by the Port of Moses Lake with distinct amenities that could attract large industrial, agricultural, and manufacturing employers. The team reviewed the existing economic market in and around Moses Lake, proposed a market strategy to attract select industries to the area, and project the economic feasibility and impact of developing shovel-ready sites within the Westside Employment Center. Ms. Sawyer specifically developed the analysis of the existing economic market area and the economic impact analysis of projected development of the Westside Employment Center, using the IMPLAN software.

Economic Impact Analysis, Tri County Economic Development District, Northeastern Washington

Ms. Sawyer was on a team supporting the Tri-County Economic Development District, covering Ferry, Stevens, and Pend Oreille counties in Washington State, to provide an understanding of the regional and local economic impacts expected to result from the closure of Hearth & Home Technology in Stevens County and the Kinross Gold Mine in Ferry County (closings). The methodology required significant and specific data to be collected from available sources. The team used the economic input-output modeling system IMPLAN as the basis of its analysis. The system allowed the team to model the economies of Ferry and Stevens counties to reflect the closings. The model evaluated the direct economic effects attributable to the manufacturing and mining industries as well as the Indirect and induced effects related to the closures. The study was in support of a feasibility analysis of potential new economic development opportunities.

Agriculture and Water

Economic Impact Analysis Model Update for Project, Bureau of Reclamation – Klamath County, Oregon, and Modoc and Siskiyou counties, California

Ms. Sawyer worked with Susan Burke, PhD and ECO Resources to support the Bureau of Reclamation in updating the Klamath Project Economic Model. Specifically, she developed an updated IMPLAN model to estimate the economic impacts to the region (Klamath County in Oregon, and Modoc and Siskiyou counties in California) under various irrigation supply scenarios. She coordinated with Dr. Burke to utilize the output from the Agricultural Model (KB_HEM) as inputs to an updated IMPLAN model for the Region based on reductions in irrigation supply as a percent of historical water deliveries (from 30% through 100%) that impact the various agricultural crops' output and employment. Methodology of the analysis and output of the IMPLAN model for each irrigation supply scenario was provided for client assessment. Ms. Sawyer also provided support through report review and edits, as well as client comment review and response regarding the Environmental Assessment.

Socioeconomic Impact Analysis of Changes in Potter Valley Hydroelectric Project Flow Release Schedule, Sonoma County Water Agency – Sonoma, Mendocino, and Marin Counties, California

Ms. Sawyer assisted in a project to study how changes in the flow release schedule of the Potter Valley Hydroelectric Project would affect the local economy, including how they would impact the municipal and industrial water supply, hydroelectric power production, minimum stream flows (including recreation- and tourism-related), and agriculture. Ms. Sawyer focused on the impacts to agriculture, particularly water for irrigation, and conducted telephone interviews and data collection. Using irrigated agricultural crop acreages for the hydrologic sub-units; production information such as irrigation application rates, frost protection requirements, yields, and crop values; and countywide information gathered from county commissioners' reports and crop budgets, Ms. Sawyer estimated the water requirements, yields, and values of each of the crops under then-current conditions. She used the results of IMPLAN modeling and input-output methodology to determine the indirect impacts related to changes in flows and documented the results.

Economic Analysis of Water Infrastructure and Fisheries Habitat Restoration Needs, State of Washington Office of Financial Management – Washington

Ms. Sawyer was a key member of a team conducting an analysis of the economic implications related to water infrastructure (stormwater, flood protection, and water supply) and fisheries habitat restoration needs in Washington. The analysis considered the state's changing population, climate, land use, and water demand. Through a review of existing data and literature, in addition to an extensive stakeholder outreach process, the team developed a 20-year forecast for investment needs pertaining to water supply, flood protection, stormwater management, and fisheries habitat restoration across the state. Specifically, Ms. Sawyer developed a large database of water infrastructure project costs, both existing and potential, categorized by type and hydrologic unit code water basin. Then, using IMPLAN, she conducted a regional economic impact assessment, considering the impact of investment on water-dependent sectors, employment, and economic output. The final report was presented to the Washington State Legislature.

Renewable Energy

Economic Impact of Renewable Energy, Renewable Northwest – Oregon, Washington, Idaho, Montana

Ms. Sawyer is leading the development of regional economic impact analysis studies for Oregon, Washington, Idaho, and Montana states and counties of their existing and proposed renewable energy projects. This includes developing a phased approach and methodology for completing the analyses in all four states. The state analyses will be completed first, followed by the specific county analyses for those counties with renewable projects within the county boundaries. The renewable projects include wind, solar, biomass, and geothermal. She is using IMPLAN modelling and data, and focusing on employment, income, and output, the direct, indirect and induced economic impacts are assessed for each of the project types, as well as the sum of the projects. She is developing simple 2-page State and county summaries for the client, with the expectation that they likely will be provided to each state's legislature by the client in support of state legislation. She has completed the Oregon analysis, with Montana the next state she will be analyzing.

Economic Impacts of Renewable Fuels Facility, Next Renewable Fuels Oregon, LLC – Columbia County, Oregon

Ms. Sawyer is developing an economic and community impact study for the planned biofuel facility development at Port Westward, in Columbia County, Oregon. This project included collecting project-specific data regarding project construction costs and jobs, construction labor classification and wages, taxes, in-lieu payments, and other initial input data. Project output or demand, employment, and wage data related to ongoing operations of the project were estimated. She used IMPLAN software in conjunction with Columbia County specific data to develop a county-level economic impact model showing the initial economic impacts related to the construction of the Port Westward Biofuel Facility. She also developed a long-term county-level economic impact model, using the IMPLAN software and data, showing the on-going annual economic impacts of the biofuel facility during its operating years. The results included the number or value of direct, indirect, and induced jobs, labor income, and taxes in the county attributable to construction of the project in the initial years for the short-term impacts and during years when the project is operating for the long-term impacts. Additional community impacts specific to the project are being assessed and will be reported to the client in a separate report.

Regional Economic Impacts of Wind Power Development, Columbia Energy Partners – Harney County, Oregon

Ms. Sawyer provided analysis for the economic impact assessment of two proposed wind power projects in Harney County, Oregon. She evaluated project-related impacts to property values and public services, among others. The assessment included collecting data from project developers and operators, interviews with local service providers, and literature reviews.

Regional Economic Impacts of Wind Power Development, Southeastern Washington Economic Development Council – Southeastern Washington

Ms. Sawyer provided analysis for the economic impact assessment of three wind power projects in Columbia County in terms of total jobs, income, and tax revenues generated. The study also included evaluation of potential impacts of future wind projects elsewhere in the region. Ms. Sawyer developed an overall socioeconomic overview of the project area and evaluated potential project-related impacts on property values, the value of agricultural production in the region based on the opportunity cost of land, and the overall economy. The economic impact assessment included collecting data from project developers and operators and interviews with local real estate professionals and community organizations including the Chamber of Commerce and economic development agencies.

Hatchet Ridge Wind Power Development and Horse Lake Wind Power Development, RES America and Invenergy – Shasta County and Lassen County, California

Ms. Sawyer prepared several economic studies that evaluated the regional economic impacts of proposed wind developments in northern California for two private wind-energy developers. As a member of the project team, Ms. Sawyer assessed the potential recreational and energy-related impacts to the local community. She coordinated development of a comprehensive document to present to the client and public, focusing on providing a socioeconomic profile of the region and estimated regional economic impacts of the proposed wind developments. The team assessed changes to aesthetic and property values, and evaluated the benefits of increased tax assessments attributable to the project.

Economic Development Impacts of Wind Power, National Wind Coordinating Committee – United States

Ms. Sawyer contributed to a study of the economic development impacts of wind power, examining the local economic effects related to three existing wind power developments and provided a framework for future studies. She helped develop case studies of the impacts of wind power development on local economies, with a primary focus on investigating and quantifying effects on local infrastructure and community services. Sites investigated included Vancycle Ridge, Oregon; Lake Benton, Minnesota; and Culberson County, Texas.

Climate and Sustainability Analysis

Decarbonization Planning, SteriCycle – Worldwide

Ms. Sawyer is assisting KERAMIDA in providing sustainability strategic, technical, and economic analysis expertise. This includes performing a cost benefit analysis for opportunities, such as desirable targets and options, including the outcomes of a Climate Scenario Analysis, capital projects, and operating practices that will improve sustainability, as well as an economic analysis of risks identified as stemming from climate related events and activities. Specifically, she is developing an interactive spreadsheet model that allows the team and the client to vary assumptions and immediately see the outcomes in table and visual format.

Meralco Sustainability Reporting, The Manilla Electric Company (Meralco) – The Philippines

Ms. Sawyer is part of a team assisting the largest electric utility in the Philippines, Meralco, in complying with sustainability reporting requirements consistent with Sustainability Accounting Standard Board (SASB), Global Reporting Initiative (GRI), UN Sustainable Development Goals (SDG), and Task Force for Climate-Related Financial Disclosures (TCFD) guidance documents for reporting of Environmental, Social, and Governance disclosures. Specifically, Ms. Sawyer is the lead energy economist, and she will be developing a climate scenario analytical tool, which will include an interactive tool allowing the user to explore how impacts will change given a range of different climate physical and policy-linked assumptions. As part of this effort, the team will be selecting appropriate metrics to be included and measured in the climate scenario analysis and in the sustainability reporting.

Regulatory Impact and Feasibility Analysis

Lead in Water Cost Study, Washington Office of Superintendent of Public Instruction – Washington State

Greene Economics, with partners EHS-International, Inc. (EHSI) and P2S engineering (Team), were retained by the Office of the Superintendent of Public Instruction (OSPI) to develop an estimate of the cost for remediation and mitigation of lead-contaminated drinking water fixtures at public (common), charter, and state tribal-compact schools. For the purpose of the study, lead contaminated drinking water fixtures is defined as testing above 5 ppb. Greene Economic's research provided OSPI a detailed analysis outlining the costs for remediation and mitigation under the new program. The study included data from a representation of large, medium, and small school districts, following the Washington State School Directors' Association definitions, and including four districts from each category.

Public Outreach and Data Analysis to Inform the Rate Revision Process, King Conservation District, King County, Washington

Ms. Sawyer provided support to the King Conservation District (KCD) in preparation for its rate assessment and development process. The team facilitated stakeholder meetings for agricultural drainage, water conservation, and habitat and ecosystem services. The team also assisted KCD in creating materials to communicate the importance of the programing to the broader county population. The communication materials, including graphical representations of the revenue projections, were used to assist legislators in determining their support for the programming. Specifically, Ms. Sawyer developed alternative revenue projections for parcel data in King County, filtering it for both land use and location. She also assisted in the development of materials for a public workshop, KCD Advisory Committee meetings, and facilitated some of the key sessions.

Second Supplemental Environmental Impact Statement (SSEIS) for the Kalama Manufacturing & Marine Export Facility, Washington State Department of Ecology – Washington

Ms. Sawyer was part of a team working with Washington State to evaluate the impacts of a methanol production and export facility along the Columbia River. Specifically, in coordination with other team members, she developed an interactive tool to assess the difference in global greenhouse gas emissions with and without the facility. Key among the issues under consideration were the many sources of uncertainty and how to address these. The tool was developed to assist in communicating to the public how the GHG outcomes would change under different economic forecasts, and alternative economic assumptions such as oil prices and global methanol demand growth. She assisted in summarizing the tool development and results as part of the Second Supplemental Environmental Impact Statement (SSEIS).

Benefit Cost Analysis of Early Earthquake Warning, California Governor's Office of Emergency Services – California

Ms. Sawyer was a key member of a team conducting a benefit cost analysis of Early Earthquake Warning (EEW) in the State of California. Relying on empirical research and stakeholder/vendor interviews, estimates for the benefits provided by an EEW system and the costs of that EEW system were developed for twelve use cases. Ms. Sawyer was responsible for Electricity Systems and Utility and Other Outdoor Workers use cases. She was also responsible for developing an Excel-based tool that allows users to choose different use cases and input assumptions from drop-down menus and view the changes in benefits, costs, net benefits and benefit-cost ratios in both tabular and visual results.

California Oil Spill Response Cost Study, California Department of Fish and Wildlife, Office of Spill Prevention and Response – California

Ms. Sawyer was part of a team that prepared a statewide study of oil spill costs for the California Department of Fish and Wildlife, Office of Spill Prevention and Response (CDFW OSPR). The cost study will be used to develop Certificate of Financial Responsibility (COFR) amounts to ensure that operators and non-operators have the

appropriate fiscal assets/capital to remediate a potential discharge/spill. The team performed industry engagement and collected confidential data on behalf of CDFW OSPR. She assisted in developing the cost model and performing natural resource damage assessment (NRDA) of spill/discharge scenarios. This process also included developing a database of oil spills in California from 1993 to 2018 that exceed 1 gallon.

Washington Rail Transportation Safety Study, Washington State Department of Ecology (ECY) and Washington State Utilities and Transportation Commission (UTC) – Washington State

Ms. Sawyer assisted Environmental Research Consulting in the preparation of the final report for the 2019 Washington Rail Transportation Safety Study (2019 WRTSS). She reviewed several chapters (other team members reviewed all other chapters) prepared by ERC and ERC's subcontractors (RPS Group, SEAConsult LLC, Risknology, Inc., MainLine Management, Inc., and BST Associates, Inc.) after editing based on comments and inputs provided by ECY and UTC. She helped prepare a revised report in which all the chapters are consistent, incorporated comments and edits to the extent feasible, addressed ADA issues (accessibility and Plain Talk) consistent with Washington State requirements, and flagged outstanding comments for resolution with ERC and subcontractors. The final report was prepared for printing and delivery to the client.

Rock Island Redevelopment Strategy, Port of Douglas County, Washington

Ms. Sawyer is lead economist on a team supporting the Port of Douglas County and the community of Rock Island foster economic growth on the industrially zoned land abutting the Columbia River. The project includes identifying potentially catalytic development projects and developing a capital improvement program that will focus public investments to maximize private-sector leverage. As a part of this process, Ms. Sawyer developed an economic and market feasibility study to provide insight regarding existing conditions in the market area and potential reuse opportunities in support of the waterfront redevelopment, and an economic impact analysis of the potential reuse of the property for various development scenarios. She is currently developing a pro forma analysis of several potential development opportunities, in consultation with the Port of Douglas County and the community.

Brownfield Redevelopment Assessment—Cost and Payback Analysis, City of Portland, Portland, OR

Ms. Sawyer was on a team providing an analysis of a proposed tax incentive program intended to encourage the redevelopment of brownfield properties. The focus of the analysis was to determine the impact and cost return from property tax abatement for remediation costs. Ms. Sawyer developed a cost and payback analysis for several prototype case studies that represent potential brownfield redevelopment scenarios in Portland, Oregon. These case studies were used to evaluate the cost of remediation, utilization of a brownfield property tax abatement, and an estimate of future tax revenues. In consultation with the client, Ms. Sawyer developed a tool for analyzing various scenarios and determining the payback period for the property tax program, using property tax revenue forecasts. She also provided the estimated additional tax revenue that could be realized through the redevelopment of brownfield properties.

Economic Impact of Potential Carbon Reduction Rules in Oregon, Confidential Client – Portland, Oregon

Ms. Sawyer reviewed the impact of potential State of Oregon carbon reduction rules (Cap and Trade, Carbon Tax) for a client with significant operations and fuel use in the state. The project team performed a literature review on existing carbon reduction programs in other regions and used data from the client to calculate the cost impacts on each sector of the client's operations for a range of potential policy choices. The work included creation of a calculator tool that allowed the client to easily compare the cost outcomes of different policy options on each of their business operations.

Review of Notice of Proposed Rulemaking, Cleaner Air Oregon Statement of Fiscal and Economic Impact, Oregonians for Fair Air Regulations – Oregon

Ms. Sawyer was part of a team that reviewed and analyzed the Notice of Proposed Rulemaking (NOPR) for Cleaner Air Oregon (CAO) Statement of Fiscal and Economic Impact (SFEI) and submitted comments to the Oregon DEQ. These comments were based on an in-depth analysis of costs to Oregon businesses using the estimates of compliance costs in the SFEI. Additional comments were provided regarding impacts to small businesses, and potential positive impacts, or benefits. In order to bound these costs and estimate the economic impact of CAO, the team analyzed three scenarios which were then paired with the low, medium, and high costs.

Phase 2 of an analysis of the Hudson River Polychlorinated Biphenyl (PCB) Natural Resource Damage Assessment (NRDA), Scenic Hudson, Inc. - Poughkeepsie, New York

Ms. Sawyer was part of a team for Phase 2 of an analysis of the Hudson River Polychlorinated Biphenyl (PCB) Natural Resource Damage Assessment (NRDA), developing a benefit-cost analysis of dredging to determine if the net benefits of dredging will lead to an overall cost reduction, accounting for the costs of the dredging and the compensatory projects needed to compensate for the interim losses pending resource recovery. Compensatory damage estimates will be rescaled, assuming remediation dredging is performed as part of the NRDA. She reviewed preliminary human use estimates developed in Phase 1 and assess the use of data, assumptions, and methodologies used to ensure they are consistent with current NRDA damage estimate approaches. She assisted revising and updating recommendations for the estimates of recreational fishing, drinking water, and navigational damages. She assisted exploring approaches to quantify human service losses such as fishing and drinking water based on surface water supply. She assisted with the review of existing information to determine if appropriate quantitative data exist as part of the modeling done to date for the Hudson River PCB remediation work. She prepared to develop a regional economic impact analysis, using input-output model software, of the economic stimulus that would occur were the dredging option to take place as part of the restoration effort.

GHG Cap and Trade Analysis and Regulatory Assistance, Confidential Client - Oregon

Ms. Sawyer provided background information and analysis specific to the client's operations that were important in the regulatory design of Oregon's proposed cap and trade program to reduce greenhouse gas (GHG) emissions. Specifically, she developed research regarding emissions leakage and an economic impact analysis of the client on the Oregon economy. She assisted in the larger economic analysis for the client, presenting its economic importance in Oregon; its emission intensive trade exposure, specifically the emissions intensity, industry production and trade, recent tariffs on the industry, the supply elasticity, and calculating the trade exposure; a discussion on carbon policy, the future investment case of a business expansion; and the emissions associated with energy in different regions of the country. The resulting deliverable outlined the regional economic benefits of the client and encouraged them to advocate to the state to create a program to discourage both production and emissions leakage.

Review of Regulatory Impact Assessment of Proposed Stream Protection Rule, National Mining Association – United States

Ms. Sawyer was part of a team of economists estimating the economic impacts from the Office of Surface Mining-proposed stream protection rule on the entire U.S. coal industry. The project evaluated the language of the draft rule and assessed the impact of implementation against current industry statistics and trends. Compliance with the rule was evaluated on 75 current surface and underground mining operations in all regions of the country to determine the impact on access to demonstrated coal reserves. The percent decrease in access to recoverable reserves was determined for both surface and underground mining for three coal-mining regions in the country. For each sector experiencing losses, Ms. Sawyer used IMPLAN software and data, along with data received from the client, to estimate potential employment impacts, including direct mining jobs as well as indirect and induced jobs.

Economic Analysis of Main Hawaiian Islands Insular False Killer Whales Critical Habitat Designation, National Marine Fisheries Service, Pacific Islands Regional Office's Protected Resources Division and Cardno – Hawaii

Ms. Sawyer was part of a team analyzing the economic, socioeconomic, and other costs and benefits for the designation of critical habitat for the Main Hawaiian Islands insular false killer whales' (*Pseudorca crassidens*) distinct population segment under Section 4 of the Endangered Species Act. Section 4(b)(2) of the ESA requires NMFS to consider the economic and national security impacts, in addition to any other relevant impacts, of specifying any particular area as critical habitat. Specifically, the team provided draft and final economic reports focused on the economic impacts associated with the designation of critical habitat for the species. While assisting with the larger project, Ms. Sawyer was specifically responsible for the economic analysis relating to benefits and costs of existing and proposed energy projects. These projects included off-shore wind power projects as well as proposed off-shore wave energy projects. The report assisted NMFS in determining if the benefits of excluding any particular area outweigh the benefits of including that area in the potential critical habitat.

Regulatory Impact Review (RIR)/4(b)(2) Preparatory Assessment/Initial Regulatory Flexibility Act Analysis (IRFA) for the Critical Habitat Designation of Cook Inlet Beluga Whale, Alaska.

Ms. Sawyer was part of a team identifying and analyzing the potential impacts to various land and water uses due to the proposed designation of critical habitat for the listed Cook Inlet Distinct Population Segment (DPS) of beluga whale (Delphinapterus leucas), Alaska. Ms. Sawyer was responsible for the analysis to assess the marine ecosystem services and measure the effects of the proposed designation on mining, transportation and other large-scale development/infrastructure projects, and wind, tidal and geothermal power development. The report also includes an environmental justice analysis to determine whether the proposed Cook Inlet beluga whale critical habit designation will have a disproportionate adverse impact on the Alaska Native tribes, corporations and villages, as well as on other minority and lower income groups. Further, the study analyzed the use and non-use benefits of the proposed critical habitat designation of Cook Inlet beluga whale in Alaska. Sources of potential benefits include, among others, subsistence fishing activities in Cook Inlet and subsistence hunting of Cook Inlet beluga whales by Alaska Native Corporations and communities.

Review of Regulatory Impact Assessment of Proposed Air Quality Regulation, American Petroleum Institute – Gulf of Mexico

Ms. Sawyer was part of a team conducting a review of a regulatory impact assessment prepared by the Bureau of Ocean Energy Management for a proposed rule regarding air quality near offshore oil and natural gas production in the Gulf of Mexico. Ms. Sawyer developed cost calculations for various elements of the proposed rule, and critiqued the RIA prepared by BOEM in regard to its estimation of the proposed rule's cost and benefit impacts. Key deliverables included economic assessment for specific sector, geography, and state; evaluation of market mechanisms; cost benefit analysis; survey design; and review of the RIA.

Bristol Bay Assessment, Pebble Partnership – Alaska

Ms. Sawyer provided a detailed review of the socioeconomic components of a U.S. Environmental Protection Agency draft scientific study document, addressing likely effects of the Pebble Mine in Alaska on the Bristol Bay watershed and its natural resources. Specific review components included existing conditions and impact assessment of economics of ecological resources, and existing conditions and impact assessment of indigenous cultures.

Economic Analysis of Critical Habitat Designation for the Kootenai River Population of the White Sturgeon, Industrial Economics, Inc. – Montana

Ms. Sawyer collaborated to conduct an economic analysis addressing the costs associated with listing the Kootenai River white sturgeon (*Acipenser transmontanus*) as endangered and designating critical habitat. The study provided guidance on the total and relative costs of designating areas as critical habitat. Ms. Sawyer focused on the power impacts related to the Libby Dam, located in Montana; collecting data; and analyzing

retrospective and prospective costs. Ms. Sawyer developed a series of draft analyses and helped prepare the draft report for public review and comment. In addition, Ms. Sawyer prepared responses to the energy-related public comments.

Oil Transfer Rule Small Business Economic Impact Statement and Cost Benefit and Least Burdensome Analysis, Washington State Department of Ecology – Washington

To support the rulemaking process of the Washington State Department of Ecology regarding transfer of oil within Washington State waters, Ms. Sawyer assisted in the completion of several economic analyses. Ms. Sawyer focused on the costs associated with changes in notification practices, "pre-booming" procedures, training, and spill prevention and response planning as they related to mid-sized facilities, called "Class 3 Facilities." Her analyses included telephone and personal interviews with the facilities' management, data gathering and management, and cost development. She also participated in the report preparation for the Class 3 Facilities.

Washington State Route 504 Feasibility Study, Washington State Department of Transportation and HDR, Engineering, Inc. – Cowlitz County, Washington

This study evaluated the engineering, environmental, and economic feasibility of constructing an extension of State Route 504 beyond Mount St. Helens. Ms. Sawyer compiled baseline economic conditions for population, employment, and tourism. Her evaluation of economic impacts of selected alternatives included developing population and employment projections, as well as projecting travel impacts.

Population and Water Demand Forecasting

Water Demand/Population Forecasting for Little Colorado River Basin, U.S. Department of Justice – Arizona and New Mexico

Ms. Sawyer is the lead economist responsible for baseline population estimates and collection and assessment of additional population data to update existing population projection models. This population projection model is being used to forecast future domestic, commercial, municipal, and industrial water requirements for the Hopi Indian and Navajo Indian reservations in the Little Colorado River Basin, located in Arizona and New Mexico. This information supports litigation and negotiation efforts by providing a revised forecast to compare to the model used in the settlement agreement related to water right claims on behalf of these tribes.

San Juan River Basin Economic/Socioeconomic Analysis, U.S. Department of Justice – Arizona and New Mexico

Ms. Sawyer estimated the baseline population and collected additional population data to develop a population projection model for the Navajo Indian Reservation in the San Juan River Basin, located in Arizona and New Mexico, to be used to forecast future domestic, commercial, municipal, and industrial water requirements. This information was used to compare model results to the model used in the settlement agreement related to water right claims on behalf of this Tribe.

Three Pueblos Population and Economic Analysis, U.S. Department of the Interior/Department of Justice – New Mexico

Ms. Sawyer developed, prepared, and documented population projections for three pueblos in New Mexico to support the determination of future domestic, commercial, municipal, and industrial water requirements for each of the pueblos.

Future Water Requirements for Domestic, Commercial, Municipal, and Industrial Purposes on the Flathead Indian Reservation, U.S. Bureau of Reclamation, Upper Columbia Area Office– Montana

Ms. Sawyer developed population forecast models for the determination of future domestic, commercial, municipal, and industrial requirements on the Flathead Indian Reservation in Montana. The results were included in an operational water model of the reservation and were used in negotiations for a water rights settlement among the Tribe, the State of Montana, and the federal government.

Reserved Water Rights for the Duck Valley Indian Reservation, Bureau of Indian Affairs, Northwest Regional Office – Idaho and Nevada

Ms. Sawyer provided input for an expert report on the domestic, commercial, municipal, and industrial water needs on the Duck Valley Indian Reservation. The work included developing a model and methodology to project the future population of the reservation. This information was developed to be used in litigation and negotiation related to water right claims on behalf of the Shoshone-Paiute Tribes of the Duck Valley Indian Reservation.

Reserved Water Rights for the Lummi Indian Reservation, Bureau of Indian Affairs, Northwest Regional Office –Bellingham, Washington

Ms. Sawyer developed population projections for the reservation to the year 2100, including the development of models, methodology, and analysis, in order to estimate future domestic, commercial, and municipal water demand. This information was developed to be used in litigation and negotiation related to water right claims on behalf of the Tribe.

Reserved Water Rights for the Nez Perce Indian Reservation, Bureau of Indian Affairs, Northwest Regional Office – Idaho

Ms. Sawyer developed population projection models, methodology, and analysis for use in estimating the future Indian population of the Nez Perce Reservation by river basin and water supply source. The results were combined with water use estimates to determine future water needs for domestic, commercial, and municipal purposes. This information was developed for use in litigation and negotiation related to water right claims on behalf of this Tribe.

Population Projections for Red River Valley Counties and Municipalities, 2000 through 2050, Bureau of Reclamation, Dakotas Area Office – North Dakota and Minnesota

Ms. Sawyer developed 50-year population projections for the 20 counties and 40 municipalities in the Red River Valley of North Dakota and Minnesota. She developed interactive models derived from historical data from the U.S. Census Bureau, and assumptions about births, deaths, and net in- and out-migration for the region based on data from the US Census Bureau, the National Center for Health Statistics, and other state and local data sources.

Population Projections for Portland and Six Parks and Recreation Subareas, 2000 through 2020, Summary and Technical Documentation Reports, Portland Parks and Recreation – Portland, Oregon

Ms. Sawyer developed population projections to the year 2020 for six subareas of the city of Portland to support parks and recreation planning. Projections incorporated total population changes, as well as changes segmented by age, race, and ethnicity. Ms. Sawyer assisted in the development of a technical report describing the methodology, which was submitted to the city. The forecast was to be used by the parks and recreation department to determine how best to meet the changing needs of the community.

Demographic Profile of the Soboba Indian Reservation, Bureau of Indian Affairs – Riverside County, California

Ms. Sawyer assisted in the development of a demographic profile of the Soboba Indian Reservation, including a detailed analysis of migration to and from the reservation between 1990 and 2000. She integrated this information into projections of the Indian population of the reservation to the year 2050. The population forecast was used by other team members to estimate future housing needs on the reservation for the Soboba Band of Luiseño Indians.

Health Economics Analysis

Economic Evaluation of Extension for Community Health Care Outcomes (ECHO) Support, Northwest Portland Area Indian Health Board – Portland, Oregon

Ms. Sawyer is leading an economic evaluation of Northwest Portland Area Indian Health Board's (NPAIHB) Extension for Community Healthcare Outcomes (ECHO), a telehealth program that increases the ability of primary care physicians to treat chronic and complex illnesses across Indian Country. The study is being conducted to help NPAIHB better understand how and whether the investment in ECHO is providing the economic returns or benefits so that they can make decisions about on-going support and potential expansion of the program in IHS service areas. The study focuses on the benefits and costs of ECHO for Hepatitis C virus (HCV). She is responsible for coordinating with NPAIHB staff to collect patient health data, costs of screening for and treatment of HCV and associated health conditions, and demographic data for different clinic locations in the NPAIHB service area both before and after ECHO was established, using a data collection tool created in coordination with NPAIHB staff and an interview tool. They are currently creating models and a benefit cost analysis framework for the assessment of representative IHS clinics. The benefits of ECHO will be assessed and monetized by the team to develop a Benefit Cost Analysis for each of the locations data is collected and then applied to other locations. These results will be assessed, documented, and presented to the client.

Economics of Tobacco Harm-Reduction Strategies, RAI Services – United States

Ms. Sawyer led the economic analysis conducted to develop estimates of health care costs and savings related to tobacco harm-reduction strategies. This was a multiyear project in which she worked on the continued development and enhancement of a model to estimate changes in life tables related to changes in tobacco harm-reduction, housed in an Access database and with simplified Excel® output reporting.

Development of Health Care Cost Wizard, Mercer Benefits Consultants –United States

Ms. Sawyer completes an annual analysis of employer-based health benefit costs, updating a "benchmark wizard." Using survey data received from the client, the project team develops Statistical Analysis System models to analyze and predict the costs of various types of health care insurance programs, depending on the composition and needs of a specific business. Ms. Sawyer developed and annually updates a spreadsheet "benchmark wizard" so that costs can be predicted, assessed, and compared for each individual business or business type, based on the results of the SAS models and industry averages.

Water Resource Management

Valuation of a Quarry, Based on Water Storage Potential, Lehigh Hanson, Frost Brown Todd, LLC – North Vernon, Indiana

Ms. Sawyer was part of the team developing an analysis to appraise a quarry in Indiana for three different capacities: water storage potential, remaining mineral resources, and other uses such as a landfill. This quarry was the subject of condemnation proceedings for the purpose of constructing a highway. A nearby city was interested in using the quarry pit as a raw water storage facility in order to ensure sufficient future water supplies for the city. The appraisal of the property and its associated mineral rights and other potential uses was important in determining the overall value of the property in relation to its highest and best use. In addition, Ms. Sawyer developed a value for the property based on its potential as a landfill, using the least-cost-alternative method.

Fall City Business District Wastewater Treatment Project, King County – Fall City, Washington

Ms. Sawyer assisted in the guidance on three governance options to operate a new proposed Fall City (Washington) community sewer, a large on-site sewage system (LOSS), in order to move forward toward constructing and operating the new LOSS. These options included private options including an HOA, non-profit organization, an LLC, or a corporation, a public entity such as a sewer district, or a phased approach that starts as an organization similar to an HOA and transitions to a sewer distract at a later time. Ms. Sawyer summarized the key themes related to the development of an HOA governance system in the technical

memorandum to consider when selecting the Fall City community sewer governance structure. Ms. Sawyer also developed a pro forma analysis for the project in coordination with the Jacobs financial team, which included assessing all costs of the project over the first six years of the project. The costs were included in the rates development process. The costs over the first 6 years of the project were subtracted from the imputed rate revenue, resulting in the net revenues over the first 6 years of the project. This analysis was presented to the client and is currently under review. The project is ongoing.

Water Supply Risks Associated with Facility Expansion, Confidential Client – Oklahoma

Ms. Sawyer assisted a confidential client in identifying the water supply risks associated with expanding a facility in Oklahoma. The analysis included a review of how water is appropriated and managed at the current and potential new locations, all relevant state(s) laws and regulations governing authority over the water supply, water rights and water management, and interstate compacts and several agreements. The study also identified historical periods of low flows in the area and looked into the reasons behind these, including, but not limited to, dam management and droughts. The team reviewed standard practices for municipalities, agriculture, and industrial facilities facing drought conditions, and explored whether mandatory water rationing has a legal or traditional precedence. Specifically, Ms. Sawyer developed an analysis of regulation and water withdrawal restrictions of the large dam and reservoir system in the region, based on regulatory and policy research and an analysis of the historic flow rates downstream of these dams and reservoirs.

Assessment of Water Supply Security for Recreational Properties with High Water Use, Confidential Client – 16 U.S. States and Province of British Columbia, Canada

Ms. Sawyer was on a team that assessed water supply security for 34 different recreational facilities in 16 different states across the U.S. Tasks involved evaluating the legal conditions surrounding water allocation in each state and assessing the specific agreement surrounding water in each of the facilities. A score of 1 to 5 was assigned to each property, depending on the certainty of policy going forward as well as on the availability of data. The study identified the risks (potential and actual) associated with water supply at the facilities and assigned water security scores to the properties. The water security scores reflected current water use, availability of alternatives for water use, relevant laws and regulations, governing authority for water supply, drought and changing weather patterns, and facility expansions. Specifically, Ms. Sawyer was responsible to evaluate the risks (potential and actual) associated with water supply at ski and mountain facilities. She assisted with forecasting trends in water availability, given changing climatic conditions, economic growth, population growth, facility growth, regulatory changes, and instituted or planned drought restrictions.

Valsetz Water Storage Project, Polk County – Polk County, Oregon

Ms. Sawyer provided economic support for a feasibility study examining the potential construction of a water storage facility that would capture water in the headwaters of the Oregon coastal range, as well as an interbasin transfer of water into the Willamette Valley. The feasibility study assessed current and future water demands and determined whether each of the three different project options, based on dam and reservoir size, would meet future water needs. The study evaluated expected physical and chemical water quality parameters in the reservoir and downstream of the dam, and potential impacts on terrestrial and aquatic resources and cultural/historical resources. Additionally, a preliminary assessment of potential hazardous wastes on the property was completed. The results were used to assess the feasibility of constructing the facility, factoring in the public need; environmental effects, including those to fisheries; and regulatory risk. As a follow-up to this study, the team also completed a rapid assessment of the potential construction of a water storage project in an adjacent basin at a location where no fish were present.

Benefit Costs Analysis

Energy Outlook Review Supporting Oil I the Sea IV for National Academies of Sciences, Engineering, and Medicine - Washington, DC

Ms. Sawyer was part of the team to conduct a review of the historic and projected future energy trends in support of a new study titled, Oil in the Sea IV: Inputs, Fates, and Effects. Specifically, she reviewed information on the production and consumption of fossil fuel hydrocarbons. She developed projections for hydrocarbon production and consumption for the period between 2020 and 2050 for current trends. Another team member developed projections under two additional scenarios: partial decarbonization and full decarbonization. The projections employed energy forecasts from the International Energy Administration (IEA), the Energy Information Administration (EIA), American Bureau of Shipping (ABS) and those developed by Greene Economics. The review assisted the Oil in the Sea IV research committee in understanding the range of potential decarbonization pathways in the future, and therefore better understand and analyze the potential inputs, fates, and effects of marine transportation of hydrocarbons. The results demonstrated that a rapid global effort will be necessary to achieve the goals of Net Zero emissions by 2050.

Phase 2 of an analysis of the Hudson River Polychlorinated Biphenyl (PCB) Natural Resource Damage Assessment (NRDA), Scenic Hudson, Inc. - Poughkeepsie, New York

Ms. Sawyer is part of a team for Phase 2 of an analysis of the Hudson River Polychlorinated Biphenyl (PCB) Natural Resource Damage Assessment (NRDA), developing a benefit-cost analysis of dredging to determine if the net benefits of dredging will lead to an overall cost reduction, accounting for the costs of the dredging and the compensatory projects needed to compensate for the interim losses pending resource recovery. Compensatory damage estimates will be rescaled, assuming remediation dredging is performed as part of the NRDA. She will review preliminary human use estimates developed in Phase 1 and assess the use of data, assumptions, and methodologies used to ensure they are consistent with current NRDA damage estimate approaches. She will assist revising or updating recommendations for the estimates of recreational fishing, drinking water, and navigational damages. She will assist exploring approaches to quantify human service losses such as fishing and drinking water based on surface water supply. She will assist with the review of existing information to determine if appropriate quantitative data exist as part of the modeling done to date for the Hudson River PCB remediation work. She will develop a regional economic impact analysis, using input-output model software, of the economic stimulus that would occur were the dredging option to take place as part of the restoration effort.

Environmental Sustainability Plan, Cascadia Consulting Group and City of Redmond – Washington

Ms. Sawyer was on a team that provided expertise in conducting financial analysis to support identification and prioritization of sustainability needs and opportunities of shortlisted actions, including an assessment of how much the action may cost over what timeframe, who would have to pay, and what funding would be available to support it. The team reviewed and provided economic analysis input on other aspects of the Environmental Sustainability Action Plan (ESAP). Specifically, the team estimated the economic variables and outcomes associated with identified actions in the ESAP. Essentially, the analysis assessed the potential of ESAP implementation to meet regional and established targets. These estimations were visualized in a “wedge analysis” that depicted a high-level estimate of how much the actions will collectively contribute towards meeting the city’s communitywide goals and targets. The analysis was organized by strategy “bundles”, including: Cleaner Electricity; Reduced Building Energy Demand; Residential Fuel Switching; Fewer Passenger Vehicle Miles Traveled; Increased Passenger Vehicle Fuel Efficiency; Improved Solid Waste & Materials Management; Increased Tree Canopy Cover; Enhanced Natural Drainage Systems; Increased Habitat Quality and Accessibility; Reduced Potable Water Use; Enhanced Stormwater Retrofit for Flow and Quality. These bundles represented key areas for reducing Redmond’s environmental impact. MS. Sawyer was primarily responsible for the analysis related to the Cleaner Electricity; Reduced Building Energy Demand; Residential Fuel Switching; and Improved Solid Waste & Materials Management bundles and assisted with other bundles as well. The analysis

was conducted to 2050 using three scenarios: Business-As-Usual; External Factors; and ESAP Actions. The findings identified the greenhouse gas emissions savings by strategy and bundle.

Forecasting Electric Truck Purchases based on Incentives, Highland Fairview – California

Ms. Sawyer developed a model to show how incentives, such as financial purchase subsidies and charging infrastructure, are expected to accelerate the conversion to ETs in commercial fleets in southern California. Components of the model include the cost of ownership and operation, battery ranges, longevity of trucks, and concerns about access to charging infrastructure, government regulation, as well as environmental awareness and social perceptions. The analysis was used in negotiations with the California Air Resources Board (CARB) surrounding potential GHG mitigation for proposed construction and operation of the World Logistics Center in Moreno Valley, California.

Effect of Policy Tools for Encouraging Electric Vehicle Adoption, Newhall Ranch – Santa Clarita, California

Ms. Sawyer conducted a review of literature pertaining to policies encouraging the adoption of electric vehicles and created a forecasting model for the impact of different policy tools on electric vehicle adoption in a new residential community in California.

Benefits and Costs of Nature-Based Adaptation to Climate Change, The Nature Conservancy – Ventura County, California

Ms. Sawyer developed a large database to be used in the analysis of costs and benefits related to nature-based adaption to climate change. For this study, all economic costs and benefits of adaptation alternatives for Ventura County were developed, including changes in the ecosystem service levels. Flood and hazard damages, including damages to public infrastructure, privately owned structures (business and residential), and agriculture, were evaluated for over 31,000 parcels in a Geographic Information Systems database. Ms. Sawyer assisted in the development of an interactive sensitivity analysis tool to vary assumptions to determine sensitivity of benefits and costs. The team worked closely with stakeholders representing city governments, state agencies, emergency managers, and the U.S. Navy.

Benefits and Costs of Proposed Arctic Regulations, Shell Alaska Venture – Alaska

The Office of Information and Regulatory Affairs, a division of the Office of Management and Budget, was tasked with the review of new rules promulgated by regulatory agencies. Ms. Sawyer was part of the team that prepared a benefit-cost analysis of three elements of the proposed rule having to do with additional security surrounding oil spill response. Benefits were estimated by using spill probabilities and reduced risk of harm to the ecosystem services provided by the natural environment. The team also analyzed the degree to which the proposed arctic regulations were consistent with international arctic regulatory trends.

Agricultural Economic Analysis

Assessment of Small Farms Programming at Washington State University, Washington State University – Pullman, Washington

Ms. Sawyer provided support to WSU in the assessment of its Small Farms Program. The work involved quickly gathering the necessary information through telephone interviews with core WSU SFP staff and conducting surveys of other people who have worked or were working with the SFP (approximately 300), using Survey Monkey, an online survey tool. Survey questions were developed in consultation with the Small Farms Team. Survey participation was increased through a concerted communication effort. Ms. Sawyer led preparation of the final report with draft recommendations for a five-year vision. Throughout the entire process, Ms. Sawyer communicated with the SFP staff members to integrate alternative approaches and ideas to better meet project goals.

Economic Analysis of Increasing Use of Compost on Food Crops, Portland Metro – Portland, Oregon

Ms. Sawyer led a team providing economic analysis for a study of the potential for increasing compost use on food crops. The analysis investigated the potential for increasing food growers' compost use by identifying barriers to market penetration, education, and knowledge; and specific requirements in nutrients and quality that may not have been met at the time of the study. Ms. Sawyer incorporated a market overview of compost supply and demand along with illustrated areas where demand may increase. In addition, she led a review of the financial impact of compost in terms of costs and revenues to local food growers. The analysis included an assessment of the existing supply of compost, both in quantity and type, and the potential for increasing the supply, conducted through interviews with compost processors and analysis of the existing data. It also included an assessment of current demand for compost for food crops and a demand forecast for the use of compost, developed through interviews with farmers in the study area as well as farmers with established compost use outside the study area.

Global Resource Issues Related to Berry Production, Driscoll's Berries – Worldwide

Ms. Sawyer conducted an environmental scan for a global berry producer, evaluating the risks and challenges associated with global access to labor over the next 15 to 20 years. Ms. Sawyer reviewed global forecasts for labor availability and analyzed how changing access might influence decisions to invest in areas throughout the world. Results were used by the firm in developing long-range business strategies.

Corn Variation Coexistence White Paper, Monsanto – United States

Ms. Sawyer assisted in conducting research and developing the resulting white paper regarding the coexistence of various corn types (e.g., conventional, organic, and biotechnology corn), including markets for, prices of, regulations of, and stewardship practices for these types of corn.

White Mountain Apache Water Use Claim Study, Bureau of Indian Affairs – Arizona

Ms. Sawyer provided agricultural economic analysis for potential agricultural enterprises related to irrigation needs and water use claims. This analysis included the development of an organic beef enterprise budget and market analysis, and a preliminary analysis of a startup organic dairy enterprise for the White Mountain Apache Indian Tribe on the Fort Apache Reservation in Arizona.

Comprehensive Water Management Plan Study for the Duckwater Shoshone Indian Reservation, Bureau of Indian Affairs – Nevada

Ms. Sawyer led the effort to develop a comprehensive water management plan for the Duckwater Shoshone Indian Reservation in Nevada, overseeing and coordinating work of staff and subcontractors from a wide variety of disciplines, including hydrology, engineering, and legal analysis. In addition to her project management duties, she conducted the agricultural economics analysis for the project, focusing primarily on hay and cattle production.

Recreation

Phase 2 of an analysis of the Hudson River Polychlorinated Biphenyl (PCB) Natural Resource Damage Assessment (NRDA), Scenic Hudson, Inc. - Poughkeepsie, New York

Ms. Sawyer is part of a team for Phase 2 of an analysis of the Hudson River Polychlorinated Biphenyl (PCB) Natural Resource Damage Assessment (NRDA), developing a benefit-cost analysis of dredging to determine if the net benefits of dredging will lead to an overall cost reduction, accounting for the costs of the dredging and the compensatory projects needed to compensate for the interim losses pending resource recovery. Compensatory damage estimates will be rescaled, assuming remediation dredging is performed as part of the NRDA. She reviewed preliminary human use estimates developed in Phase 1 and assessed the use of data, assumptions, and methodologies used to ensure they were consistent with current NRDA damage estimate approaches. She assisted revising and updating recommendations for the estimates of recreational fishing. She assisted exploring approaches to quantify human service losses of recreational fishing. She reviewed existing

information to determine if appropriate quantitative data exist as part of the modeling done to date for the Hudson River PCB remediation work. She will develop a regional economic impact analysis, using input-output model software, of the economic stimulus that would occur were the dredging option to take place as part of the restoration effort.

Recreational Needs Assessment, Enloe Dam Hydroelectric License Application Process - Okanogan County, Washington

Ms. Sawyer helped develop a recreational needs assessment for the Enloe Dam relicensing process. The work involved projecting recreational needs for the next 30 years and evaluating the capacity of the project to mitigate recreational demand. Trends in recreational participation, based on national, state, and county research, were developed for the County. Local stakeholders were interviewed to validate the results. Specifically she assessed the existing inventory and assisted in the recreational needs projection.

Human Use Services Information System, Arnold and Porter – United States

Ms. Sawyer assisted in the development of a Web-based information management system that compiles, evaluates, and facilitates access to publicly available data, reports, articles, and geospatial information related to baseline ecological and human use of ecosystem services related to a large water body.

Planning Strategies for Revenue Enhancement on the Valles Caldera National Preserve, Valles Caldera Trust – New Mexico

Ms. Sawyer assisted with a business plan for the Valles Caldera National Preserve in New Mexico. Specifically, Ms. Sawyer performed research and evaluation of a variety of recreational ventures for the preserve, including an equestrian center, equestrian trails, and a horse campground. She also assisted in the development of an interactive financial model to be used for planning purposes. The model allows board members and preserve staff to adjust model assumptions to see impacts on future cost and return projections.

Pelican Butte Ski Area Master Plan Environmental Impact Statement: Alpine Skiing Market Analysis, U.S. Department of Agriculture, Forest Service – Pacific Northwest Region, Oregon

The overall project evaluated the potential market for downhill skiing at the proposed Pelican Butte Ski Area in southern Oregon. Ms. Sawyer was responsible for population projections by county and age cohort, skier demand analysis, and other economic analysis. She projected population by age cohort in the local and regional market areas, and projected potential participation by selected age cohorts for counties in the market area. She also completed an analysis of the allocation of potential skiers to ski areas in and outside the market area.

Energy Economic Analysis / Federal Energy Regulatory Commission

Economic Analysis of Proposed Hydroelectric Project, Haines Borough – Haines Borough, AK

Ms. Sawyer provided economic analysis for a proposed hydroelectric project on Excursion Inlet in Haines Borough, Alaska. The first phase of the project involved a preliminary fish habitat study. The second phase of the project focused on a reconnaissance of: resources identification and analysis; land use, permitting, and environmental analysis; preliminary engineering design and costs analysis; cost of energy and market analysis; and a simple economic analysis. Ms. Sawyer developed costs and energy benefits of the project and a payback analysis. She researched, compiled, and analyzed economic data regarding the project and the project area to determine potential impacts to the surrounding community.

Enloe Dam FERC Hydroelectric Dam Relicensing and Energy Analysis, Okanogan Public Utility District – Okanogan County, Washington

Ms. Sawyer provided economic and socioeconomic analysis for the Enloe Dam FERC licensing process. She developed the power economics and socioeconomic sections of the license application. Specifically, she collected, compiled, and analyzed power cost and revenue data, and developed a socioeconomic impact analysis of the project.

Economic and Energy Analysis for Proposed 230-KV Transmission Line and Wind Project, Harney Electric Cooperative & Columbia Energy Partners – Harney County, Oregon

Ms. Sawyer provided economic and energy analysis relating to a proposed transmission line right-of-way to connect a wind power project to the existing power grid in Harney County, Oregon. The preferred ROW path crossed national wildlife refuge lands that are under the general management plan direction of the U.S. Fish and Wildlife Service and the Bureau of Land Management.

Pelton Dam FERC Hydroelectric Dam Relicensing, U.S. Department of Interior, Bureau of Indian Affairs – Jefferson County, Oregon

Ms. Sawyer served as project manager and provided technical analytical support on economics, recreation and land use, and database and document management to protect the trust resources of the Warm Springs Indian Reservation. She was responsible for oversight and coordination of staff and subcontractors performing studies for a wide variety of disciplines, including fisheries, terrestrial resources, power engineering, water quality and hydrology, cultural resources, and Geographic Information Systems. She also developed a methodology and price calculations for the sale of allotted reservation land used in the production of power to the licensees.

Similkameen River Proposed Hydroelectric Project FERC Study, Okanogan Public Utility District – Okanogan County, Washington

Ms. Sawyer provided economic and flooding analysis for the proposed Similkameen River hydroelectric project FERC study for the license applicant. She developed the power economics and flooding impact analyses through collection, compilation, and analysis of county tax data. She was also responsible for developing a socioeconomic impact analysis of the project.

St. Lawrence River/FDR Power Project FERC Relicensing Study, U.S. Department of the Interior/Bureau of Indian Affairs – Franklin County, New York

Ms. Sawyer was responsible for oversight and coordination of the work of subcontractors from a wide variety of disciplines in the FERC relicensing studies for the St. Lawrence/FDR Project in New York, for which Section 10(a) recommendations were submitted. She was responsible for the overall project management and technical support to the Bureau of Indian Affairs in economics, recreation and land use, and database and document management. She coordinated the work of subcontractors performing studies for fisheries, terrestrial resources, power engineering, water quality and hydrology, and cultural resources. Deliverables focused on the protection of the trust resources of the St. Regis Mohawk Tribe Reservation.

Friant Power Authority Impacts, Friant Power Authority – San Joaquin Valley, California

Ms. Sawyer provided technical support and analysis of the impacts to the Friant Power Authority from various alternative flow regimes of the San Joaquin River. The Friant project consists of three generators, one on each of the following: the Madera Canal, the Friant-Kern Canal, and the San Joaquin river outlet of the Friant Dam. Ms. Sawyer analyzed the proposed reductions in flow through the two canals as applicable to the Friant Power Authority as a whole as well as to its member districts. Power generation impacts to the three power facilities and financial impacts to the Friant Power Authority, its eight-member water, irrigation, and municipal utility districts, as well as the final consumers in the region, were included in the analysis.

Annual Charges Related to Wisconsin River Headwaters Hydroelectric Project FERC Application, Bureau of Indian Affairs, Minneapolis Area Office – Gogebic County, Michigan

Ms. Sawyer developed recommendations for Section 10(e) annual charges to be paid to the Lac Vieux Desert Band of the Lake Superior Chippewa Tribe. She conducted a study on the Lac Vieux Desert Indian Reservation in northern Michigan to determine the amount and value of reservation land flooded by the headwaters of the hydroelectric project.

Licensing Conditions and Annual Charges Related to Cushman Hydroelectric Project FERC Application, U.S. Department of the Interior/Bureau of Indian Affairs – Mason County, Washington

Ms. Sawyer was responsible for overseeing and coordinating the work of subcontractors from a wide variety of disciplines and providing economic analysis for the multiyear Cushman Hydroelectric Project FERC relicensing. She coordinated the development of Section 4(e) conditions and developed the recommended 10(e) annual charges for the relicensing of the Cushman Hydroelectric Project, which impacts the Skokomish Indian Reservation in western Washington. As project manager, she coordinated the work of six subconsultant firms, including experts in fisheries, hydrology, power engineering, geology, sediment transport, wetlands, wildlife, and cultural resources, to address project impacts, including loss of fish habitat and fish passage, flooding, changes in groundwater, changes in wetland and wetland habitat, and impacts on cultural resources.

West Enfield Hydroelectric Project Operations Modification Assessment, U.S. Department of the Interior/Bureau of Indian Affairs – Penobscot County, Maine

Ms. Sawyer was responsible for overseeing and coordinating the work of subcontractors from several disciplines. This study evaluated the potential impacts of a proposal to raise the dam at the West Enfield Project (FERC Project No. 2600) in Maine, which could cause further flooding of lands of the Penobscot Indian Nation. Based on information provided by Geographic Information Systems analysts, including the identification and quantification of additional lands and habitat that could potentially be flooded by a rise of 1 foot or 2 feet in the pool level, Ms. Sawyer developed an annual charge for the flooded lands to be paid to the Penobscot Indian Nation and made recommendations to the Bureau of Indian Affairs.

Box Canyon Hydroelectric Project Relicensing, U.S. Department of the Interior/Bureau of Indian Affairs – Pend Oreille County, Washington

Ms. Sawyer provided technical support to the Bureau of Indian Affairs and the Department of the Interior in developing recommendations for Section 10(e) annual charges to be paid to the Kalispell Tribe for the relicensing of Pend Oreille Public Utility District's Box Canyon FERC Hydroelectric Project lands located on the Tribe's reservation. This included economic analysis related to the costs of the project and alternative sources of electric power for the PUD, as well as determining the appropriate methodology to be used in the calculation.

Priest Rapids-Wanapum FERC Hydroelectric Project Relicensing Study, PacifiCorp and the Yakama Nation – Washington

Ms. Sawyer provided technical analytical support to the client in the areas of power economics and agricultural benefits. She served on a technical subcommittee assisting in the development of an initial consultation document in preparation for compiling a draft license application.

Socioeconomic Base Study Report for the Spokane River Hydroelectric Project Relicensing, Avista Corp. – Spokane, Washington

Ms. Sawyer served as project manager, leading a team of economists conducting a socioeconomic base study for the economic region surrounding the Spokane River Hydroelectric Project. The base study, part of the FERC relicensing process, focused on the project's ties to the community, lake and river recreation, jobs, income, and related industrial and retail business.

Review of Training Manual on Economic Analysis of FERC Hydroelectric Relicensing, and Conducting Training, Industrial Economics, Inc. – United States

As a subcontractor, Ms. Sawyer provided training support on applied economics issues in FERC relicensing through a review of training materials and participation in a training session on economic analysis for hydropower project relicensing for the U.S. Fish and Wildlife Service. She performed a review and provided comments on the training manual, *Economic Analysis for Hydropower Project Relicensing: Guidance and Alternative Methods*, prepared under contract with the USFWS. The primary focus of the review was the practical applicability of the methods described in the report to hydroelectric relicensing projects. Ms. Sawyer

also participated, in an advisory role, in the training session conducted with representatives of several federal government agencies, focusing on the application of the methods to then-current hydroelectric relicensing projects.

Shoreline Erosion Study and Monitoring near St. Ann's Church, U.S. Department of the Interior/Bureau of Indian Affairs – Penobscot County, Maine

As a Section 4(e) condition of the FERC license for the Milford Hydroelectric Project, this project involved using global positioning system technology and Geographic Information Systems to monitor streambank erosion that threatens the historic St. Ann's Church on the Penobscot Indian Reservation in Maine. Ms. Sawyer assisted in the preparation of a base report, describing current conditions to which changes can be compared. Ongoing erosion would be measured and assessed as needed. Ms. Sawyer assisted in cost development and report writing.

Long-Term Environmental Water Account Environmental Impact Report/Environmental Impact Statement Power Impact Analysis, CDM – Central California

Ms. Sawyer was the lead economist developing the impact to power production and prices under the various alternatives of the long-term EWA EIR/EIS. This analysis included assessing the power model results provided by the client, including the energy output of several state- and federal-operated dams, and determining whether the impacts under each of the alternatives were "significant" or "not significant," as well as determining the impact on power and power prices in the entire project area.

Population Projections/Agricultural Economic Analysis

Federal Reserved Water Rights Claim for the Fort Belknap Indian Reservation, Bureau of Indian Affairs, Northwest Regional Office – Montana

The project analyzed the economic feasibility of a comprehensive water right claim plan. Ms. Sawyer developed population forecast models for the determination of future domestic, commercial, and municipal water needs. This information was developed for use in litigation and negotiation related to water right claims on behalf of the Tribe. Agricultural economic analysis performed by Ms. Sawyer for this project included development of an organic beef enterprise budget and market analysis, and studies related to buffalo production on the reservation.

Reserved Water Rights for the Flathead Indian Reservation, Bureau of Indian Affairs, Northwest Regional Office – Montana

Ms. Sawyer was a part of a multidisciplinary study team assembled to quantify water rights. The team conducted farm economics and feasibility analyses for irrigation development. The team also inventoried facilities for domestic and municipal water supply, livestock ponds, and undeveloped springs. An analysis of future domestic, commercial, municipal, and industrial water needs of the Tribe was also conducted. Ms. Sawyer developed a population projection model, methodology, and analysis for the reservation. This information was developed for use in litigation and negotiation related to water right claims on behalf of this Tribe. Ms. Sawyer also developed agricultural economic analyses for this project, including the development of an organic beef enterprise budget and market analysis, as well as studies related to buffalo production on the reservation.

Reserved Water Rights for the Crow Indian Reservation, Bureau of Indian Affairs, Rocky Mountain Regional Office – Montana

Ms. Sawyer served as part of a multidisciplinary study team assembled to investigate water rights over a number of years. The team analyzed the economic feasibility of a comprehensive water right claim plan, including a detailed analysis of farm enterprises. Ms. Sawyer developed population projections for the reservation. This work included the development of population projection models, methodology, and analysis, which were used to forecast future domestic, commercial, municipal, and industrial water needs on the reservation. In addition, Ms. Sawyer provided agricultural economic analysis to the team, including the development of an organic beef enterprise budget and market analysis, as well as studies related to buffalo production on the reservation. This

information was developed for use in litigation and negotiation related to water right claims on behalf of this Tribe.

Published Papers and Presentations

Metro Compost Use: Economic Analysis of Supply, Demand, and Utilization. BioCycle West Conference, Portland, Oregon, 2015.

Economic Impacts of Recycling in Colorado. Colorado Association for Recycling Annual Meeting, Denver, Colorado, 2014.

The Importance of Detailed Small Area Population Projections in Local Planning Efforts. Pacific Northwest Regional Economic Conference, Tacoma, Washington, 2004.

Estimating AIAN Migration on Indian Reservations in the Western United States. Population Association of America Annual Meeting, Boston, Massachusetts, 2004.

Projecting Indian Populations for the Purpose of Determining Water Requirements: Methodological Issues. Population Association of America Annual Meeting, Minneapolis, Minnesota, 2003.