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Supporting Natural Resource Management—The Role of Economics at the Department of the Interior—A Workshop Report

Open-File Report 2018–1054

U.S. Department of the Interior
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Cover. Compilation of natural resources and activities found on lands of, or managed by, the Department of the Interior.

Sources:

1. Bureau of Land Management.
2. U.S. Geological Survey.
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4. Bureau of Land Management.
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8. National Park Service.
9. U.S. Geological Survey.
10. Fish and Wildlife Service.
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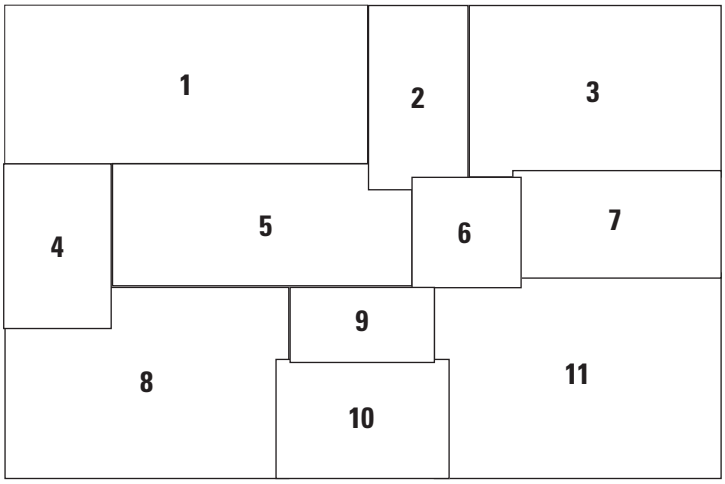

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U.S. Geological Survey

U.S. Department of the Interior
RYAN K. ZINKE, Secretary

U.S. Geological Survey
William H. Werkheiser, Deputy Director
exercising the authority of the Director

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Abbreviations

BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
DOI	U.S. Department of the Interior
ECG	Economics Coordinating Group
ECOP	Economics Community of Practice
FWS	U.S. Fish and Wildlife Service
IMPLAN	Economic Impact Analysis for Planning
NEPA	National Environmental Policy Act
NPS	National Park Service
ONRR	Office of Natural Resource Revenue
PPA	Office of Policy Analysis
Reclamation	Bureau of Reclamation
SDC	Science and Decisions Center
USGS	U.S. Geological Survey
VOI	Value of Information

Supporting Natural Resource Management—The Role of Economics at the Department of the Interior—A Workshop Report

By Emily J. Pindilli,[1] Christian S.L. Crowley,[2] Sarah A. Cline,[2] Anthony J. Good,[1] Carl D. Shapiro,[1] and Benjamin M. Simon[2]

Executive Summary

The first U.S. Department of the Interior (DOI) Economics Workshop (hereafter "Workshop") was held April 5–7, 2017 in Washington, D.C., to identify, highlight, and better understand needs and opportunities for economic analysis to support DOI's mission. The Workshop, jointly convened by the DOI Office of Policy Analysis and the U.S. Geological Survey (USGS) Science and Decisions Center, provided an opportunity for DOI's economists to share expertise and experiences and to build collaboration and communication channels across DOI.

Natural and cultural resource managers face complex questions and often have to balance competing stakeholder interests. Per the mission statement, DOI "protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities." Economic analysis is relevant to issues integral to nearly all the land and water management decisions made by DOI. More than 80 DOI economists gathered at the Workshop to share their work, discuss common challenges, and identify approaches to advance the use and contribution of economics at the DOI.

Key Findings

Workshop participants identified a set of findings including communication issues, lack of standardization, and a need to continue developing methods and data for economic analysis. One challenge identified was a lack of understanding of economic concepts and conclusions among decision makers and policymakers, physical and biological scientists, natural and cultural resource managers, and the public. As a result, DOI teams that would benefit from economic analysis might not consult DOI economists or bring them in too late in the process for truly integrated analytical design. DOI economists also noted gaps in communication among the DOI economics community.

Participants discussed a need to develop and standardize methods for estimating natural resource values. They also noted issues with consistency in energy resource modeling. Another area requiring further research is the consideration of interactions and tradeoffs among DOI-managed energy, water, and biological resources. Finally, the value of scientific information is not well understood, which may lead to underprioritizing its development and utilization.

Recommendations

To address the findings, workshop participants developed a number of recommendations. The DOI economics community should improve communication with noneconomist colleagues and the public by developing materials in coordination with the public affairs staffs in the DOI and Bureaus that explain economic concepts, how economics is used in decision making, and some basic economic methods. The community should establish a workgroup led by the Office of Policy Analysis to coordinate this effort. To further increase information development, sharing and consistency, the community should (1) hold regular DOI economics workshops, (2) establish a DOI Economics Community of Practice (ECOP), and (3) establish a DOI Economics Coordinating Group (ECG). The ECOP could provide routine opportunities to share information and expertise, identify opportunities for capacity sharing, and develop coordinated plans to address research priorities. The ECOP could be responsible for planning future workshops and other events for the community.

The ECG could identify economics expertise for different topics and serve as a key advisor and resource for DOI decision makers, helping to develop and coordinate a unified response for high-level economics-related inquiries and tasks. Additionally, the ECG could seek to identify key emerging natural and cultural resource issues of strategic importance

[1]U.S. Geological Survey.

[2]U.S. Department of the Interior Office of Policy Analysis.

to DOI that could benefit from economic analysis. The ECG could coordinate a workgroup of DOI economists to identify gaps, to prioritize research, and to coordinate approaches and methods development across DOI for estimating nonmarket values of natural resources and develop materials on best practices.

DOI should develop a modeling platform to address questions covering the full range of onshore and offshore energy resources. The USGS should lead an effort to develop an integrated analysis framework for multi-resource analysis, considering energy and nonenergy resources in a platform that models relevant interactions and tradeoffs.

Finally, the USGS should establish a "value of information" workgroup, with participation from economists in DOI and Bureaus, to prepare a paper articulating the current methods and practices used to estimate the values associated with scientific information. This workgroup should identify a program of empirical DOI research to advance the development and coordination of these values.

Summary

The Workshop had a variety of sessions including opportunities to share research, panels on specific issues, breakout groups to identify potential solutions, and open forums to brainstorm new ideas. The first day of the Workshop included an overview of each of the Bureaus/offices in DOI and a discussion of their economics capacity and function. A panel on regulatory analysis focused on responding to new requirements from the Office of Management and Budget and a new emphasis on retrospective analysis.

A series of "lightning rounds" allowed for a diverse set of research and analysis to be discussed. Ten presentations on nonmarket valuation provided a sample of the many research efforts and ongoing gaps in this area. Another lightning round focused on economics, decision making, and policy. This lightning round was followed by a panel on economics in decision making to further explore this topic.

A panel discussed the use of economic models and data to support DOI requirements. Ten presenters described the specific modeling and scenario analysis they were doing.

On the final day of the Workshop, participants were engaged in a strategic discussion on the future of economics in DOI. They scoped a number of Workshop products, including a research agenda, synthesis document, and development of a DOI economics community.

Conclusions

The Workshop provided a platform for DOI economists to network; to discuss past, ongoing, and future projects; and to build a foundation for future collaborative efforts to improve methods, data, results, and communication. To ensure that limited resources are used most efficiently and effectively, it is imperative that DOI economists leverage each other's expertise, maximize collaboration, share data and tools, and pursue methodology improvements through retrospective analysis. It also is important to improve communication and sharing of economic data, methodologies, and analytical results with physical scientists, resource managers, decision makers, policymakers, DOI staff, and the public.

Major outcomes of the Workshop include the desire for recurring DOI economics workshops and ongoing collaboration with supplementary workgroups, webinars, blogs, and discussion forums. The Workshop came at an important time when DOI's need for socioeconomic analysis continues to grow. Looking ahead, there are several key issues that DOI will face, and understanding the economic and societal implications will inform decision makers on the tradeoffs.

Introduction

The first U.S. Department of the Interior (DOI) Economics Workshop (hereafter "Workshop") was held April 5–7, 2017 in Washington, D.C., to identify, highlight, and better understand needs and opportunities for economic analysis to support DOI's mission. Although this was the first all-DOI Economics Workshop, the U.S. Geological Survey (USGS) Science and Decisions Center (SDC) convened a USGS Economics Workshop in 2011 with participation by many DOI economists. The USGS Workshop highlighted the importance of interdisciplinary studies at the USGS and advanced development of the Multi-Resource Analysis concept—an emerging approach that uses an economic framework to consider multiple natural resources at a given location, their interrelationships, and the impacts of change. The DOI Workshop, jointly convened by the DOI Office of Policy Analysis (PPA) and the USGS SDC, also provided an opportunity for DOI's economists to share expertise and experiences and to build collaboration and communication channels across DOI's Bureaus and offices.

The Workshop covered a broad suite of topics including regulatory analysis, tools and models used by DOI economists, data needs and availability, nonmarket valuation, and the use of economics in decision making. The Workshop included "lightning rounds"—5-minute talks that facilitated sharing a large number of research and analysis presentations. There also were posters, small workgroup sessions, panel discussions, and open forum discussions. This report summarizes the Workshop and describes conclusions and recommendations based on insights from the Workshop.

Natural and cultural resource managers face complex questions and often have to balance competing stakeholder interests. Per the mission statement, DOI "protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities" (U.S. Department of the Interior, 2018). Economic

U.S. Department of the Interior (DOI) economists at the first DOI Economics Workshop. Photograph by Christian Crowley, DOI.

analysis is relevant to issues integral to nearly all the land and water management decisions made by DOI. DOI economic analysis contributes to effective decision making in leasing minerals; implementing and managing royalties, revenues, and fees; infrastructure; water management; evaluating the costs and benefits of alternative plans for projects including the societal tradeoffs associated with actions; timber management; identifying unintended consequences of decisions; identifying externalities and their costs; estimating the market and nonmarket value of natural resources; and evaluating the value of scientific information in decision making.

Key Findings and Recommendations

Key findings and recommendations are a product of the Workshop discussions and are provided in this section.

Finding 1—There is great and unmet potential for applying economic concepts to decision making in DOI.

Recommendation.—DOI economists should improve communication with noneconomist colleagues and the public by developing materials, in coordination with public affairs staff in DOI and Bureaus, that explain basic economic concepts, how economics is used in decision making, and some of the basic economic methods. Infographics or similar materials that would be readily accessible on DOI's web page would further enhance communications. PPA should lead a DOI workgroup to coordinate this effort. Outputs from this effort can include the following:

- Develop a DOI economics technical guide that outlines the role of economics in DOI, when an economic analysis is needed, and how economics can be applied most effectively. The technical guide should describe key economics concepts and their application to DOI natural resource issues.
- Develop a training course about working with economists to be offered at departmental training centers.
- Identify training opportunities for economists interested in improving their presentation and communication skills.
- Develop a communications guide for economists to refer to when drafting papers, briefings, presentations, and so on.
- Institute a series of podcasts or internet-based content for use on social-media platforms.

Finding 2—DOI economists need to increase communication and collaboration across DOI Bureaus and offices.

Recommendation.—Three actions are recommended: (1) hold regular (annual or biannual) DOI economics workshops, (2) establish a DOI Economics Community of Practice (ECOP), and (3) establish a DOI Economics Coordinating Group (ECG). The ECOP can provide routine opportunities to share information and expertise, identify opportunities for capacity sharing, and develop coordinated plans to address research priorities. The ECOP could be responsible for planning future workshops and other events for the DOI economics community.

The ECG could identify economics expertise for different topics and could be chaired by PPA and include representation from each DOI Bureau and office. Bureaus and offices could establish a lead point of contact for economics-related issues. The ECG could serve as a key advisor and resource for DOI decision makers, helping to develop and coordinate a unified response for high-level economics-related inquiries and tasks. Additionally, the ECG could seek to identify key emerging natural and cultural resource issues that are of strategic importance to DOI and would benefit from economic analysis.

Finding 3—There are substantial gaps in methods to estimate the value of natural resources and a lack of standardization in the application of these methods. Understanding natural resource values is essential for managing resources and assessing tradeoffs.

Recommendation.—Identify gaps, prioritize research, and coordinate approaches and methods development across DOI for estimating nonmarket values of natural resources. Establish materials on best practices to encourage the use of standardized approaches. A workgroup of DOI economists, led by PPA, could start this work.

Finding 4—DOI needs to improve consistency in modeling frameworks related to energy resource management questions, including revenue-related issues.

Recommendation.—Develop a DOI modeling platform to address questions covering the full range of onshore and offshore energy resources.

Finding 5—DOI needs to develop an improved understanding of the interrelationships across multiple natural resources that DOI manages including energy, mineral, water, and biological resources.

Recommendation.—The USGS should lead an effort to develop an integrated analysis framework and a multi-resource analysis, which considers multiple natural resources in a platform that models relevant interactions and tradeoffs including economic effects.

Finding 6—DOI needs to improve efforts to quantify the value of scientific information required for decision making.

Recommendation.—DOI should develop a DOI value of information (VOI) technical guide through a VOI workgroup led by the USGS, with participation by economists from across DOI. The technical guide should describe what VOI is, when it is most useful, methods to be used, and collaborative approaches to develop a study team.

U.S. Department of Interior Economics Workshop Summary

This section provides a day-by-day overview of the Workshop agenda. The list of Workshop participants is available in appendix 1, and the detailed agenda is provided in appendix 2. The DOI Economics Workshop was opened by Carl Shapiro (SDC) and Benjamin Simon (PPA) who welcomed participants and provided an overview of the role of economics from each of the participating DOI Bureaus and offices. The first day included a panel discussion on regulatory analysis, a lightning round of nine presentations on nonmarket valuation, and an interactive small workgroup session on nonmarket valuation.

USGS Deputy Director Bill Werkheiser gave the keynote address on the second day of the Workshop, describing the importance of economics to DOI. A lightning round on economics, decision making, and policy was followed by a panel discussion on the economics of decision making. The second day also included a panel discussion on using economic modeling and data to support agency missions, a lightning round on data and tools, and a small workgroup session in which attendees were divided into fixed groups that rotated through four topic areas: supporting the DOI economics community, communication, working with contractors and partners, and economic analysis by noneconomists.

The third day of the Workshop included a lightning round on modeling and scenarios, summaries or key takeaways from each participating Bureau or office, a strategic discussion on the future of economics in DOI Bureaus and offices, a final discussion on scoping Workshop products, and concluding remarks.

Regulatory Analysis Panel

DOI economists serve a key role in regulatory analysis. Retrospective regulatory analysis is required currently (2018) under the Regulatory Flexibility Act (5 U.S.C. 601 note) and Executive Orders 13563 (Executive Office of the President, 2011) and 13610 (Executive Office of the President, 2012). The proposed Regulatory Accountability Act of 2017 (U.S. Congress, 2017) would require a host of new regulatory analysis requirements on existing and prospective regulations. The panel consisting of Benjamin Simon (PPA), Stu Levenbach (Office of Information and Regulatory Affairs), Mark Lawyer (Office of the Executive Secretary),

U.S. Department of the Interior (DOI) economists viewing panel session. Photograph by Christian Crowley, DOI.

and Marty Heinze (Bureau of Ocean Energy Management [BOEM]) discussed issues such as: how DOI can best conduct a robust analysis of existing regulations and overcome the inherent agency bias; examples of good Federal oversight or State retrospective regulatory review efforts; Office of Management and Budget or DOI guidance for Bureaus on retrospective regulatory analysis and estimating the cumulative burden of Federal regulatory programs; and how to measure the regulatory effectiveness and cumulative burden for Bureaus operating under statutory authorities focused on safety and environmental protection. One key insight from the panel was that regulations that are larger (in terms of size, complexity, importance, and so on) should be prioritized over less significant regulations. Prioritization is especially important in the DOI because there are few economists to complete the analysis. Panel members also encouraged the use of a program evaluation approach as opposed to a managerial accounting approach for regulatory analyses. It is important to leverage multidisciplinary teams of engineers, economists, lawyers, scientists, and external members to help avoid agency confirmation bias, which translates to a more effective, efficient, and coherent regulatory analysis.

Nonmarket Valuation Lightning Round

Executive departments and agencies are required to incorporate ecosystem services into Federal planning and decision making when applicable. This incorporation is especially important for DOI Bureaus and offices because they most often deal with natural resource management. The nonmarket valuation lightning round presentations included a wide array of examples of nonmarket valuation techniques used to support decision making by policymakers, stakeholders, and the public. See appendix 3 for a table of all lightening round presentations. To improve the incorporation of ecosystem service valuation into applicable regulatory decision-making processes, Kim Coffman (BOEM) described work he has been doing with the DOI's Ecosystem Services Task Force and the creation of the BOEM Ecosystem Service Team. One substantial challenge with nonmarket valuation is assessing nonuse values of natural and cultural resources. Max Millstein (Bureau of Reclamation; hereafter "Reclamation") discussed some of the difficulties of monetizing intangible (nonuse) benefits and costs using a number of examples. Similarly, Rob Winthrop (Bureaus of Land Management [BLM]) presented a

paper on the limitations of valuing cultural ecosystem services (for example, aesthetics, spiritual, recreational, cultural heritage, sense of place, and ways of life values).

There are a number of ecosystem service valuation projects being done across DOI. Several presenters described completed and ongoing work to monetize ecosystem services. Fabiano Franco (USGS) described a project valuing nutrient and sediment retention and flood attenuation in the Difficult Run Watershed, Fairfax County, Virginia. A replacement cost method is being used to assess nutrient and sediment retention, and a damages avoided approach is being used to value flood attenuation (Hopkins and others, in press). Anthony Good (USGS) described an ecosystem services study that uses benefit transfer to value recreation, a standard damage cost avoided ecosystem valuation method to value carbon sequestration, and a biophysical and socioeconomic model to value sea-level rise mitigation in the J.N. "Ding" Darling National Wildlife Refuge (see map of Ding Darling Wildlife Refuge). Leslie Richardson (National Park Service [NPS]) described how alternative approaches could be used to overcome limitations of the traditional travel cost and benefits transfer methods to estimate the value of "virtual visitation" to a remote national park in Alaska (Richardson and others, 2017). Bryan Parthum (USGS) presented an analysis of the fire mitigation ecosystem service provided by the Great Dismal Swamp National Wildlife Refuge. The analysis estimates the avoided cost of illness of nearby communities based on a reduction in catastrophic wildfires because of management actions (Parthum and others, 2017).

The DOI's Bureaus and offices provide scientific information and research to the public; however, valuing that information and the effect of the research is difficult. Emily Pindilli (USGS) described a case study using Bayesian decision analysis to estimate the economic value of information provided by USGS streamgages (Pindilli, 2017). Rudy Schuster (USGS) discussed USGS progress to develop consistent means by which the value and effects of research products are identified, summarized, framed, connected, and disseminated.

Map of the J.N. "Ding" Darling National Wildlife Refuge, site of an ongoing ecosystem services analysis. Source: Fish and Wildlife Service.

Nonmarket Valuation Working Session

During the nonmarket value small workgroup session, Workshop participants were split into four groups to discuss nonmarket valuation related topics. Participants responded to this question: What extent does your Bureau rely on benefits transfer for nonmarket values, and what are the major issues and data gaps with its use? Participants relayed that benefit transfer nonmarket valuation is used commonly by DOI economists and contracted economists. The efficacy of the benefit transfer method relies on the transferability of benefits across time, location, species, and populations. Using benefit transfer to estimate the nonmarket valuation of natural capital is most challenging when the natural capital resides in unique locations or is different from specific natural capital valuated in various other benefit transfer studies. With effective communication across research disciplines and with the expansion of the benefit transfer toolkit, the benefit transfer nonmarket valuation technique could prove to be an indispensable asset for DOI economists. Notes from this and other workgroup sessions are provided in appendix 5.

Economics, Decision Making, and Policy Lightning Round

The economics, decision making, and policy lightning round presentations described how economics is used in DOI policy decisions. Steve Payson (Bureau of Safety and Environmental Enforcement) presented suggestions on how economic education could improve to better train government economists, specifically at the graduate level, and discussed the importance of scientific integrity in economics, validity in statistical inference, and accurate and useful measurement of economic variables. Rebecca Moore (BLM) discussed the development of a BLM socioeconomic framework for National Environmental Policy Act (NEPA; 42 U.S.C. §4321 et seq.), which identifies considerations and requirements for key steps in the planning process, including development of the socioeconomic baseline, public engagement, and evaluating socioeconomic effects of alternatives.

Vince Barbara (Reclamation) described the use of the Economic Impact Analysis for Planning (IMPLAN) model (Minnesota IMPLAN Group, Inc., 2018) to estimate the

U.S. Department of the Interior (DOI) economists during a workgroup session. Photograph by Christian Crowley, DOI.

potential economic effects on regional economies for the proposed Upper San Joaquin River Basin Storage project to construct a new 1.3 million acre-foot reservoir east of Fresno, California. Sarah Peters Coffman (BOEM) presented an analysis of price uncertainties associated with BOEM's option value in its 5-year program and lease sale planning process. Mark Gehlhar (Office of Surface Mining Reclamation and Enforcement) discussed the implications of technological change in the U.S. energy sector and the effects of a few current and proposed polices. Thierno Sow (BOEM) discussed an analysis that used a stochastic discounted cash flow model to quantify various royalty rates under different commodity price regimes. Josh Sidon (BLM) described a third party economic feasibility study of alternatives in Greater Moose Tooth 1 in Alaska for which a deciding factor to abandon the preferred alternative was predicated on the scrutiny by BLM and DOI leadership.

Ed Hall (Bureau of Indian Affairs) talked about the Native American Tourism and Improving Visitor Experience (NATIVE) Act (Public Law 114–221) and that tourism is an opportunity and necessity for Tribes to build capacity for development, as well as an opportunity for Tribes to write themselves back into history. Prioritizing and allocating funds toward specific tourist functions within Tribes is a challenge; however, the DOI and other Federal agencies are working to solve the dilemma. David Koch (Bureau of Indian Affairs) described the magnitude of logging done on Native American lands and the DOI's role in ensuring the management of Tribal forests is sustainable. Frank Casey (USGS) presented a published USGS report that explores the policy context, structure, ecological effectiveness, and tools associated with market-based mechanisms for biodiversity and habitat conservation that was completed in collaboration with the U.S. Department of Agriculture Office of Environmental Markets (Pindilli and Casey, 2015).

Economics in Decision-Making Panel

Effective communication of economic information to decision makers and managers can be challenging given the variety of economic concepts, the misperceptions of economic conditions, nuances, limitations, and availability of economic data and analyses. Relatively, economists are underrepresented within DOI, and the role of economics in decision making is often ambiguous or not defined explicitly. Leadership is more likely to value and seek economic expertise and input when the role of economics is defined clearly and its contributions are communicated effectively. When DOI economists fail to communicate economic information, there is an increased risk of losing relevance for agency leadership. The panel, consisting of Carl Shapiro (USGS), Lynne Koontz (NPS), Mike Ford (BLM), and Max Millstein (Reclamation), explored these communication challenges and discussed examples of success and failure. The NPS has had success communicating the economic impacts of National Parks contributions of park visitation on adjacent communities; however, the challenge is to translate the raw data including uncertainties into a form that is easy to understand yet retains enough information.

Using Economic Modeling and Data to Support DOI Missions Panel

DOI Bureau economists often use input-output analysis and other types of economic modeling for analyzing economic contributions of Bureau activities and impacts of proposed rules and policies. The panel, consisting of Mark Jensen (BOEM), Cathy Cullinane Thomas (USGS), Randy Christopherson (Reclamation), James Caudill (U.S. Fish and Wildlife Service [FWS]), and Adam Stern (PPA), addressed the importance of economic modeling in Bureau missions and how modeling results are used by and communicated to decision makers. Panelists also discussed alternative tools for economic modeling and communicating economic information, how they are used, and challenges that might affect their use. A tool frequently used by DOI economists is the IMPLAN model, which allows users to do economic impact analysis. An issue with this tool is the relative expense of acquiring data. Most Bureaus cannot afford to update the data on an annual basis, and the output is only as good as the data being used. IMPLAN also does not include ecosystem service values; rather, it focuses on traditional economic contributions. Because of the limitations and expense of IMPLAN, there have been some efforts to develop a Federal government version. Other models discussed include the Regional Economic Model (Regional Economic Models, Inc., 2018), an integrated input-output and econometric model, and the HAZUS model (Federal Emergency Management Agency, 2018), which estimates physical damage, lost jobs, business interruptions, construction costs, and social impacts associated with natural disasters.

Data and Tools Lightning Round

This session covered topics such as strengths, weaknesses, compilation, development, and applications of economic data and tools used by DOI economists. Christian Crowley (PPA) described development of the recreation information database (https://ridb.recreation.gov/), which offers publically available information about recreational activities on Federal lands. The database is a great example of collaboration among U.S. government agencies including DOI, U.S. Army Corps of Engineers, U.S. Forest Service, National Oceanic and Atmospheric Administration, Tennessee Valley Authority, Smithsonian, U.S. Air Force, U.S. Department of Transportation, and the National Archives. Chris Huber (USGS) presented the Benefit Transfer Toolkit (U.S. Geological Survey, 2018), developed by NPS, BLM, and USGS, which includes spreadsheet-based databases of nonmarket valuation studies, average value tables, and metaregressions to aid researchers in doing benefit transfer

studies. To develop the Benefit Transfer Toolkit, more than 500 existing original valuation studies were reviewed, which includes more than 3,000 estimates from various revealed and stated preference studies.

Carlann Unger (PPA) described the collection of Native American reservation level business and labor data by the PPA, which was previously in shortage. The data includes unpublished, historical reservation level unemployment data from the Bureau of Labor Statistics and State governments. Michael Ford (BLM) discussed the differences between oil and gas sales data and accounting year data and how each may be useful for analysis. Lynne Koontz (NPS) provided an overview of a formal Socio-Economic Monitoring program being established by NPS to ensure relevant appropriation of National Park resources over time through better understanding of National Park visitors' needs.

Steven Anderson (USGS) described an ongoing case study to estimate the pressure-limited carbon dioxide storage capacity and probable costs in the Mount Simon Sandstone in the Illinois Basin; this may lead to the development of a methodology to estimate basin-wide geologic storage capacity. Ken Bagstad (USGS) described a USGS Powell Center-National Socio-Environmental Synthesis Center effort that brought together experts in government, academia, and the private sector to synthesize national accounting data in a multiyear project. Richard Aiken (FWS) discussed the 2016 updated National Survey of Fishing, Hunting, and Wildlife Associated Recreation (FWS, 2017). A $5.5 million four-State telephone survey was completed by the U.S. Census Bureau to estimate the expenditures for trip-related items, equipment, licenses, plantings, land leasing, and owning associated with recreational wildlife activities.

James Meldrum (USGS) presented on the use of National Water-Quality Assessment Program information in a hedonic price function to estimate willingness to pay for improving water quality in Charlotte, North Carolina. Nick Paduano (Office of Natural Resources Revenue [ONRR]) described an analysis of the effects of expected coal powerplant retirements on sales value and Federal royalties.

Common Issues Open Discussion

Participants discussed whether economists are brought on to project teams early in the process. Participants reported that, depending on the subject matter and scope of any particular DOI project, DOI economists may be included during the project development phase. However, programs are oftentimes resource constrained and may not include economists until after the biophysical analysis has been completed. In this case, economists are brought in at the end of a project timeline to tie socioeconomic values on to biophysical model outputs. Including economists at the wrong time (for example, too early or too late) may inflate budgetary pressures or restrict the ability of interdisciplinary researchers to provide a sufficient analysis.

Including economists at the problem formulation stage is an issue because the lack of communication among interdisciplinary researchers persists. Early communication among project developers and economists is imperative to establish a project timeline and ultimately to meet deadlines and agency missions. When completing economic analysis in conjunction with natural scientists, it may be helpful to keep the socioeconomic analysis relatively simple and provide clear, concise infographics of results. Many natural scientists stigmatize nonmarket valuation and may not understand the benefits of monetizing the value that humans derive from natural resources.

Increased communication of economic data, methods, and results may persuade natural scientists to accept the socioeconomic science of formulating nonmarket valuations. Although developing a strong communication channel between interdisciplinary researchers is necessary to maximize efficiency, it also is important to understand stakeholder values when developing methods of project result communication networks. Some stakeholders want a simple outline of the results, whereas others may want an explanation of probability and uncertainty as well.

Modeling and Scenarios Lightning Round

Sarah Cline (PPA) presented a study that used econometric modeling to estimate the determinants of county-level growth, specifically in rural areas, that account for the presence of public conservation land. Bill Stevens (BLM) described a model he developed for BLM recreation planners that can be used to estimate the economic effects of any change in recreation for use in NEPA documents. Adam Stern (PPA) discussed an impact analysis on the land Buy-Back Program, implemented as part of the Cobell Settlement, which allows participating individual owners to receive payments for voluntarily selling their land to Tribes.

Cathy Cullinane Thomas (USGS) and Sarah Cline (PPA) provided an overview of invasive species simulation modeling and methods of integrating socioeconomic decision tools to help public land managers and other decision makers efficiently control invasive species. Mathew Fuller (FWS) described a probabilistic model he developed to estimate the likelihood of feral swine hunting based on the proximity to feral swine habitat using existing data.

Bill Anderson (BOEM) described an analysis of greenhouse gas emissions related to exploration of oil and gas, which was expanded to consider greenhouse gas emissions from consumption. Emil Attanasi (USGS) presented a probabilistic reservoir model that provides production profiles from which cash flow and cost streams are calculated to determine the economically recoverable quantity of oil and the volume of carbon dioxide remaining in the subsurface as a side effect of enhanced oil recovery.

Lucas Bair (USGS) presented a bioeconomic model that, through the establishment of juvenile humpback chub (*Gila*

U.S. Department of Interior (DOI) economists during an open discussion. Photograph by Christian Crowley, DOI.

cypha) survival targets, identifies the least cost method of achieving humpback chub population abundance goals over time. Ken Bagstad (USGS), for Darius Semmens (USGS), delivered the economics of transboundary migratory wildlife, which suggests that spatial mismatches between providing and receiving regions can be uncovered by analyzing socio-economic benefits provided by and to species throughout the migratory cycle.

Community of Practice Open Forum

An open forum was held to determine the utility of conferences, google documents and spreadsheets, mailing lists, blogs, and webinars to continue collaboration and share information. Many participants agreed that the momentum created by the DOI Workshop should be used to create efficient channels of information sharing and networking platforms. Expressed by participants was the recognized benefits of a functional DOI economic community. It was mentioned that annual workshops are a good idea to establish networks amongst the DOI economists. Other suggestions to strengthen the DOI economics community included a quarterly call, economics DOI Learn courses, developing a listserve, and establishing a peer-review system across agencies. If annual DOI Economics Workshops are not economically feasible, many participants agreed that using the aforementioned networking channels to develop specific projects or topic interest groups could be an effective strategy to strengthen the economic analysis done within the DOI.

Poster Presentations

Eight posters were presented during five "poster viewing and networking" sessions of the Economics Workshop. A table of poster presentations is available in appendix 4. Lindsay Goldstein (ONRR) presented a map showing the size and location of U.S. natural gas processing plants to convey ONRR's ongoing effort to develop standardized unbundling

cost allowances based on the applicable technology and geographical location of natural gas processing plants. She also presented a poster depicting ONNR's market analysis and royalty reports that result in an electronic consolidation of market intelligence on offshore oil and gas production. Josh Sidon (BLM) presented a poster on a study that draws on readily available data and information to estimate economic effects of onshore oil and gas development and production.

Amy Stillings (BOEM) provided a poster highlighting three studies informing NEPA assessments: (1) characterizing fisheries usage using geospatially assigned commercial fish revenue to ocean locale of harvest, (2) understanding economic benefits of offshore wind energy developments using the U.S. Department of Energy input-output model, and (3) estimating the effects of the wind energy turbines on tourism using literature values and surveys. Bill Anderson (BOEM) provided a poster on the net benefit analysis for BOEM's 5-year program. The analysis estimated the benefits to society and the environmental and social costs based on resource and activity estimates (see fig. 1, a conceptual diagram of the Offshore Environmental Cost Model below). Kristen Stellec (BOEM) presented a poster on socioeconomic research to understand the cumulative effects of Outer Continental Shelf oil and gas development.

Cathy Cullinane Thomas (USGS), Chris Huber (USGS), Kristen Skrabis (PPA), Josh Sidon (BLM), and Noah Van Gilder (PPA) presented a poster estimating the economic effects of Federal investment activities aimed at ecosystem restoration (Thomas and others, 2016). The study estimates that for every $1 million invested in ecosystem restoration, between 13 and 32 job-years and between $3.3 and $3.4 million in total economic output are added to the U.S. economy. James Meldrum (USGS) and the WiRe team (see https://wildfireresearchcenter.org/) presented a unique behavioral economics experiment to convey social science contributions to the National Cohesive Wildland Fire Management Strategy. The results of the study suggest that mailing "nudge" letters asking recipients to visit parcel-specific websites increases the overall engagement with previously inactive communities, but the nudge ultimately fails to affect behavior.

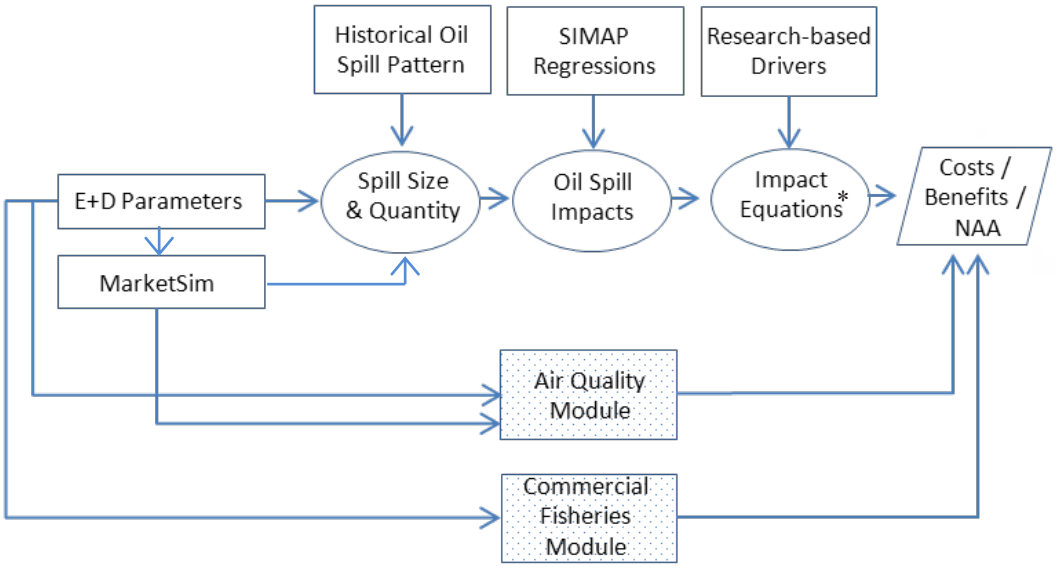

Figure 1. Conceptual diagram of the Offshore Environmental Cost Model [*, Impact equations apply to recreation, property values, subsistence, and ecological effects]. Source: Industrial Economics, Inc., and SC&A, Inc. (2015).

Summary and Conclusions

The U.S. Department of the Interior (DOI) Economics Workshop (hereafter "Workshop") provided a platform for DOI economists to network, to discuss past, ongoing, and future projects, and to build a foundation for future collaborative efforts to improve economic methodology, data, and results communication. The Workshop highlighted opportunities to leverage DOI economists for completing economic analyses. To ensure that limited resources are used most efficiently and effectively, it is imperative that DOI economists leverage each other's expertise, maximize collaboration, share data and tools, and pursue methodology improvements through retrospective analysis. It also is important to improve communication of the pros and cons of economic data and methodologies and to communicate the results of economic analyses to physical scientists, resource managers, decision makers, policymakers, DOI staff, and the public.

Major outcomes of the Workshop include the desire for recurring DOI Workshops that could be held on an annual basis or less frequently, based on resources available. The group also identified a desire to support ongoing collaboration with supplementary workgroups, webinars, blogs, and discussion forums. After the Workshop, participants were asked to complete a survey to assess the effectiveness, format, and timing of this and future workshops. Results of the survey are provided in appendix 6.

The Workshop was successful in bringing together DOI economists, sharing information, developing channels of communication, and encouraging collaboration across Bureaus and offices. The Workshop came at an important time when DOI's need for socioeconomic analysis continues to grow. Looking ahead, there are several key issues that DOI will face that are supported by an understanding of the economic and societal implications.

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Appendix 1. List of Participants, U.S. Department of Interior Economics Workshop, 2017

Table 1.1. List of participants in the U.S. Department of the Interior Economics Workshop, 2017.

[FWS, Fish and Wildlife Service; Va., Virginia; USGS, U.S. Geological Survey; BOEM, Bureau of Energy Management; Ariz., Arizona; Reclamation, Bureau of Reclamation; Calif., California; AS–IA, Assistant Secretary–Indian Affairs; Colo., Colorado; Oreg., Oregon; PPA, Office of Policy Analysis; Mont., Montana; OSMRE, Office of Surface Mining Reclamation and Enforcement; ONRR, Office of Natural Resources Revenue; BIA, Bureau of Indian Affairs; La., Louisiana; Mont., Montana; Nev., Nevada; NPS, National Park Service; DOI, U.S. Department of Interior; OMB, Office of Management and Budget; OIA, Office of Insular Affairs; BSEE, Bureau of Safety and Environmental Enforcement]

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Table 1.1. List of participants in the U.S. Department of the Interior Economics Workshop, 2017.—Continued

[FWS, Fish and Wildlife Service; Va., Virginia; USGS, U.S. Geological Survey; BOEM, Bureau of Energy Management; Ariz., Arizona; Reclamation, Bureau of Reclamation; Calif., California; AS–IA, Assistant Secretary–Indian Affairs; Colo., Colorado; Oreg., Oregon; PPA, Office of Policy Analysis; Mont., Montana; OSMRE, Office of Surface Mining Reclamation and Enforcement; ONRR, Office of Natural Resources Revenue; BIA, Bureau of Indian Affairs; La., Louisiana; Mont., Montana; Nev., Nevada; NPS, National Park Service; DOI, U.S. Department of Interior; OMB, Office of Management and Budget; OIA, Office of Insular Affairs; BSEE, Bureau of Safety and Environmental Enforcement]

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Table 1.1. List of participants in the U.S. Department of the Interior Economics Workshop, 2017.—Continued

[FWS, Fish and Wildlife Service; Va., Virginia; USGS, U.S. Geological Survey; BOEM, Bureau of Energy Management; Ariz., Arizona; Reclamation, Bureau of Reclamation; Calif., California; AS–IA, Assistant Secretary–Indian Affairs; Colo., Colorado; Oreg., Oregon; PPA, Office of Policy Analysis; Mont., Montana; OSMRE, Office of Surface Mining Reclamation and Enforcement; ONRR, Office of Natural Resources Revenue; BIA, Bureau of Indian Affairs; La., Louisiana; Mont., Montana; Nev., Nevada; NPS, National Park Service; DOI, U.S. Department of Interior; OMB, Office of Management and Budget; OIA, Office of Insular Affairs; BSEE, Bureau of Safety and Environmental Enforcement]

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Appendix 2. Agenda, U.S. Department of Interior Economics Workshop, 2017

DOI Economics Workshop
April 5–7, 2017
South Interior Building Auditorium
Washington, DC

WEDNESDAY, APRIL 5

9:00 am: Welcome Day 1

- Logistics for the Conference
- Welcome from Carl Shapiro (USGS) and Benjamin Simon (PPA)
- Participant Introductions

9:30 am: Bureau/Office Overview Session - Moderator: Karen Jenni

- Office of Indian Energy and Economic Development (Dennis Bodenchuk)
- Bureau of Reclamation (Randy Christopherson)
- National Park Service (Lynne Koontz)
- Office of Insular Affairs (Wali Osman)
- U.S. Fish and Wildlife Service (Jim Caudill)
- U.S. Geological Survey (Carl Shapiro)

10:30 am: Break - *Networking and Poster Viewing*

11:00 am: Bureau/Office Overview Session, cont. - Moderator: Karen Jenni

- Bureau of Ocean Energy Management (Tom Farndon)
- Bureau of Safety and Environmental Enforcement (Steve Payson)
- Bureau of Land Management (Rebecca Moore)
- Office of Natural Resources Revenue (Lindsay Goldstein)
- Office of Surface Mining Regulation & Enforcement (Mark Gehlhar)
- Office of Policy Analysis (Benjamin Simon)

12:00 pm: Lunch (local restaurants and food trucks)

1:00 pm: Regulatory Analysis - Panel Discussion

- Benjamin Simon, PPA (moderator)
- Stu Levenbach, OIRA
- Mark Lawyer, Exec Sec
- Marty Heinze, BOEM

DOI economists serve a key role in the regulatory analysis required among the pending legislative and administration proposals. Retrospective regulatory analysis is currently required under the RFA and Executive Orders 13563/13610. The proposed Regulatory Accountability Act (RAA) of 2017 would require a host of new regulatory analysis requirements on existing and prospective regulations. This panel will discuss issues such as: How can DOI best conduct a robust analysis of existing regulations and overcome the inherent agency bias? Examples of good federal, overseas or state retrospective regulatory review efforts (2 out 1 in); OMB or DOI guidance for bureaus on retrospective regulatory analysis and estimating the cumulative burden of Federal regulatory programs. How to measure the regulatory effectiveness and cumulative burden for bureaus operating under statutory authorities focused on safety and environmental protection?

2:00 pm: Non-market valuation - Project Lightning Round

1. Emily Pindilli - The Value of Streamgage Information: A case study evaluating the use and value of streamgage data for culvert design and operations
2. Fabiano Franco - Difficult Run Watershed Floodplain Ecosystem Services
3. Bryan Parthum - Benefits of a Fire Mitigation Ecosystem Service in The Great Dismal Swamp National Wildlife Refuge
4. Anthony Good - The value of recreation, carbon sequestration, and sea level rise protection at J.N. "Ding" Darling National Wildlife Refuge
5. Leslie Richardson - Valuing Virtual Visitation: A Case Study of Katmai National Park & Preserve Bear Viewing
6. Max Millstein - Monetizing Intangible (Non-use) Benefits and Costs – Potential Effects on Plan Selection
7. Rudy Schuster - Value of Scientific Information
8. Kim Coffman - Ecosystem Services
9. Rob Winthrop - Cultural Services as a Limiting Case for the Ecosystem Services Paradigm
10. Karen Jenni - Economic valuation as a key integrator in multi-resource analysis

3:00 pm: Break - *Networking and Poster Viewing*
3:30 pm: Non-market valuation - Small Group Working Session

- Pete Grigelis, FWS (moderator)
- Leslie Richardson, NPS
- Rebecca Moore, BLM
- Emily Pindilli, USGS

The values for non-market goods and services can be an important factor for the various land and resource management decisions faced by DOI. However, non-market valuation methods are typically an unfamiliar topic to DOI decision-makers and the general public. Furthermore, project timelines, staffing capacity, and budgets can limit how project teams account for non-market values in the decision making process. This group discussion forum intends to get a better understanding of how non-market valuation methods are applied in the decision making process across DOI bureaus. Some questions to address include: To what extent does your bureau rely on benefits transfer for non-market values and what are the major issues/data gaps with its use? Are economists brought on to project teams early in the process? Is this a challenge and how do you educate internal stakeholders on the need to include economics at the problem formulation stage? How do you communicate the results of non-market valuation studies to decision makers and the public? What are the challenges and how do you attempt to overcome those challenges?

4:30 pm: Adjourn
5:00 pm: Happy Hour
Old Ebbitt Bar & Grill
675 15th Street NW

THURSDAY, APRIL 6
9:00 am: Welcome Day 2

- Logistics for Day 2
- Keynote speaker: Bill Werkheiser (Acting Director, USGS)

9:30 am: Economics, Decision Making & Policy - Project Lightning Round

1. Josh Sidon - Ruling Out an Alternative based on Economic Feasibility
2. Rebecca Moore - BLM's new framework for socioeconomic aspects of planning and NEPA
3. Sarah Peters Coffman - Option price analysis
4. Thierno S. Sow - Resource Evaluation
5. Vince Barbara - Temperance Flat Dam Economic Modeling Tools and Role in NEPA Analysis

6. Frank Casey - Biodiversity and Habitat Markets-Policy, Economic, and Ecological Implications of Market-Based Conservation
7. Ed Hall - Tourism and the NATIVE Act
8. David Koch - Improving Forest Management Through Anchor Forests
9. Steve Payson - Improvements in Economics Education that Would Benefit Government Economists
10. Mark Gehlhar - Changing Demand Conditions and Implications for Policy: The Case for Coal

10:30 am: Break - *Networking and Poster Viewing*
11:00 am: Economics in Decision Making - Panel Discussion

- Josh Sidon, BLM (moderator)
- Carl Shapiro, USGS
- Lynne Koontz, NPS
- Mike Ford, BLM
- Max Millstein, Reclamation

Effective communication of economic information to decision-makers and managers can be challenging given the variety of economic concepts, the (mis)perceptions of economic conditions, and nuances, limitations, and availability of economic data and analyses. Economists are relatively under-represented within Interior, and the role of economics in decision-making is often ambiguous or not explicitly defined. Leadership is more likely to value and seek economic expertise and input when our contributions are effectively communicated and actually help in making or supporting a decision. Conversely, when we fail to communicate economic information, we risk losing relevance for agency leadership. This panel will explore these communication challenges and discusses instances of successes and failures.

12:00 pm: Lunch (local restaurants and food trucks)
1:00 pm: Using Economic Modeling and Data to Support our Agency Missions - Panel Discussion

- Ted Maillett, FWS (moderator)
- Mark Jensen, BOEM
- Cathy Cullinane Thomas, USGS
- Randy Christopherson, Reclamation
- James Caudill, FWS
- Adam Stern, PPA

DOI bureau economists often use input-output (I-O) analysis and other types of economic modeling for analyzing economic contributions of bureau activities and impacts of proposed rules and policies. This session addresses the importance of economic modeling to bureau missions and how modeling results are used by and communicated to decision makers. Panelists will also discuss alternative tools for economic modeling and communicating economic information, how they are used, and challenges that might affect their use.

2:00 pm: Data & Tools - Project Lightning Round

1. Nick Paduano - Impacts of Coal Generation Retirements on Federal Mine Leases
2. Richard Aiken - The 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation
3. Christian Crowley - Data from Recreation.gov
4. Steven Anderson - Estimating CO2 Storage Capacity and Costs
5. Mike Ford - Breakout of oil and gas data and how to use it
6. Chris Huber - Benefit Transfer Toolkit
7. James Meldrum - Economics Benefits of Stream Health

8. Ken Bagstad - Natural Capital Accounting: Synthesizing biophysical and socioeconomic data for improved decision making
9. Carlann Unger - American Indian/Alaska Native Data
10. Lynne Koontz - Comprehensive Socio-Economic Monitoring for the National Park Service

3:00 pm: Break - *Networking and Poster Viewing*
3:30 pm: Open Forum Discussion
Moderators: Lindsay Goldstein, Lesli Kirsch, DeShawn Woods, and Erin Carver

- Supporting the DOI Economics Community (Training, website, listserv, meeting)
- Communication of economic information
- Working with contractors and partners
- Economic analysis by non-economists

4:30 pm: Adjourn
5:00 pm: Social Activity
Guided Monuments Walk (with NPS Ranger Bret Burger)

FRIDAY, APRIL 7
9:00 am: Modeling & Scenarios - Project Lightning Round

1. Emil Attanasi - Estimation of economic miscible CO2 enhanced oil recovery and incidental CO2 sequestration
2. Bill Stevens - Estimating the Economic Impacts of Recreation for BLM NEPA Documents
3. Lucas Bair - Identifying cost-effective invasive species control strategies in the Grand Canyon to enhance endangered species population viability
4. Ann Miller - Outdoor Recreation Satellite Account
5. Sarah Cline - DOI Conservation Lands and Rural Economic Growth in the United States
6. Bill Anderson - Lifecycle GHG Analysis of Five Year Program
7. Adam Stern - Participation Decisions and Economic Impacts of the DOI Fractionated Land Buy-Back Program
8. Cathy Cullinane Thomas and Sarah Cline - Integrating simulation models and socioeconomic decision tools for invasive species control problems
9. Darius Semmens - The economics of transboundary migratory wildlife
10. Matthew Fuller - The Likelihood of Feral Swine Hunting Based on the Proximity to Feral Swine Habitat

10:00 am: Break - *Networking and Poster Viewing*
10:30 am: Bureau/Office Wrap-ups - 1-minute summaries of take-away ideas
Moderator: Karen Jenni
10:45 am: Strategic Discussion on Future of Economics in Bureaus/Offices
Moderator: Karen Jenni
11:15 am: Scoping Workshop Products
Moderators: Carl Shapiro and Benjamin Simon

- Research Agenda
- Synthesis Document
- Building our DOI Economics Community of Practice
- Volunteers for Products

11:45 am: Wrap-up Messages - Carl Shapiro and Benjamin Simon
12:00 pm: Adjourn
1:30 pm: Guided DOI Murals Tour, Main Interior Building Museum (60 min)

Appendix 3. Lightning Round Presentations, U.S. Department of Interior Economics Workshop, 2017

Table 3.1. Lightening round presentations from the U.S. Department of the Interior Economics Workshop, 2017.

[FWS, Fish and Wildlife Service; CO_2, carbon dioxide; USGS, U.S. Geological Survey; GHG, greenhouse gas; BOEM, Bureau of Energy Management; NEPA, National Environmental Policy Act; Reclamation, Bureau of Reclamation; DOI, U.S. Department of Interior; PPA, Office of Policy Analysis; BLM, Bureau of Land Management; OSMRE, Office of Surface Mining Reclamation and Enforcement; BIA, Bureau of Indian Affairs; ONRR, Office of Natural Resources Revenue; BSEE, Bureau of Safety and Environmental Enforcement]

Last name	First name	Presentation title	Bureau	Session
Aiken	Richard	The 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation	FWS	Data and Tools
Anderson	Bill	Lifecycle GHG Analysis of Five Year Program	BOEM	Modeling and Scenarios
Anderson	Steven	Estimating CO_2 Storage Capacity and Costs	USGS	Data and Tools
Attanasi	Emil	Estimation of economic miscible CO_2 enhanced oil recovery and incidental CO_2 sequestration	USGS	Modeling and Scenarios
Bagstad	Ken	Natural Capital Accounting: Synthesizing biophysical and socioeconomic data for improved decision making	USGS	Data and Tools
Bair	Lucas	Enhancing native species population viability via cost-effective invasive species control in the Grand Canyon, USA	USGS	Modeling and Scenarios
Barbara	Vince	Temperance Flat Dam Economic Modeling Tools and Role in NEPA Analysis	Reclamation	Economics, Decision Making, and Policy
Casey	Frank	Biodiversity and Habitat Markets-Policy, Economic, and Ecological Implications of Market-Based Conservation	USGS	Economics, Decision Making, and Policy
Cline	Sarah	DOI Conservation Lands and Rural Economic Growth in the United States	PPA	Modeling and Scenarios
Cline	Sarah	Integrating simulation models and socioeconomic decision tools for invasive species control problems	PPA	Modeling and Scenarios
Coffman	Kim	Ecosystem Services	BOEM	Nonmarket Valuation
Crowley	Christian	Data from Recreation.gov	PPA	Data and Tools
Cullinane Thomas	Cathy	Integrating simulation models and socioeconomic decision tools for invasive species control problems	USGS	Modeling and Scenarios
Ford	Michael	Data needs (for analysis): availability and accessibility	BLM	Data and Tools
Franco	Fabiano	Difficult Run Watershed Floodplain Ecosystem Services	USGS	Nonmarket Valuation
Fuller	Matthew	The Likelihood of Feral Swine Hunting Based on the Proximity to Feral Swine Habitat	FWS	Modeling and Scenarios
Gehlhar	Mark	Implications of Changing Elasticities of Supply and Demand in Energy Markets	OSMRE	Economics, Decision Making, and Policy
Good	Anthony	The value of recreation, carbon sequestration, and sea level rise protection at J.N. “Ding” Darling National Wildlife Refuge	USGS	Nonmarket Valuation
Hall	Ed	Tourism and the NATIVE Act	BIA	Economics, Decision Making, and Policy
Huber	Chris	Benefit Transfer Toolkit	USGS	Data and Tools
Koch	David	Improving Forest Management Through Anchor Forests	BIA	Economics, Decision Making, and Policy
Koontz	Lynne	Comprehensive Socio-Economic Monitoring for the National Park Service	NPS	Data and Tools
Meldrum	James	Economics Benefits of Stream Health	USGS	Data and Tools

Table 3.1. Lightening round presentations from the U.S. Department of the Interior Economics Workshop, 2017.—Continued

[FWS, Fish and Wildlife Service; CO_2, carbon dioxide; USGS, U.S. Geological Survey; GHG, greenhouse gas; BOEM, Bureau of Energy Management; NEPA, National Environmental Policy Act; Reclamation, Bureau of Reclamation; DOI, U.S. Department of Interior; PPA, Office of Policy Analysis; BLM, Bureau of Land Management; OSMRE, Office of Surface Mining Reclamation and Enforcement; BIA, Bureau of Indian Affairs; ONRR, Office of Natural Resources Revenue; BSEE, Bureau of Safety and Environmental Enforcement]

Last name	First name	Presentation title	Bureau	Session
Millstein	Max	Monetizing Intangible (Non-use) Benefits and Costs – Potential Effects on Plan Selection	Reclamation	Nonmarket Valuation
Moore	Rebecca	BLM's new framework for socioeconomic aspects of planning and NEPA	BLM	Economics, Decision Making, and Policy
Paduano	Nick	Impacts of Coal Generation Retirements on Federal Mine Leases	ONRR	Data and Tools
Parthum	Bryan	Benefits of a Fire Mitigation Ecosystem Service in The Great Dismal Swamp National Wildlife Refuge	USGS	Non-Market Valuation
Payson	Steve	Improvements in Economics Education that Would Benefit Government Economists	BSEE	Economics, Decision Making, and Policy
Peters Coffman	Sarah	Option price analysis	BOEM	Economics, Decision Making, and Policy
Pindilli	Emily	The Value of Streamgage Information: A case study evaluating the use and value of streamgage data for culvert design and operations	USGS	Nonmarket Valuation
Richardson	Leslie	Valuing Virtual Visitation: A Case Study of Katmai National Park & Preserve Bear Viewing	NPS	Nonmarket Valuation
Schuster	Rudy	Value of Scientific Information	USGS	Nonmarket Valuation
Semmens	Darius	The economics of transboundary migratory wildlife	USGS	Modeling and Scenarios
Sidon	Josh	Ruling Out an Alternative based on Economic Feasibility	BLM	Economics, Decision Making, and Policy
Sow	Thierno	Resource Evaluation	BOEM	Economics, Decision Making, and Policy
Stern	Adam	Participation Decisions and Economic Impacts of the DOI Fractionated Land Buy-Back Program	PPA	Modeling and Scenarios
Stevens	Bill	Estimating the Economic Impacts of Recreation for BLM NEPA Documents	BLM	Modeling and Scenarios
Unger	Carlann	PPA Unpublished Data Sets	PPA	Data and Tools
Withrop	Rob	Cultural Services as a Limiting Case for the Ecosystem Services Paradigm	BLM	Nonmarket Valuation

Appendix 4. Poster Presentations, U.S. Department of Interior Economics Workshop, 2017

Table 4.1 Poster presentations from the U.S. Department of the Interior Economics Workshop, 2017.

[ONRR, Office of Natural Resources Revenue; BLM, Bureau of Land Management; IMPLAN, Economic Impact Analysis for Planning; BOEM, Bureau of Energy Management; USGS, U.S. Geological Survey; PPA, Office of Policy Analysis]

Last name	First name	Poster title	Bureau
Anderson	Bill	Five Year Program: Net Benefit Analysis	BOEM
Cullinane Thomas	Cathy	Measuring the Restoration Economy	USGS
Goldstein	Lindsay	Natural Gas Processing Plants (Unbundling Cost Allocation)	ONRR
Goldstein	Lindsay	ONRR Economic Analysis reports	ONRR
Huber	Chris	Measuring the Restoration Economy	USGS
Meldrum	James	Wildfire Economics	USGS
Sidon	Josh	Measuring the Restoration Economy	BLM
Sidon	Josh	Methods and Desk Guide for BLM Oil and Gas Economic Impact Analysis: A Tool to Facilitate IMPLAN Analysis for Oil and Gas Activities	BLM
Skrabis	Kristen	Measuring the Restoration Economy	PPA
Stilling	Amy	Socioeconomic Impacts of Offshore Wind Energy Development	BOEM
Strellec	Kristen	Highlights of BOEM Socioeconomic Research	BOEM
Van Gilder	Noah	Measuring the Restoration Economy	PPA

Appendix 5. Small Workgroup Session Notes, U.S. Department of Interior Economics Workshop, 2017

U.S. Department of Interior (DOI) Economics Community research agenda:

- Hold regular economics webinars, invite entire DOI economics community: new, ongoing/completed work; training on tools/methods; ecosystem services; nonmarket valuation; benefits transfer; Economic Impact Analysis for Planning; recreation; and so on.
- DOI economic community output: produce a brochure/website on types of economic analysis within DOI; value of economic analysis I DOI programs/decisions; how else economics might be used in DOI programs/decisions
- Slackboard for quick communication across the community
- Pass economic knowledge and skills to junior economists through DOI University
- Common economic models across all DOI; common software
- Collaboration: what are the transaction costs, and how can we lower them?
- Collaboration: are there institutional barriers to collaborating?
- Identify collaborators at the start of a project
- U.S. Department of Agriculture economics "club": officers, newsletter, listserv, website, seminars, awards
- Collaborating: how can we determine who has the skills we would need for a project, and whether they are available to collaborate?
- Create a Twitter/Facebook page for DOI economics to share information, research, and so on
- Develop a DOI economics "journal" published annually or quarterly
- Establish a DOI economic Community of Practice: one representative from each Bureau/office/service; executive sponsor; charter; quarterly meetings; message board/SharePoint
- Find ways to publicize DOI economic capabilities and contribute to Bureau missions
- The economics community within DOI needs a website to diffuse research in interactive ways (graphs, apps, videos, and so on)
- DOI web page with journal publications, working papers, and so on that help DOI economists identify those with specific skills
- Hold a meeting like this 2.5-day workshop each 3–4 years
- Create a training website everyone can add links/ideas for training in the field of economics
- Create a Google Sheet for every workshop participant to enter their information: experience, years of experience, willingness to do a seminar in a different agency, and so on
- Identify and individual who is in charge of retrospective analysis, as opposed to having the original economist handle it
- Would it be possible to distribute an attendee list with contacts?
- Send out a survey to workshop participants asking for feedback on this and future workshops among economists
- Annotate, manage, and host economic data in ways that make it easy to find and reuse
- Royalties lost from Kayenta mine if Navajo Generation Station closed
- Role of monitoring in checking on project performance and conducting future analyses on similar project types (for example, human use, ecological)
- Ecosystem services: valuing natural and cultural resources

- Ecosystem services:
  - Ecological production functions: dependent variable=change in management; independent variable=change in ecosystem services
  - Economic production functions: dependent variable=change in value (U.S. dollar); independent variable=change in ecosystem services
- Standardized NMV survey instruments for endangered species that can be administered regionally and (or) results that can be used regionally. Tied to vulnerability of species and willingness to pay to reduce risk of extinction
- Develop standardized DOI tools that can be maintained internally to increase consistency to lower costs; for example, "DOI-plan"
- Valuing natural resources
- Valuing scientific information; decision and scenario analysis; institutional structures
- Visitor spending profile database or tool for interagency use

Supporting the DOI Economics Community (experiences, ideas, and lessons learned):

- Annual workshop
- DOI University: training oneself, training colleagues
- Details: help, learning, and information exchange
- Database of economists and skills/software expertise: offices identified; Google Sheet or Drive
- Community of practice, quarterly representative calls
- Software needs, wants, and training
- Overlap between agencies, common platforms and consistency/comparability
- Networking to ensure not doubling efforts
- Network of peer reviewers
- Quarterly call: updates on current projects and issues; and opportunities for collaboration
- Clarify data/product to reduce redundancy, following best practices, make publicly available
- Coordinate data requests to fields (reduce field visits, share information)
- Within the conference, allocate time for similar groups to coordinate via phone
- Money for studying the benefits of collaboration
  - Any potential that we are not capturing
  - Stakeholders can be identified with networking with other disciplines
  - Need to have connections with DOI economics community and other parts of DOI
  - Economists can have wrong assumptions
  - Economists can be seen as arrogant
  - Define the scope of work
- Communication forum
- Listserv/website
- Announce new products
- Outside peer review
- User groups
- Cross-departmental training

Communicating economic information (experiences, ideas, and lessons learned):

- What information do we get from the public? How can we use this?
- Earlier in the process is better; simple, coordinated, infographics, storylines, web design is a need
- Translated to the target audience
- Lose the black box
- Too high level
- Avoid eye-glaze: summaries condensed
- Compelling materials—no excuses
- Related real examples to current events
- Proactively answer questions before they come in
- Provide caveats: we present the best data we have, but it is limited
- Allow them to value their impact
- Multiple ways to communicate information (graphs, tables, and so on)
- Focus groups of people we are trying to communicate information to (what do they want, and how do they want it?)
- Not only communication: remember to educate about economic terms and concepts
- Distinguish between label contexts: when to keep it simple, when to use complexity; plain English
- Communicate why something matters to the audience
- Know the audience, know the message, translate to relative impacts
- Allow stakeholders to own the conclusions and listen
- Do not reinvent the wheel: listen to solutions that are currently being used
- Communicate risk and uncertainty: probability and likelihood analysis, relative impacts
- Ensure message is framed to reduce confusion to stakeholders

Working with contractors and partners (experiences, ideas, and lessons learned):

- Explore avenues for access—contract vehicles
- Contract flexibility (timeframe and adjustments), though must be specific to get what you need, but do not limit methods. This is easier with established relationships
- Multidisciplinary contracts: more difficult because not always on same page or using different language
- Relationships (for contracting and research): minimize transactions costs over time
- Need to get involved early
- Pro: quick turnaround
- Con: no communication, wasted efforts
- Partnerships lead to innovation and knowledge sharing
- Contractors lack experience or qualifications
- Develop standardized scopes of work
- Pre-vet and share contractors
- You are still responsible for quality of work
- Hard to nail down specifications
- Given review requirements, contracting does not always save time

- Principal-agent problem for Public Law 93–638 (Native American contracts)
- State agencies also a third party: data may be sensitive, may need leverage
- Success rests on relationships
- Brokering?

Economic analysis by noneconomists (experiences, ideas, and lessons learned):

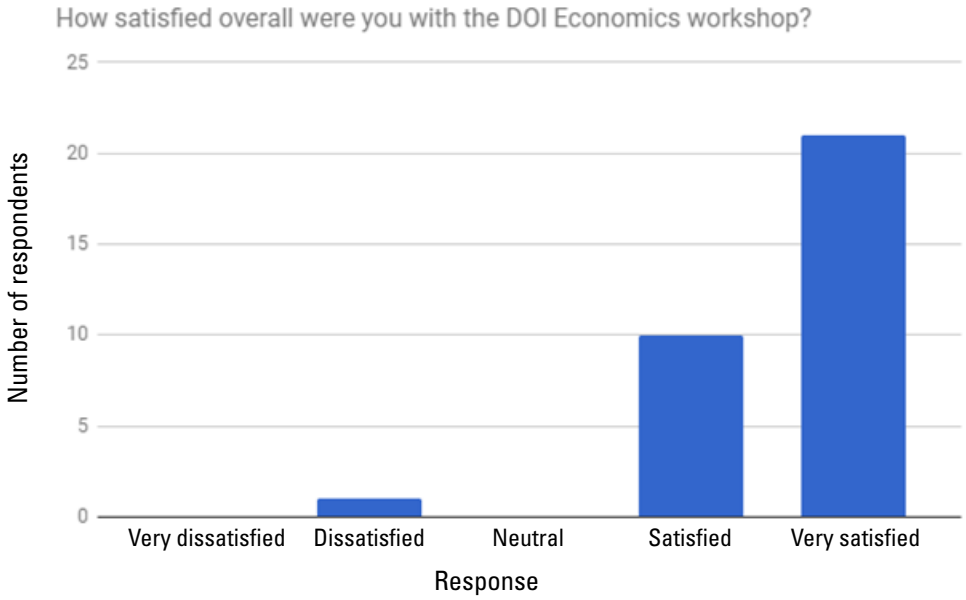
- Noneconomists and those with no experience should not be involved except to provide information
- Industry knowledge
- Economists focus on theory; noneconomists focus on application
- Coordination is necessary to yield better outcomes
- Outside perspective and openness with non-economists
- Model assumptions should include multiple perspectives
- Waste of time and resources correcting work
- Discrediting
- Cross-training and education could improve results
- Can you apply economic analysis to a noneconomist's product?
- Do we all have the same assumptions, definitions, and format?
- Department policy: require economist oversight for noneconomist work or even contractor work (for example, Natural Resource Damage Assessment and Restoration)
- Collaborate with noneconomists: provide guidance of when to contact economics staff. Include economic component in training so others understand the economic perspective and whom to contact

Appendix 6. Followup Survey Results, U.S. Department of Interior Economics Workshop, 2017

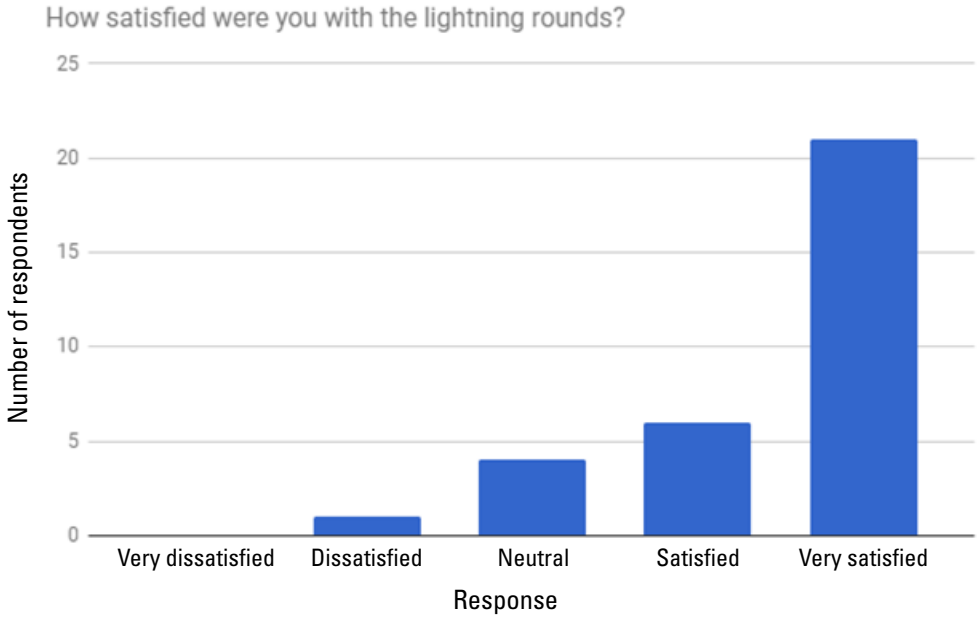
Participants in the U.S. Department of Interior (DOI) Economics Workshop (hereafter "Workshop") held from April 5 to 7, 2017, were asked to complete a short survey requesting information about their opinions on the Workshop and future workshops. A total of 32 responses were received from Workshop participants. The responses to individual questions are reported below.

Satisfaction with Workshop and Sessions

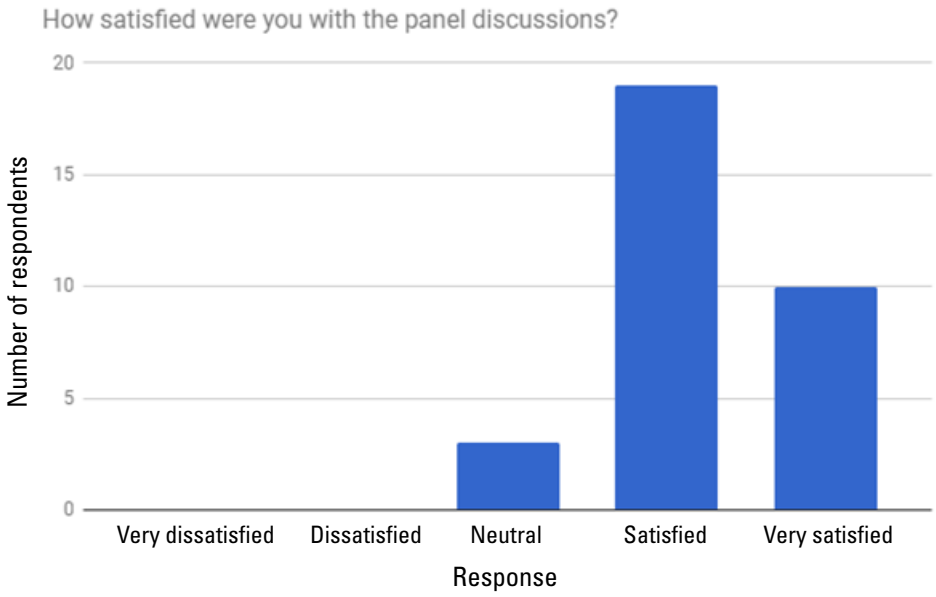
- Overall satisfaction of respondents was high; 97 percent of respondents indicated that they were satisfied or very satisfied with the Workshop.



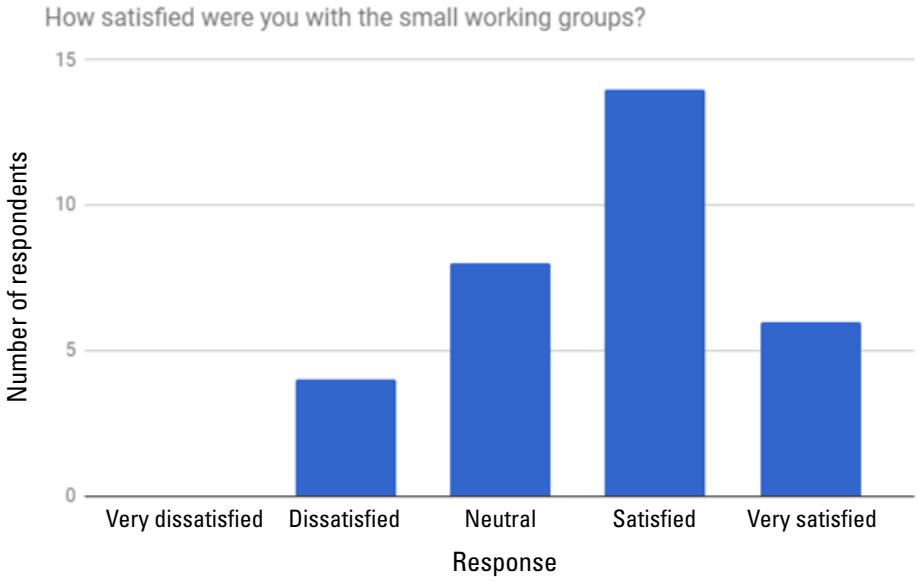
- 84 percent of respondents were very satisfied or satisfied with the lightning rounds.



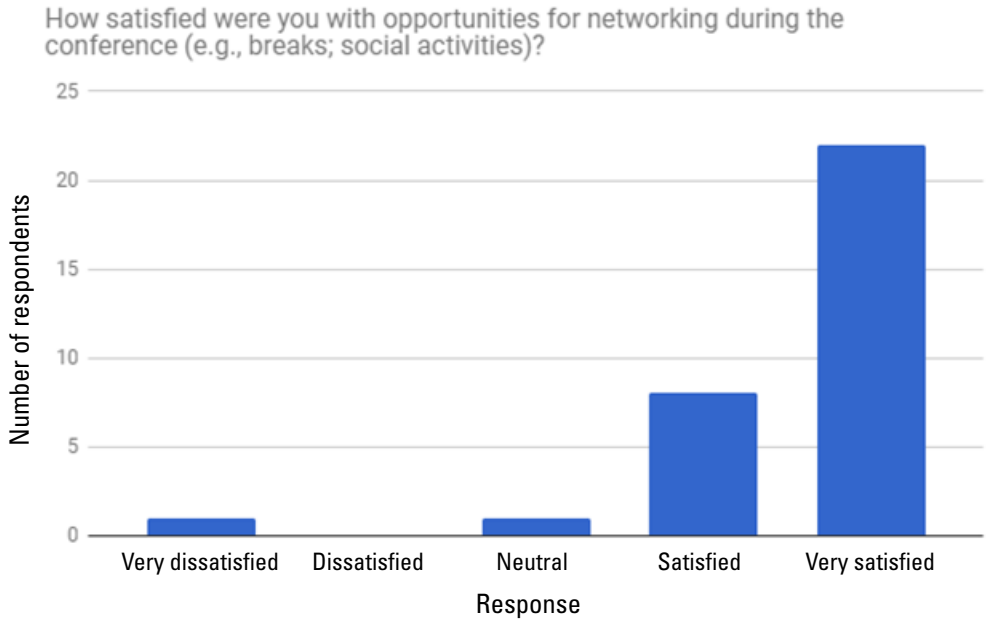
- 59 percent of respondents were satisfied, and 31 percent very satisfied with the panel discussions.



- 44 percent of respondents were satisfied, 25 percent were neither satisfied nor dissatisfied, and 19 percent were very satisfied with the small workgroup sessions.

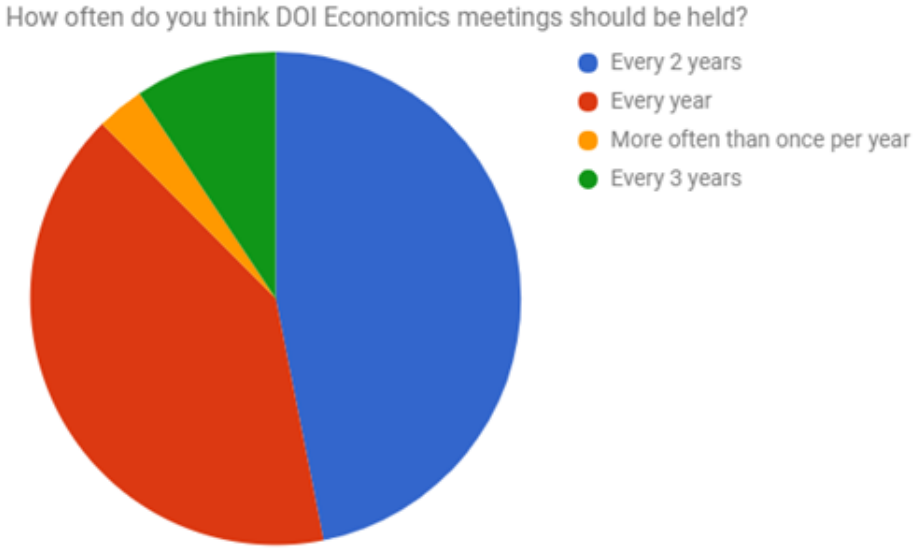


- 94 percent of respondents were very satisfied or satisfied with the networking opportunities available during the Workshop.

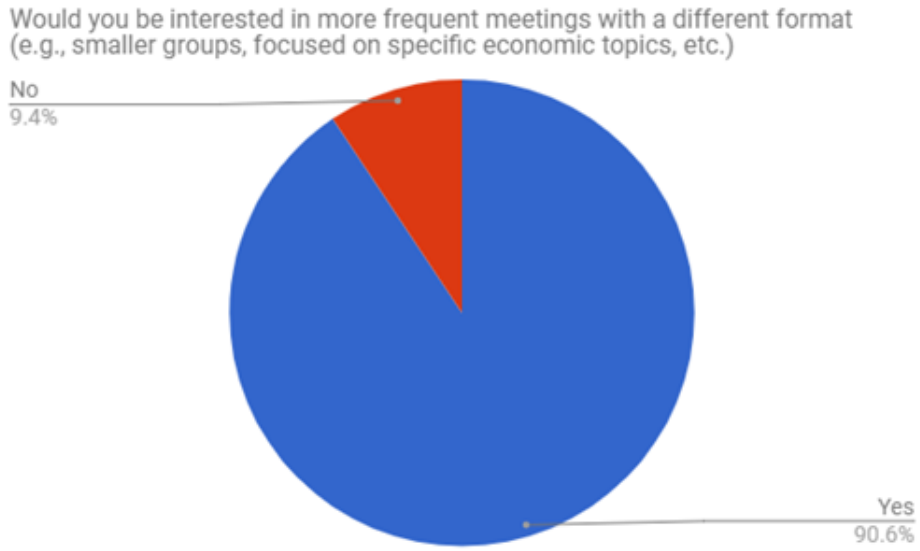


Future Meetings

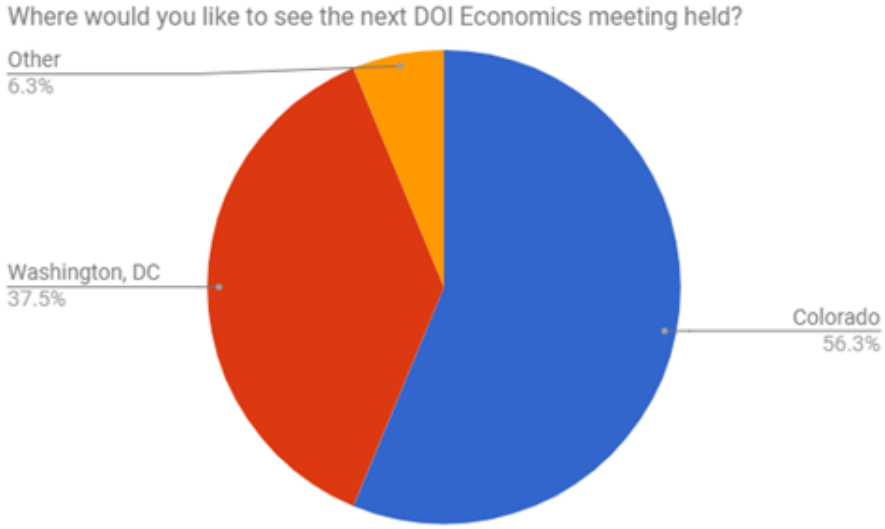
- All respondents agreed that there should be additional DOI Economics Workshops in the future.
- Most respondents felt that the Workshop should be held every 2 years (47 percent) or every year (41 percent).



Most respondents would be interested in more frequent meetings of a different format.



More than 50 percent of all respondents would prefer to have the next meeting held in Colorado.



- Several respondents provided additional comments, which are summarized below:
  - Timing: shorter breaks and longer lunches (mentioned by several respondents); 9 a.m. start time was appreciated.
  - Fewer academic presentations, more on daily economics tasks.
  - Fewer panels/small groups, more time for question and answer and discussion.
  - More time for presentations (7–10 minutes); additional time to discuss model assumptions, and so on.
  - Small group sessions where the group sits down together and develops a product or has a more indepth discussion about a particular topic.
  - Start peer review on documents before the meeting, and share feedback during meeting.
  - Specific suggestions about timing of future meetings:
    - Have DOI-wide meeting every 3 years and smaller meetings on specific topics more often.
    - Smaller meetings for people in the same area (for example, Denver, D.C.) more than once a year, and large meeting every other year.

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