AERE NEWSLETTER

Association of Environmental and Resource Economists (AERE) *Vol. 37, No. 1* *May 2017*

FROM THE PRESIDENT…

Greetings, friends and colleagues. I hope that you are having a productive and impactful year so far. Things have been busy as usual with AERE! I'm pleased to share with you news and updates on several new AERE initiatives, not least of which is a change in how we communicate with our members. In particular, this will be our last issue of the *AERE Newsletter* in its current form. I invite you to read more below about our updated approach to communications and other AERE initiatives.

AERE Summer Conference in Pittsburgh

The AERE Summer Conference is just days away! It's not too late to register and join your colleagues June 1-2 for two days of outstanding programming at the historic Omni William Penn Hotel in the heart of Pittsburgh.

The conference organizing committee has put together nearly 275 presentations and two dozen posters into an outstanding program. Our sincere thanks go to co-chairs Karen Clay (Carnegie Mellon University) and Randy Walsh (University of Pittsburgh), and committee members Edson Severnini (Carnegie Mellon University) and Jeremy Weber (University of Pittsburgh). Thanks also go to Jessica LaVoice, Ph.D. student at the University of Pittsburgh, who has been an invaluable part of the team.

Conference highlights include a Keynote by Janet Currie (Princeton University) on June 1 and *Sponsored Sessions* on (1) Emerging Data Opportunities, (2) Shale Oil and Gas, and (3) Renewables and the Grid. This year, there are also two *JAERE Editors Selected Sessions* on the Distributional Effects of Energy Policy.

At the luncheon preceding the Keynote, annual AERE awards will be presented including the newest AERE Fellows, the Publication of Enduring Quality, and the Best *JAERE* paper for the last calendar year. While the results are embargoed until the conference, I'd like to thank the PEQ committee for their work on this year's award: Brian Copeland (University of British Columbia, committee chair), Olivier Deschenes (University of California, Santa-Barbara) and Frances Homans (University of Minnesota).

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Events begin Wednesday, May 31, with a pre-conference workshop on "New Opportunities for Environmental Measurement" that is organized by Cathy Kling (Iowa State University), Yusuke Kuwayama (Resources for the Future) and Dan Phaneuf (University of Wisconsin) and features seven outstanding speakers.

For all the details on the conference and workshop, please visit the conference website which is updated continually!

The AERE Summer Conference benefits greatly from the financial support of its sponsors and we are very thankful to our many sponsoring organizations. First, our two Legacy Sponsors have been longstanding supporters of the AERE conference and made the *Emerging Data Opportunities* and *Shale Oil and Gas* sponsored sessions possible this year.

Legacy Sponsors
National Oceanic and Atmospheric Administration (NOAA)
Economic Research Service (ERS) of the U.S. Department of Agriculture

Thank you to Norman Meade (NOAA) and Marca Weinberg (ERS) for their support and for serving ex-officio on the Organizing Committee.

We would also like to thank our Gold, Silver and Bronze sponsors of the conference. Their support allows us to deliver the highest quality experience, including the *Sustainability, Renewables, and the Grid* sponsored session, and is greatly appreciated.

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We would also like to thank the Carnegie Mellon Electricity Industry Center for its financial support. Please take the time to thank representatives of our sponsoring organizations personally while at the conference.

Other Upcoming AERE Events

The 6th World Congress of Environmental and Resource Economists will be held in Gothenburg, Sweden from June 25-29, 2018. We have an excellent local organizing committee, chaired by Thomas Sterner (University of Gothenburg). A truly outstanding EAERE summer conference was hosted by the University of Gothenburg in 2008 – so the World Congress promises to be a truly memorable event. Look for more details in the monthly eNews toward the end of this year!

AERE also sponsors approximately 40 sessions presenting over 150 papers at six regional and national meetings throughout the calendar year. Upcoming after the AERE conference are the Western Economic Association International annual conference (June 25-29) with sessions organized by Trudy Ann Cameron (University of Oregon) and the Agricultural & Applied Economics Association annual meeting (July 30 – August 1) with sessions organized by the AERE program committee: Nick Kuminoff, chair (Arizona State University), Soren Anderson (Michigan State University) and Derek Lemoine (University of Arizona).

Rounding out this calendar year are the AERE sessions at the Southern Economic Association annual conference in November organized by John Whitehead (Appalachian State University). With over forty presentations in more than a dozen organized sessions, this makes for a large AERE presence at a regional meeting.

The call for abstracts for presentation in AERE-sponsored sessions at the 2018 Midwest Economic Association annual meeting (organized by Lea Rachel Kosnik, University of Missouri – St. Louis) will open on July 15. Check the AERE website later this summer for information about AERE sessions at the 2018 Eastern Economic Association annual conference. This is new for AERE this year, and the sessions will be organized by Kelly Maguire, US EPA.

These regional meetings are excellent professional opportunities for our members. To help support these activities, AERE now provides an abstract submission portal and management system for each meeting, and provides support for the after-hours opportunities that the organizers provide for AERE members to socialize and network. I'd like to thank John, Lea, and Trudy for making these popular gatherings possible.

AERE News

On a sadder note, William Baumol passed away this month at the age of 95. *Baumol's contributions to the* economics profession, and our field, were profound. In environmental economics, his enduring contribution with Wally Oates, *The Theory of Environmental Policy*, remains a standard for Ph.D. coursework and for every environmental and resource economist's bookshelf. Dr. Baumol was one of the founders of AERE, and was its second President after Allen Kneese.

I took this opportunity to visit Dr. Baumol's website and was inspired to see that, at age 90, he was co-teaching a course on innovation and entrepreneurship at New York University. Within just a few simple lines on his syllabus there was important insight that creativity may not be something that is taught, but understanding how to support and execute creative ideas is something that can be learned. Perhaps you'll find this an opportunity, as I have, to take a moment and reflect on your own creative process and recommit to supporting your ideas, and those of your students and colleagues, so they too may come to fruition.

Turning to other AERE news, we elected two new Board members this past fall: Karen Fisher-Vanden (Penn State University) and Ann Wolverton (US EPA). Many thanks to our outgoing Board members: Gib Metcalf (Tufts University) and Wolfram Schlenker (Columbia University). We truly appreciate their service to AERE over the past three years.

We also awarded the Wallace E. Oates Outstanding Dissertation Award at the AERE luncheon and business meeting held during the ASSA meetings this past January. I am pleased to announce that Casey Wichman (Resources for the Future) received the award for *Information and Environmental Policy*, University of Maryland, College Park. His advisors were Maureen L. Cropper and Roberton Williams III.

AERE has several new communication initiatives that I'd like to share with you. In 2016, AERE formed a Communications Committee to explore how we communicate with members and what we can do better. The committee is chaired by AERE Vice-President Andrew Plantinga (UC Santa Barbara), and includes AERE Board members Severin Borenstein (UC Berkeley), Meredith Fowlie (UC Berkeley), and Elena Irwin (Ohio State). Several new initiatives will be rolling out over the upcoming year, thanks to their work and insights.

First, this is the last time you will receive an AERE newsletter in this format. AERE is moving to monthly ENews that will provide concise, easy to read updates on upcoming conference announcements, calls for papers, and important deadlines and news for the coming month. The eNews will include all the information content that the *AERE Newsletter* has provided over the past thirty-six years, but will be more frequent so that members are notified of events and deadlines in a more timely fashion. The President's column will continue so that members are updated on AERE news and it will be available on the AERE website. Finally, this issue's *Newsletter Essay* titled "*Integration of Economics into Management and Resource Protection of National Marine Sanctuaries"* by Danielle Schwartzman and Bob Leeworthy will be the last. Thank you to the numerous authors over the years for contributing interesting insights and opening dialogue among our members.

I would like to extend my sincere appreciation to Marilyn Voigt and John Loomis who together co-edited the newsletter, along with assistant editor, Kathleen Meaney Stobie. Marilyn has expertly crafted the newsletter for 30 years and John solicited and edited the *Essay* section of the newsletter for 19 years. The dedication and talent of both Marilyn and John has been a great service to AERE, and to our profession, and we are very grateful for their service.

Please make sure you allow emails from "aere@memberclicks-mail.net" so that our timely and informative eNews emails don't hit your spam folder! And as always, the updated AERE website will have all the information you need to stay current.

As AERE expands its communications, we are now also supporting ResEcon, which is an email list serve for environmental and resource economists. ResEcon has over 1,000 members from around the world who post and receive information relevant to their work, such as information about upcoming events and conferences, or asking questions of the list (e.g. references on particular topics or questions about methodology).

Jeff Lazo (National Center for Atmospheric Research) has managed the list for over 20 years. On behalf of all the list members over the years, I wish to express our sincere gratitude for his selfless service to the profession. Martino Pelli (Université de Sherbrooke) will be taking over the management of the list this month. The list has been a valuable resource for professional economists and students and AERE is pleased to be able to help keep this resource available for many years to come.

AERE was founded nearly forty years ago as a means for exchanging ideas, stimulating research, and promoting graduate training in environmental and resource economics. Over the next year and a half, AERE will be implementing new initiatives and growing our activities to better serve our members and to serve the profession as a whole in meeting our mission.

I hope your summer is a good one and I look forward to seeing you in Pittsburgh, or at one of the other upcoming AERE events!

Laura

Dr. Laura O. Taylor
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AERE BOARD OF DIRECTORS MEETING

The AERE Board of Directors is meeting during the AERE Summer Conference in Pittsburgh, Pennsylvania at the Omni William Penn Hotel. Anyone with matters to be brought before the Board should contact the AERE president:

Laura O. Taylor
University of North Carolina
Raleigh, NC
lotaylor@ncsu.edu

NOMINATIONS FOR AERE OFFICERS AND BOARD MEMBERS

This year, AERE members will vote for a President (whose term will begin in January 2019), Vice President (whose term will begin in January 2018), and two new members of the Board of Directors who will serve for three years beginning in January 2018. The nominations are being handled by a committee chaired by AERE Vice President Andrew Plantinga (University of California, Santa Barbara). Elections will be held in November 2017.

Nominations may also be made by the membership through petitions, each of which contains signatures of 5% of the association's members who are then in good standing. Such petitions should be sent to arrive at the AERE Secretary's (Sarah West) address no later than **August 1, 2017**.

Sarah E. West
Professor of Economics
Macalester College
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wests@macalester.edu

AERE PUBLICATION OF ENDURING QUALITY AWARD 2018 CALL FOR NOMINATIONS

The AERE Board of Directors will present the annual award (to co-authors if appropriate) for a publication of enduring quality that appeared at least five years prior to the year of the award. Nominated works are to be evaluated on their seminal nature and enduring value. Place and type of publication are unrestricted but posthumous awards will not be given. Nominees may include individuals who are not members of AERE.

Evaluation of nominated works and final selection for the 2018 award will be undertaken by a committee chaired by Frances Homans, University of Minnesota. Nomination packages should consist of four copies each of a cover letter, a document supporting the nomination, and the publication itself. The supporting document (not to exceed three pages) should include quantitative as well as qualitative information (e.g., number of citations or copies printed). Nominations should be sent to arrive no later than **December 1, 2017**. This is an important award for AERE and for the recipients. Please give serious consideration to nominating a publication and to observing the submission requirements.

Frances Homans
University of Minnesota
fhomans@umn.edu
Subject Line: AERE PEQ Award

AERE FELLOWS 2018 CALL FOR NOMINATIONS

This program recognizes outstanding contributions to the field by members of the association. The 2017 AERE Fellows will be announced at the AERE Summer Conference in June 2017.

Click **here** for nomination criteria and process and a list of all AERE Fellows.

THE WALLACE E. OATES OUTSTANDING DOCTORAL DISSERTATION AWARD

1937 – 2015

The AERE Board of Directors has moved to recognize the many distinguished contributions of Wally Oates by naming the recently created AERE Outstanding Doctoral Dissertation Award in his honor and initiating a fund-raising drive to endow the award in perpetuity.

Wally was a seminal figure in the modern field of environmental economics. His book *The Theory of Environmental Policy*, coauthored with William Baumol, is a classic in the field and was honored by AERE as a Publication of Enduring Quality in 1993. Wally was also an inaugural AERE Fellow and served on the AERE Board from 1983 – 1986.

In addition to his pioneering scholarship in the field of environmental and resource economics, Wally was a mentor to many environmental economists in the field both through his role as a doctoral advisor and simply through his gentle and wise guidance given in innumerable seminars, conferences, and workshops.

The AERE Board feels that naming the new dissertation award in Wally's honor is a fitting and enduring way to honor his memory. The members of the Board invite you to join them in contributing to the Oates Endowment Fund for this award. AERE is a 501(c)(3) organization—all donations are tax exempt. Click **here** to donate online or mail your check (payable to AERE) to:

Marilyn M. Voigt
AERE Executive Director
1616 P St NW, Suite 600
Washington, DC 20036

Click **here** for **Award Description.**

AERE MEMBERSHIP OPTIONS

The AERE Board approved an increase in the membership rates for 2017. Dues had been unchanged since 2006 and were considerably lower than those at similar professional associations. Our efforts over the past ten years to provide improved opportunities and services to members—such as expanding the annual workshop for an average of 60 attendees to an annual workshop and conference for over 300; establishing a new journal and improving journal support; developing a new website; enhancing management capabilities and oversight for a growing organization – all have increased our expenses.

Click **here** for more information.

6TH WORLD CONGRESS OF ENVIRONMENTAL AND RESOURCE ECONOMISTS

wcere
World Congress of Environmental and Resource Economists

Gothenburg, Sweden
June 25th-29th, 2018

The Association of Environmental and Resource Economists (AERE), the East Asian Association of Environmental and Resource Economics (EAAERE), and the European Association of Environmental and Resource Economists (EAERE) announce that the 6th World Congress of Environmental and Resource Economists will be held in Gothenburg, Sweden, from June 25th to June 29th, 2018. The Congress will be organized by the University of Gothenburg, with Prof. Thomas Sterner chairing the Local Organizing Committee.

Click **here** for more information.

AERE MEMBERSHIP SERVICES

Please direct any questions or requests regarding your membership, subscriptions to *JAERE*, *REEP*, luncheon or AERE Summer Conference registrations, receipts, or related membership matters to:

AERE Membership Services
info@aere.org
Telephone: 407-774-7880

Marilyn M. Voigt, AERE Executive Director, can be reached at:

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Department of Economics

Virginia Tech
Agricultural and Applied Economics

AERE CALLS FOR PAPERS

AGRICULTURAL & APPLIED ECONOMICS ASSOCIATION (AAEA)

August 5 - 7, 2018
Washington, DC

Call for Papers: AERE Sessions

The 2018 Agricultural & Applied Economics Association (AAEA) will be held in Washington, DC from August 5 - 7, 2018. The Call for Papers will open on January 31, 2018. Check here for details.

ALLIED SOCIAL SCIENCE ASSOCIATIONS (ASSA)

January 5 - 7, 2018
Philadelphia Marriott
Philadelphia, Pennsylvania

Call for Papers: AERE Sessions

The 2018 annual winter meeting of the ASSA will be held in Philadelphia, Pennsylvania on January 5 - 7, 2018. The AERE Program Committee will organize AERE sessions. The call for papers is now closed.

See listings on the AERE Web for other upcoming events such as NAREA

CONFERENCES, MEETINGS, AND WORKSHOPS

The sixth annual AERE Summer Conference will be held Wednesday, May 31, to Friday, June 2, 2017 at the Omni William Penn Hotel located in Pittsburgh, Pennsylvania. Please join us! Pittsburgh is located at the confluence of three beautiful rivers and is near excellent biking, hiking, and kayaking. We encourage participation from academic, public, and private sector environmental and resource economists as well as graduate students, in particular those entering the job market.

A pre-conference workshop,, led by Daniel J. Phaneuf (University of Wisconsin, Madison), Catherine L. Kling (University of Iowa), and Yusuke Kuwayama (RFF) will be held on Wednesday, May 31. It will be organized around the theme of “New Opportunities for

Environmental Measurement", with an emphasis on using remote sensing and related technologies for attaching air, water, and land pollution outcomes to economic models. Seven speakers from relevant disciplines will instruct participants on the latest developments, current and future capabilities, and practical use of available data sources.

The conference will begin with an informal welcome reception on Wednesday evening; the academic program will follow on Thursday and Friday. We are excited to announce that Professor Janet Currie, Henry Putnam Professor of Economics and Public Affairs at Princeton University, will give the Keynote Address.

The conference features over 275 papers and 24 poster presentations. **Sponsored Sessions** feature papers on the following three themes: 1) Emerging data opportunities in environmental and resource economics, 2) Shale oil and gas, and 3) Sustainability, renewables, and the grid. Sponsored Sessions are supported this year by generous funding from the National Oceanic and Atmospheric Administration (U.S. Department of Commerce), the Economic Research Service (U.S. Department of Agriculture), and Microsoft.

Registration for general attendees will be accepted online until May 24, 2017. On site registrations will be accepted at the Omni William Penn Hotel conference registration desk starting May 31st.

AERE looks forward to welcoming you to the Omni William Penn Hotel in downtown Pittsburgh. In addition to an excellent academic program, there will opportunities for people to meet for dinner downtown or in one of many Pittsburgh's charming neighborhoods, enjoy beautiful Point State Park, and explore the area. Additional details about the conference are posted to the conference website.

Conference Organizing Committee:

Co-Chair Randy Walsh, University of Pittsburgh
Co-Chair Karen Clay, Carnegie Mellon University
Jeremy Weber, University of Pittsburgh
Edson Severnini, Carnegie Mellon University

Questions should be directed to the organizing committee at aere2017pittsburgh@gmail.com

AGRICULTURAL & APPLIED ECONOMICS ASSOCIATION (AAEA)

July 30-August 1, 2017
Chicago Marriott Downtown Magnificent Mile
Chicago, Illinois

Click **here** for conference information.
Click **here** for AERE Sessions.

7TH CONGRESS OF THE EAST ASIAN ASSOCIATION OF ENVIRONMENTAL AND RESOURCE ECONOMISTS (EAAERE)

August 5 – 7, 2017
Mandarin Orange Singapore Hotel
Singapore

Click **here** for conference information.

EAERE 23RD ANNUAL CONFERENCE

June 28 – July 1, 2017
Megaron Athens International Conference Center
Athens, Greece

Click **here** for conference information.

SOUTHERN ECONOMIC ASSOCIATION (SEA) 87TH ANNUAL MEETING

November 17 – 19, 2017
Tampa Marriott Waterside Hotel and Marina
Tampa, Florida

Information about AERE sessions will be posted **here**.

WESTERN ECONOMIC ASSOCIATIONINTERNATIONAL (WEAI) 92 ND ANNUAL CONFERENCE

June 25 - 29, 2017
Marriott Marquis and Marina
San Diego, California

Click **here** for information about the AERE sessions.

Click here for a direct link to the AERE Web Page with full listings of AERE sessions at the ASSA and regional US meetings along with conferences, workshops and meetings sponsored by our colleagues including:

Environment for Development (EfD)
Northeast Agricultural and Resource Economics Association (NAREA)
New Directions in Commodities Research at the University of Colorado, Denver

ESSAY

Integration of Economics into Management and Resource Protection of National Marine Sanctuaries

Danielle Schwartzman and Bob Leeworthy, Economists
Office of National Marine Sanctuaries, NOAA, Silver Spring, MD 20910

Overview of the National Marine Sanctuaries

The National Oceanic and Atmospheric Administration's (NOAA) Office of National Marine Sanctuaries (ONMS) serves as the trustee for a network of underwater parks encompassing more than 600,000 square miles of marine and Great Lakes waters. The network includes a system of 13 national marine sanctuaries. Few places on the planet can compete with the diversity of the National Marine Sanctuary System, which protects America's most iconic natural and cultural marine resources. The system works with diverse partners and stakeholders to promote responsible, sustainable ocean uses that ensure the health of our most valued ocean places. A healthy ocean is the basis for thriving recreation, tourism and commercial activities that drive coastal economies. ONMS also leads the National Marine Protected Areas Center, the nation's hub for building innovative partnerships and tools to protect our special ocean.

For more than 40 years, our national marine sanctuaries have worked to protect special places in America's ocean and Great Lakes waters, from the site of a single Civil War shipwreck to a vast expanse of ocean surrounding remote coral reefs and tiny atolls. Backed by one of the nation's strongest pieces of ocean conservation legislation, the National Marine Sanctuaries Act, the sanctuaries seek to preserve the extraordinary scenic beauty, biodiversity, historical connections and economic productivity of our most precious underwater treasures. By acting as responsible stewards of these special places, we strengthen our nation now and for future generations.

Roles of Economics in Sanctuaries

The field of economics is becoming increasingly important in conservation management. The ability to foster strong community support and involvement in place-based management requires understanding of a suite of socioeconomic conditions. These include the economic value that people place on resources, the economic impacts of using those resources, the jobs sustained by uses like recreation, tourism, fishing, and the ways in which managing resources may result in trade-offs among the benefits to various user groups.

As multiple use marine protected areas, national marine sanctuaries are an important component of local communities and their economy. As such, ONMS uses economics to inform a variety of program components. Management uses economic data to meet analytical requirements under the National Environmental Policy Act, Regulatory Flexibility Act, and Management Plans. Similarly, damage assessment and scenario analysis are both used in attaining resource protection and/or restoration goals. There is also an effort to continue the integration of natural sciences with social sciences. To accomplish this goal, ONMS has released new guidance for preparation of sanctuary Condition Reports calling for inclusion of ecosystem service status and trends as part of the suite of factors describing the health and state of sanctuary resources. ONMS also uses economics to assess the value of the program's educational services and to aid in the development of targeted educational and outreach campaigns. The following examples further describe the ways in which ONMS uses economics to support its conservation goals through integration with the management planning process, preparation of sanctuary Condition Reports, evaluation of educational programs, development of outreach campaigns, resource protection activities, and community engagement.

Management Planning

Roughly every ten years, sanctuaries review and update their management plans. These plans are comprehensive documents that are specific to each sanctuary. They consider short, mid, and long term challenges and opportunities for the sanctuary and present a course of action to address them. These actions may involve education, research, restoration, boundary expansion, and resource protection measures to better conserve and enhance resources. Often, this involves additional socioeconomic research depending on the data needs of the site.
(http://sanctuaries.noaa.gov/management/mpr/)

Spatial use data is often identified as a data gap. For example, Monterey Bay National Marine Sanctuary is currently working with commercial wildlife viewing operators to better understand the spatial distribution of uses within the sanctuary. Knowing where operators are most dependent upon the resource will better inform management and users about the effects of policy changes designed to impact wildlife habitat and the stream of ecosystem services.

Florida Keys National Marine Sanctuary is currently involved in a review and revision of all its regulations. The sanctuary uses marine zoning as a management tool for both protection and restoration of resources but also for reducing conflicts between user groups. Decision support software, such as Marxan, can assist in evaluating biological or economic hotspots of activity. Marxan analysis can identify what areas are most significant to protect based upon optimization of management goals and criteria. It is also possible to estimate the economic impacts of marine zoning alternatives and other policies on specific user groups. The analysis may also reveal if trade-offs might exist among various stakeholders, such as whether a research-only area may benefit researchers and academics, but harm those that use the area for consumptive purposes. However, Marxan is only a screening tool. ONMS has been an innovator in gathering spatial use information and cost-and-earnings data from commercial fishing operations and for hire recreational businesses that take recreators out for consumptive and non-consumptive activities. Geographic information systems (GIS) are used to develop tools for analyzing spatial regulatory alternatives. GIS information is then linked to economic data and models to estimate potential impacts of regulatory alternatives. This all is done within a Sanctuary Council Advisory (SAC) working group tasked with providing a recommendation to ONMS management. ONMS stakeholders, with information supplied by ONMS physical and social scientists, design the regulatory alternative. Thus, ONMS presents a unique nexus between process, science, and governance. Examples include the Tortugas Ecological Reserve in the Florida Keys, the network of marine reserves in the Channel Islands, the research only area in Gray's Reef, and boundary expansion in the Flower Garden Banks.

Condition Reports

The Office of National Marine Sanctuaries compiles regular reports on the condition of each sanctuary's natural and archaeological resources. The first generation of these Condition Reports used the Pressure-State-Response (PSR) framework and did not include information on ecosystem services, the impacts humans have on resources or the benefits humans derive from sanctuary resources. The next generation of condition reports has an expanded framework that includes both drivers and ecosystem services - the Drivers, Pressures, State, Ecosystem Services and Response (DPSER) model. Based on supply and demand forces, including and analyzing drivers will bring increased awareness and understanding to how societal values, behaviors, and changes to drivers affect pressures on the resources.

The added assessment of ecosystem services allows for examination of how changes to environmental, biological, archeological or cultural resources positively or adversely affect the benefits humans receive from the sanctuary and its resources. Changes to market values, non-market values and non-economic indicators will be considered when determining the status and trends of ecosystem services. This additional component of

Condition Reports will help to inform community members and user groups about how changes to sanctuary resources, and consequently ecosystem services, affect them. Further, management may use this information to develop programs or policies to protect specific resources to sustain the benefits people derive from national marine sanctuaries.
(http://sanctuaries.noaa.gov/science/condition/)

Resource Protection

Damage Assessment & Restoration. The issues above focused on promoting a more cooperative working relationship among stakeholders with interest in sanctuary management. Damage Assessment is by its nature an adversarial process. ONMS economists do not engage in damage assessment cases in order to avoid creating potential divisive adversarial relationships with sanctuary stakeholders. Instead, NOAA's Office of Response and Restoration (ORR) conducts this work in collaboration with sanctuary experts, and other federal and state trustees. The results of ONMS studies on the economic value of sanctuary resources, however, are used by ORR and other trustees to inform damage assessment cases and restoration.

Scenario Analysis. Olympic Coast National Marine Sanctuary is currently developing potential management scenarios for consideration based upon the environmental improvements that could occur because of specific policies or actions. The results of the non-market valuations discussed above would then be used to estimate the economic value associated with these scenarios. The benefits can then be compared to the costs of implementation to determine which policies or actions will create a net positive impact. Further, given the spatial analysis component of the research, it may be possible to identify where the benefits are most likely to accrue.

Market Based Analyses in ONMS

Businesses in sanctuary communities, including restaurants to hotels, aquariums, kayak and wildlife viewing operators, and recreational and commercial fisheries, rely on thriving national marine sanctuaries to be successful. Across all national marine sanctuaries, about $8 billion annually is generated in local, coastal and ocean dependent economies from a diverse range of activities. The activities may be consumptive or non-consumptive and include examples such as commercial fishing, research, education and recreation-tourist activities.

In recognition of this contribution and the need to characterize associated impacts, the ONMS socioeconomics program works with partners to survey and evaluate sanctuary communities and economies. Sanctuary economists and partners employ multiple techniques that not only address market and non-market values, but non-economic indicators such as importance/satisfaction and knowledge, attitudes and perceptions. The following case studies of ONMS socioeconomic projects and products show the breadth of the sanctuary program's economic research and analysis.

GDP, Jobs, Income and Value-Added. IMPLAN is an input output modeling software that ONMS use to determine the impact of expenditures in and around a sanctuary on the local economy. Sanctuary economists use the software in conjunction with studies that estimate the intensity of recreational activities in terms of the number of person-days or person-trips, as well as the associated expenditures. A study released in 2015 (Leeworthy, et al. 2015a), incorporated this approach using data collected by Ecotrust for the State of California's Monitoring Enterprise's North Central Coast Marine Protected Area (MPA) Baseline Program. This study provides estimates of person-days of non-consumptive recreational activity, expenditures and economic impacts of those expenditures for Greater Farallones National Marine Sanctuary and the northern portion of MBNMS.
(http://sanctuaries.noaa.gov/science/socioeconomic/farallones/non-consumptive-use.html)

Although there are several steps to developing the final project, a short summary of ONMS's approach follows. The data collected in this effort included spatial information, which enabled isolation of the observations that occurred in or near the sanctuary and to determine the associated number of person-trips and person-days. In addition, associated expenditure data allowed for expenditure profiles to be developed for those who were engaged in non-consumptive recreation on the North Central Coast. This expenditure information is then used in the IMPLAN software to estimate gross domestic product (GDP), jobs, value-added and income generated within the study area as a result of these expenditures. (The study area is identified by using the American Commuter Survey to identify where most of the impacts of spending will occur).

This information is important to sanctuaries and their communities. Understanding the jobs and incomes that are supported by healthy marine ecosystems is important to management and those whose livelihoods rely on the resources. Changes to the ecosystem services could impact the types of recreation or activities that people spend money on, and consequently impact local businesses. For example, an improvement to whale populations could provide additional business opportunities for tours, where a decline in the resources may hurt the owners if visitors expect that there will not be whales to see.

Wildlife Viewing. Across the majority of sanctuaries, especially those adjacent to land, wildlife viewing is a common recreational activity that residents and visitors report doing. Data may be collected from wildlife viewing operators about their business operations, personal opinions and attitudes or from their passengers. When expansions to existing sanctuaries are proposed or when management or regulatory changes are being considered, these data can be used to inform constituents and site SACs about the potential impacts, good or bad, that any changes may have on local businesses.

Currently efforts are underway at Monterey Bay National Marine Sanctuary (MBNMS) to collect economic information about the importance of marine wildlife to the local tourism industry. Associated ocean recreation businesses that support this industry include whale watching, seabird viewing charters, kayaking, SCUBA diving, and paddleboarding. Data collection includes costs and earnings, number/types of vessels, trips and passengers and spatial data on where the trips are occurring and the types of wildlife they are targeting for customers. This information helps to paint a complete picture of how ocean recreation businesses benefit and profit from healthy wildlife and how they may be impacted by changes in management or ecosystem services.

The need to reduce disturbance of whales, pinnipeds, sea otters and seabirds has prompted MBNMS and its Sanctuary Advisory Council to explore different management options that could address this challenge while also minimizing the economic impact on the wildlife viewing industry. For example, a non-regulatory approach to reducing disturbance to marine wildlife could include increased education, outreach and interpretive enforcement programming in ways that are more integrated with wildlife viewing businesses and the general public. An example of a regulatory approach could include establishment of an "approach distance" for encounters with whales, which could require spectators to remain a specified minimum distance from particular whale species. The latter approach may be explored for implementation on a voluntary basis or for future regulatory action by MBNMS.

Non-Market Based Economics

Olympic Coast. An assessment of the non-market economic value of outdoor recreation on the Outer Coast of Washington and Olympic Coast National Marine Sanctuary (OCNMS) is currently underway. The study used survey data of Washington households that participated in outdoor recreation on the Outer Coast of Washington in 2014. In this analysis, the attributes approach to valuation was used to value changes in natural resource conditions from the "Status Quo" or low condition (i.e., the condition the resources will be in if existing policies and management continue over the next 10 to 20 years) and improved conditions to a medium and high condition. Of the different techniques that could be used, the discrete choice experiment approach was chosen so that marginal values to changes of each of the resource attributes could be estimated (Leeworthy, et al., 2017). Values were also estimated as a function of user characteristics (e.g., per capita income, experience with the Outer Coast for recreation and user's ecological worldview). (http://sanctuaries.noaa.gov/science/socioeconomic/olympiccoast/recreation.html)

The results will provide information on the marginal willingness to pay to improve the nine attributes evaluated in the questionnaire. These results will ultimately allow for scenario preparation based on potential management directives that evaluate how a change to the resources could affect Washington residents' value of the sanctuary. For example, if management were to consider a policy to reduce the amount of marine debris in the sanctuary and along its coast, the economic value of the change could be estimated and compared to the costs of implementing the directive.

This study also obtains information on people's preferences for different marine animals (e.g. seabirds and marine mammals), development of an environmental index for predicting people's non-market economic values, estimation of the non-market economic values, and estimation of how those values change with changes in natural resource attributes and user characteristics.

Outreach and Education

Ocean Guardian. The Ocean Guardian School (OGS) program is a grant program supported by the National Marine Sanctuary Foundation and coordinated out of ONMS. The program was designed to further the educational goals of the National Marine Sanctuary System by supporting hands-on ocean stewardship projects in K-12 public, private and charter schools. As part of the program, schools are awarded small grants (up to $4,000) to carry out their own school or community-based conservation projects that make a difference in the health and protection of their local watersheds and/or the world's ocean. Up until this point, little was known about the quantified benefits parents and children receive from the OGS program. In order to improve program evaluation going forward, ONMS developed a study that uses a contingent choice survey to estimate the value that parents place on their child's participation in OGS programming.

By asking parents to make trade-offs between costs and the types of education their child receives, a value for each program area was estimated. The types of education include;

1. Watershed Restoration - Learning about local watersheds and participating in projects to improve the local watershed; such as removing invasive species, planting native species or improving fish habitat

2. Marine Debris - Learning how to reduce one-time use plastics (such as plastic water bottles) and participating in projects to reduce trash entering the ocean

3. Refuse/reduce/reuse/recycle/compost - Learning how to reduce waste and implement programs to reduce their waste within the school

4. Schoolyard Habitat/ Garden - Learning about ocean-friendly gardens and habitats and participating in projects to create/ improve school gardens and yards with eco-friendly practices and methods such as planting native species, reducing run-off, installing rain barrels

5. Energy Use and Ocean Health - Learning about how fossil fuel-based energy use impacts the ocean; participating in projects to reduce energy use and/or implementing renewable energy projects such as wind or solar

6. Involvement – this could be one of the following;

    a. interacting with those in your grade level,

b. in addition to interacting with students and teachers in their grade, your student would also interact with students and teachers in other grades or

c. in addition to interacting with students and teachers in their grade and other grades, your student would also interact with local community members, such as small businesses, non-profits or local government officials.

Results show that parents had the highest willingness to pay for habitat and restoration education (Schwarzmann, et al. 2017). The findings from this study will be used by ONMS educators and shared with OGS teachers to increase the value and benefits parents receive as a result of their child's education experience. Given that specific mixes of educational aspects of the OGS can result in net positive benefits (after accounting for the average per student cost of OGS); knowing these mixes can help guarantee that the program has positive benefits across all schools in which it is implemented.

Valuation. As discussed previously, the Ocean Guardian School (OGS) program seeks to educate K-12 students about ocean conservation and stewardship. Part of the ONMS socioeconomics review of the program included a cost-benefit analysis, which determined that the average cost per student ranged from $14.16 to $52.91. If a student receives habitat restoration-focused experiences only, then the benefits exceed the costs. Similarly, if students received either restoration or energy education in combination with a high level of involvement from outside their grade level, then the benefits exceed the costs. By understanding the various components of this program that create the largest value, educators can work to ensure that the benefits exceed the costs of the program across all schools. When faced with limited budgets, this same information can help prioritize program components.

Non-Economic Measures

National marine sanctuaries are designated for their cultural, natural and historical significance and are located adjacent too or offshore from diverse communities across the United States and its Territories. Despite the place-based oriented approach to management, the effects of protecting these areas do not necessarily accrue to or impact only those who are willing to pay for improvements or who rely on the areas for their livelihoods. Thus, it is important to collect and use other non-economic measures to guarantee representation in management and policy decisions to all citizens. The ONMS approach to economics goes beyond efficiency to include measures that address equity issues too.

Knowledge, Attitudes and Perceptions (KAP). This information addresses ONMS management processes, regulations and management strategies. "Knowledge" refers to what people know, how they get their information, and level of trust in the sources of information. For "attitudes", surveys collect people's ratings according to an agreement statement or via support scales about different ONMS processes, regulations or management strategies. "Perceptions" ratings are obtained on different natural resource attributes, which are usually measured on a Likert scale. Measurements are compiled by user group and are designed for comparison with ecological measures to guide decisions on whether an investment is needed addressing potential misconceptions; an example situation may be when a person's perception of the health of a resource does not agree with its status as measured through associated ecological indicators.

Importance-Satisfaction. As part of the Outer Coast of Washington and OCNMS project mentioned above, respondents were asked to rate 25 natural resource attributes, facilities and services based upon their level of satisfaction and importance. The resulting analysis was presented by mapping each of the attributes into one of four quadrants based on that attribute's relative importance and satisfaction to other attributes. (See Figure 1below). The four quadrants can be interpreted as "Concentrate here (relatively high in importance and relatively low in satisfaction); "Keep up the Good Work" (relatively high in importance and relatively high in satisfaction); "Low Priority" (relatively low in importance and relatively low in satisfaction); and "Possible Overkill" (relatively low in importance and relatively high in satisfaction). The results can be used by sanctuary management and the local community to aid in prioritization of policy, education, conservation, research, and facility development efforts (Leeworthy, et al. 2015b) (http://sanctuaries.noaa.gov/science/socioeconomic/olympiccoast/recreation.html)

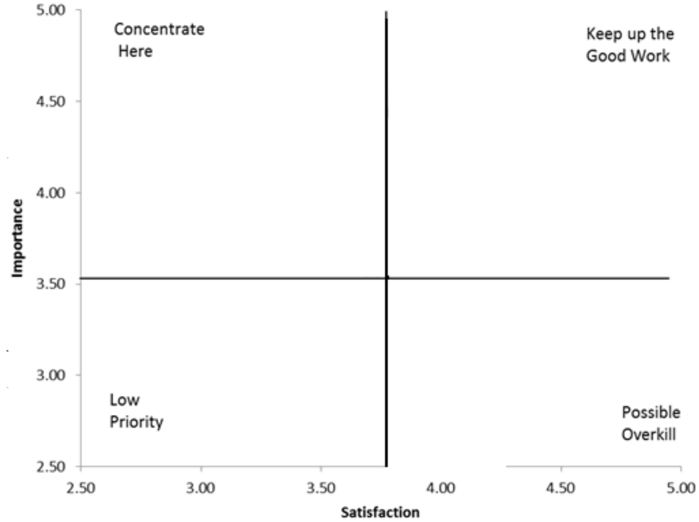

Figure 1. Importance-Satisfaction Matrix

Community Involvement & Place-Based Management

Sanctuary Advisory Councils. ONMS actively seeks community engagement through public meetings, volunteer opportunities, education and outreach events and sanctuary advisory councils (SACs). These SACs are a type of community-based advisory group that is unique to the sanctuary system. They provide advice and recommendations to the sanctuary superintendents on management, science, service and stewardship.

By engaging local sanctuary communities, ONMS is practicing place-based management. This means that management and conservation methods are developed specific to each sanctuary location, realizing that community and conservation needs vary by location. ONMS actively engages with communities through the SACs so that programs, expansions and regulations are, in-part, developed by the communities that sanctuaries benefit. Although, these place-based programs benefit from national assets and resources, they are implemented locally by the sanctuaries and their partners, which include state and local governments, treaty-tribes, local and indigenous peoples, non-profit and academic institutions.

Information Sharing. As discussed above, the sanctuary economic approach also involves the collection and analysis of non-market indicators. For example, divers in the Florida Keys may have the perception that the reefs are healthy because they perceive high water clarity in seagrass beds, and around sponges, coral and other underwater resources. However, from a scientific standpoint, the water may have higher nutrient levels than historical averages, which can be an indication of lowered water quality and a threat to reef health. Such an inconsistency would highlight the need to increase public understanding of ecological conditions. This could be addressed through development and dissemination of education materials to divers so that they are aware of the overall heath and trends of the ecosystem. Outreach effectiveness can be further enhanced when Knowledge, Attitudes, and Perception survey results include information about respondents' sources of information, thus allowing educators to find the best way to contact or reach specific user groups.

Nomination Process. Community engagement and support is also driving the sanctuary nomination process. For the first time in over two decades, NOAA is inviting communities across the nation to nominate new national marine sanctuaries in locations they view as national treasures and that have national significance within marine and Great Lake waters. The community, not NOAA or the federal government, builds the nomination and works to gather and obtain broad community support for a new sanctuary. Since the nomination process opened two years ago, 12 nominations have been received to date.

ONMS identified several criteria that would be considered during review of submitted nominations, including information prepared by the nominator about whether the areas support present and potential economic uses such as recreation, tourism, subsistence, traditional uses and/or commercial fishing. Another criterion focused on whether the public-derived benefits of the areas depend on conservation and management of the nominated resources. The ability to evaluate these criteria requires an understanding of the economics of the affected area, values and uses of the resource, and potential changes to the resource. (http://www.nominate.noaa.gov/)

Partnerships. Sanctuary economic research is driven primarily by management priorities at local, regional, and national scales. Research needs are identified on each marine sanctuary's science needs website. ONMS can collaborate on research with universities, local and state governments, non-governmental organizations and private businesses. ONMS economists also mentor many undergraduate and graduate students to help fill those science needs. Although many students are volunteers meeting their degree requirements, NOAA has several programs that provide paid internships or scholarships (e.g., the ONMS Nancy Foster Fellowships for M.S. and Ph.D. students, the University Internship Partnership Program, and the Hollings Scholars Program, with the latter two directed mostly to undergraduate students). An important ONMS objective for all interns is that they leave with at least one peer-reviewed paper on their resume. This meets a wider NOAA objective of assisting in the development of future scientists. (http://www.noaa.gov/opportunities/opportunities-for-students)

Figure 2 below summarizes the economic products that ONMS produces and their applications to ONMS programs and activities.

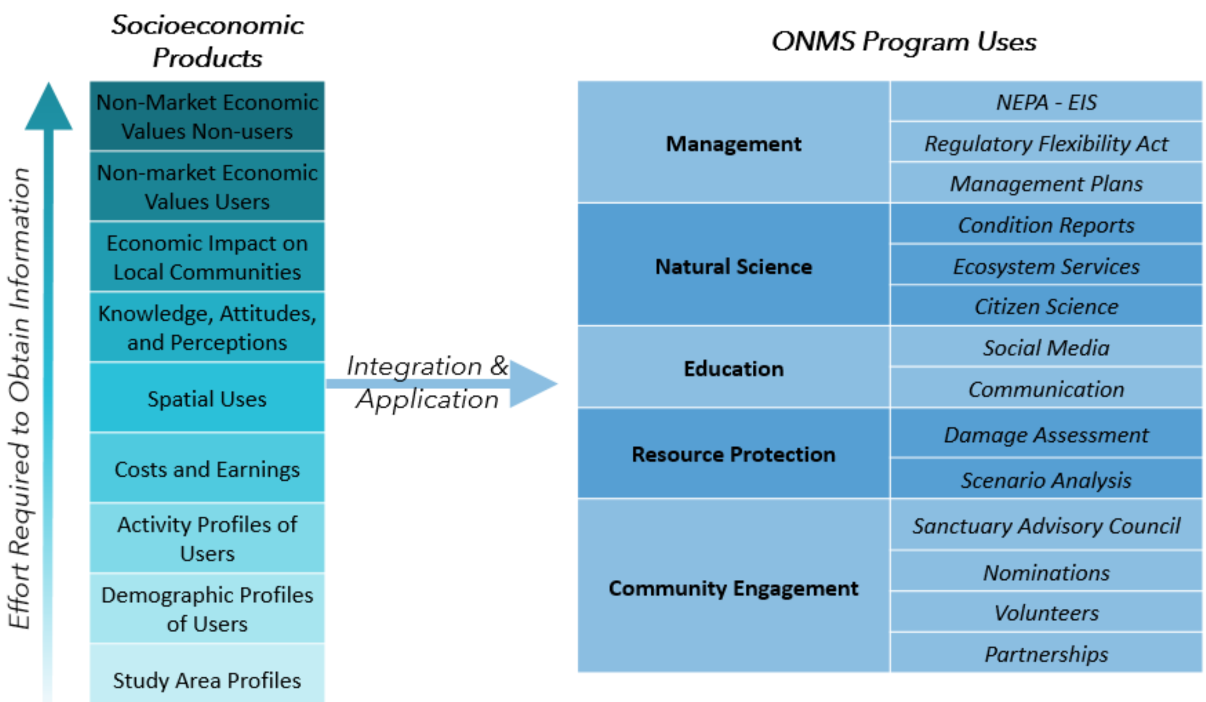

Figure 2: ONMS Economic Products and Applications

Conclusion

The Office of National Marine Sanctuaries incorporates a diverse range of economic methods and applications in support of its mission. These methods span both market and non-market valuation, in addition to the use of non-economic indicators. The subsequent results of economic research and analysis provide a better understanding for management and the communities of resident and visitor interactions and dependencies on these national treasures. The research of sanctuary economists and partners is seen not just in peer reviewed journals and white papers, but in NEPA environmental impact statements, sanctuary nomination packages, management plans, condition reports, conferences and education materials. Along with the support of communities, economics provide an integral component of the contribution made by a diverse team of scientists, educators, and managers in making sanctuaries successful.

For Additional Information
http://sanctuaries.noaa.gov/science/socioeconomic/

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JOB POSTINGS

- **Vice President (VP) for Land, Water, and Nature -** Land, Water, and Nature Program at **Resources for the Future**. Washington, D.C. Posted April 19, 2017.

- **AAEC Department Head -** Department of Agricultural and Applied Economics, **Virginia Tech**. Blacksburg, VA. Posted February 24, 2017.

- **Faculty Position in Environmental and Resource Economics -** Rosenstiel School of Marine and Atmospheric Science at the **University of Miami**. Miami, FL. Posted February 6, 2017.

- **Department Head. -** John and Willie Leone Family Department of Energy and Mineral Engineering. College of Earth and Mineral Sciences, **Pennsylvania State University**. Posted December 15, 2016.

POST-DOCTORAL POSITIONS AND FELLOWSHIPS

- **Axford Fellowship in Public Policy**. New Zealand. Ongoing - applications close April 1 annually.

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