Jeffrey R. Wakefield PhD

Current Position
Principal

Discipline Areas
> Natural Resource Economics
> Natural Resource Damage Assessment
> Socioeconomic and Land Use Assessment
> Regulatory Impact Assessment
> Benefit Cost Analysis
> Marine Biology

Years' Experience
16 Years

Joined Cardno
2001

Education
> PhD, Economics, University of Delaware, Newark, DE, 2001
> MS, Marine Biology & Biochemistry, College of Marine Studies, Lewes, DE, 1996
> BS, Biology, Rochester Institute of Technology, Rochester, NY, 1993

Summary of Experience

Dr. Jeffrey Wakefield is formally trained in Economics, Marine Biology, and Biochemistry. He has fifteen years of experience managing and performing intergovernmental and private sector projects related to the valuation of natural resources and environmental impact assessments. Formerly adjunct faculty at the University of Delaware, he has published in biological, coastal erosion, and oil spill related journals. He has also conducted economic analysis for government entities including the U.S. National Marine Fisheries Service (NMFS), U.S. Coast Guard (USCG), Federal Energy Regulatory Commission (FERC), Australia's National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), and the Secretariat of the Pacific Community (SPC), trade groups including the Electric Power Research Institute (EPRI), the American Petroleum Institute (API), law firms and industrial clients. In addition, Dr. Wakefield has developed statistical and modeling approaches that integrate hydrodynamic modeling, toxicology, and population dynamics to quantify and value natural resource impacts.

Working on behalf of BP, Dr. Wakefield spent several years designing and coordinating efforts to assess potential impacts to, and restoration of, avian and nearshore resources following the Deepwater Horizon oil spill. He is currently managing the assessment of impacts to recreational activity and natural resources along a mercury contaminated river and reservoir system and conducting an economic valuation of Deep Sea mining activity in the Pacific Island Region.

Significant Projects

Lead Consultant – Cost Benefit Analysis of Deep Sea Mineral Mining in Papua New Guinea, Cook Islands, and the Republic of Marshal Islands

Co-Authored an assessment of the social costs and benefits of deep sea mineral mining at hydrothermal vent, seamount, and abyssal plain sites. The detailed economic assessment of tax and royalty revenues, social costs, and environmental costs was used by the Secretariat of the Pacific Community to inform policy decisions related to the regulation of this emerging industry.

Lead Consultant – Independent Review of APPEA Cost, Expenses and Liabilities Estimation Method for Petroleum Activities in the Offshore Waters of Australia

Conducted an independent review of financial assurance calculation methodologies put forth by The Australian Petroleum Production & Exploration Association (APPEA) in association with Australia's offshore oil and gas development. The assessment was relied upon by Australia's Offshore Petroleum Safety and Environmental Management Authority to develop compliance guidelines for Australia's Offshore Petroleum and Greenhouse Gas Storage Act of 2006.

Lead Consultant – Natural Resource Damage Assessment Following the Deepwater Horizon Oil Spill in the Gulf of Mexico

Developed data collection protocols and assessment methods to evaluate impacts to birds and nearshore ecological resources resulting from the Deepwater Horizon oil spill and directed the cooperative assessment of bird-related injuries on behalf of BP in conjunction with United States Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA) and resource agencies representing all Gulf Coast states.

Lead Consultant – Economic Evaluation of Regulatory Options for Managing Ground Fisheries in the Northeast United States

Coordinated with New England Regional Office of NMFS, the Northeast Fisheries Science Center and commercial fishermen to evaluate the socioeconomic impacts of alternative groundfish regulatory regimes. The team completed a total of 17 assessments in 10 months allowing implementation of new regulation prior to the targeted fishing year.

Lead Author – Economic Evaluation of Regulatory Options for Responding to Coastal Erosion in Delaware – United States

Estimated the costs and benefits of alternative strategies for responding to coastal erosion in the state of Delaware. The analysis integrated historical erosion data, coastal engineering, and real-estate information to identify the costs and benefits of coastal armoring, beach nourishment, and coastal retreat and assist Delaware's Department of Natural Resources in policy development and implementation.

Consultant – Evaluation of Environmental Costs Associated with U.S. Cooling Water Intake Regulation – United States

Estimated the economic impacts of alternative cooling water regulatory regimes at sites throughout the United States. This EPRI sponsored report integrated engineering and environmental data from industrial sites throughout the United States to evaluate the economic effects of alternative regulatory regimes. The assessment included monetized estimates of aesthetic, ecological and human health externalities associated with various cooling technologies. The report was submitted to support EPA's rule making process.

Lead Consultant – Impacts of Potential Offshore Oil Development – Niger Delta, Nigeria

Coordinated and assessed the potential for impacts to offshore fisheries resources on the Nigerian coast associated with potential offshore drilling sites. The exercise used 3-dimensional hydrodynamic modeling to assess chemical and sediment transport associated with surface, subsurface and pressurized blowouts. The report was submitted to the government of Nigeria to support their permitting process.

Consultant – Financial and Socioeconomic Evaluation of the Keystone XL Pipeline – Western United States

Evaluated the purpose of, and need for, an international pipeline connecting the Canadian oil sand fields to refineries along the United States Gulf Coast and supported the U.S. Department of State in assessing potential socioeconomic impacts during project construction and operation. Reports were integrated into the project impact assessment.

Lead *Consultant – Economic Evaluation of Habitat and Resource Equivalency Analysis Prepared for American Petroleum Institute (API) – United States*

Reviewed the theory of economic compensation and integrated that theory into a discussion of habitat and resource equivalency analysis in damage assessment. The purpose was to help potentially responsible parties develop emergency response and data collection strategies that reduce uncertainties related to the assessment of natural resource damages following the release of oil or other hazardous chemicals.

Lead Consultant – Cost Benefit Analysis of Alternative Cooling Water Strategies at Multiple Inland and Coastal Sites Throughout the United States

Estimated the social costs and benefits of converting once-through cooling water systems into cooling tower based systems at multiple riverine, estuarine and Great Lakes sites. Assessments included valuations of commercial and recreational fisheries as well as human health and environmental impacts.

Natural Resource Damage Assessments

Consultant – Natural Resource Damage Assessment – Kalamazoo, Michigan

Providing strategic support and analysis for a confidential client involved in the assessment of Natural Resource Damages related to the historic release of PCBs into the Kalamazoo River. The assessment addresses over 70 miles of contaminated river and multiple potentially responsible parties.

Consultant – Natural Resource Damage Assessment – Saltville, Tennessee

Supporting Olin in their efforts to work with state agencies and the USFWS to evaluate the potential impact of, and compensatory restoration for, mercury-related impacts to natural resources along an 80-mile stretch of the North Fork Holston River. The assessment focused on impacts to recreational fisheries, birds, bats, and aquatic resources.

Consultant – Natural Resource Damage Assessment – Galveston, Texas

Working cooperatively with Texas agencies, NOAA and USFWS to evaluate the potential impact of, and restoration for, oil spill related impacts to birds, mammals, and coastal habitats following an oil release into the Galveston ship channel.

Consultant – Natural Resource Damage Assessment – Midland, Michigan

Working cooperatively with state agencies and USFWS to evaluate the potential impact of, and restoration for, Dioxin related hunting advisories on Michigan's recreational hunting community. The advisories placed on waterfowl, deer and small game affect the Shiawassee National Wildlife Reserve, state game lands, and several hundred acres of private hunting acreage.

Consultant – Natural Resource Damage Assessment – Delta National Wildlife Refuge, Louisiana

Developed data collection protocols and assessment methods to evaluate spill-related injuries to wetland habitat, aquatic species, and avian species including the listed brown pelican. Created models to estimate numbers of birds killed based on a series of ground surveys and aerial overflights. Directed cooperative assessment of wildlife related injuries with USFWS, NOAA, Louisiana Oil Spill Coordinator's Office (LOSCO), and Louisiana Department of Wildlife and Fisheries (LA DWF) representatives.

Consultant – Natural Resource Damage Assessment – New Orleans, Louisiana

Developed data collection protocols and assessment methods to evaluate spill-related injuries to avian species including the listed brown pelican. Developed models to estimate numbers of birds killed based on a series of ground surveys and aerial overflights and modeled time-paths of avian populations after the spill and under different management scenarios. Directed cooperative assessment of wildlife related injuries with USFWS, NOAA, LOSCO, and LA DWF representatives.

Consultant – Natural Resource Damage Assessment – Lake Calcasieu, Louisiana

Developed assessment methods to evaluate injury to avian species including the listed brown pelican. Developed models to estimate numbers of birds killed using swept through and observation based modeling approaches; estimated the time paths of avian population recovery after the spill and under different management scenarios.

Lead Consultant – Natural Resource Damage Assessment – Buzzards Bay, Massachusetts

Directed wildlife recovery efforts during emergency response phase of a major oil spill. Developed data collection protocols and assessment methods to evaluate injury to four species listed by the USFWS as endangered. Developed models to estimate numbers of birds killed based on bird carcass collections during on-shore surveys and time-paths of endangered species' population after the spill and under different management scenarios. Directed cooperative assessment of wildlife related injuries with Native American representatives as well as USFWS, NOAA, Massachusetts and Rhode Island representatives.

Consultant – Natural Resource Damage Assessment – Humboldt Bay, California

Created methods for assessment of injury to avian wildlife including two species listed by the USFWS as endangered. Significantly refined models that estimated numbers of birds killed based on bird carcass collections during on-shore surveys. Working cooperatively with California's Office of Spill Prevention and Response (OSPR) and USFWS, developed innovative models that assess population and population viability.

Lead Consultant – Natural Resource Damage Assessment – Puget Sound, Washington

Directed wildlife recovery efforts during emergency response phase of an oil spill in Puget Sound. Developed data collection protocols and assessment methods to evaluate injury to avian wildlife, wetland habitat and Native American resources. Provided technical input into methods to value impacts to Native American persons.

Consultant – Emergency Response Management and Environmental Monitoring Post Hurricane Katrina – Louisiana

Provided environmental monitoring and liability assessment for Louisiana oil producing platforms. Provided strategic input for emergency response and strategic liability management in the immediate aftermath of the storm.

Consultant – Natural Resource Damage Assessment – Chalk Point Oil Spill, Maryland

Provided technical support for avian and diamondback terrapin injury assessments. Developed Resource Equivalency Analysis (REA) to scale and evaluate proposed restoration projects.

Consultant – Natural Resource Damage Assessment – Little Lake, Louisiana

Developed swept through modeling approach for assessing impacts to avian and wildlife species following an oil release into Little Lake, Louisiana. Working cooperatively with NOAA, USFWS, and Louisiana representatives, created an innovative approach for integrating impacts assessed using both Habitat and Resource Equivalency Analysis (HEA and REA).

Consultant – Net Environmental Benefits Analysis (NEBA), (Confidential Client) – Massachusetts

Provided statistical analysis supporting development of a remediation plan that integrated risk-based criteria with Net Environmental Benefits Analysis (NEBA) to identify a socially optimal remediation strategy.

Consultant – Groundwater Natural Resource Damage Claim, (Confidential Client) – New Mexico

Provided technical and litigation support for a natural resources damage claim for groundwater. Tasks included evaluating plaintiffs' expert reports, conducting spreadsheet analyses, and reviewing published literature on water and resource valuation.

Consultant – Groundwater Natural Resource Damage Claims, (Confidential Client) – New Jersey

Provided technical and litigation support for several groundwater natural resource damage claims in New Jersey. Tasks included research of local groundwater institutions, current water use, and the theoretical requirements of an economic valuation of impacts to water resources.

Consultant – Natural Resource Damage Assessment (Confidential Client) – New Jersey

Provided technical support for habitat injury assessments at an abandoned industrial site. Developed Resource Equivalency Analysis (REA) that integrated multi-species impacts and the potential for offsite impacts via displacement. Developed an estimate of potential liability.

Modeling

Beached Bird Modeling Evaluation Prepared for American Petroleum Institute (API) – Washington D.C.

Conducted a sensitivity analysis of various beached bird modeling assessment methods and approaches. This sensitivity analysis was used to develop practitioner guidelines for the collection of bird related data and oil spill response as well as the implementation of a cooperative beached bird modeling assessment.

Piping Plover and Roseate Tern Population Restoration Model – Buzzards Bay, Massachusetts

Developed Monte-Carlo based models to estimate the effects of various habitat restoration projects on the populations of piping plovers and roseate terns, endangered bird species affected by a coastal Massachusetts oil spill. The model built upon a basic population model by introducing distributions for population parameters (stage-specific mortality, fecundity, etc.) and a simulation of negative population perturbations (designed to mimic shocks to the population from disease or oil spills). The output was used to evaluate different restoration options. The model runs within MS Excel, utilizing Visual Basic for Applications (VBA) for automation.

Beached Bird Oil Spill Mortality Model – Humboldt County, California

Developed a model to estimate the number of birds killed in an oil spill based on the number of birds found in shoreline surveys. Model accounted for various factors such as at-sea sinking, scavenging, and search efficiency. The model can be run both as a deterministic and a stochastic Monte-Carlo model. The model runs within MS Excel and utilizes VBA to perform calculations and automation.

Marbled Murellet Population Restoration Model – Coastal California

Developed a Monte-Carlo stochastic model to estimate the effects of various habitat restoration projects on the population of Marbled Murrelets, an endangered bird that was affected by a coastal California oil spill. The model built upon a basic population model by introducing distributions for population parameters (stage-specific mortality, fecundity, etc.) and a simulation of negative population perturbations (designed to mimic shocks to the population from disease or oil spills). The output was used to evaluate different restoration options. The model runs within MS Excel, utilizing VBA for automation.

Population Viability Model for Assessment of Impacts to a Meta-population – Coastal Massachusetts

Created a model to assess the effects of oil spill restoration alternatives to an endangered species. This model extended the traditional population viability analysis by incorporating a spill induced colonization event, addressing long term loss of habitat via erosion, and assessing the benefits of reductions in auto-correlated shocks to the population. The model runs within MS Excel, utilizing VBA for automation.

Fate, Effects, and Transport Model – Coastal Massachusetts

Participated in the cooperative development of protocols that facilitated a side-by-side comparison of SIMAP and COSIM, two common Fate, Effects, and Transport Models. Through a series of iterative meetings, the models were modified such that inputs and outputs could be compared, contrasted, and calibrated.

Transport Fate and Effects Modeling – Argentina

Cardno project coordinator for a modeling exercise that used reverse trajectory analysis to identify the likely source of a mystery oil spill at a coastal oil terminal in Argentina. The exercise used 3-dimensional hydrodynamic modeling to assess surface oil transport and intersect those projections with known routes of area ships.

Transport Fate and Effects Modeling – Gulf of Mexico

Cardno project coordinator to use transport, fate, and effects modeling to identify the potential impacts of an oil spill associated with BP's Thunderhorse Deep Sea Drilling rig. The exercise used 3-dimensional hydrodynamic modeling to predict surface and dissolved oil concentrations, intersect them with ecological resources, and predict outcomes. BP used model predictions to support litigation.

Clean Water Act §316(a) Resource Assessment, (Confidential Client) – Delaware

Provided technical support for assessment of heated effluent discharge effects of a power plant in Delaware. Assessed physiological and habitat requirements of species present and assisted in statistical analyses on historical and current trends in fish populations and community structure.

Valuation of Entrainment and Impingement at a Proposed Deepwater Port – Mobile, Alabama

Conducted an economic assessment of potential entrainment and impingement at a proposed Deepwater LNG facility. This work culminated in a novel integration of dynamic fisheries modeling and Clean Water Act §316(b) guidance to assess potential economic impacts.

Permitting

Eastern Shore Pipeline – Chesapeake Bay Maryland and Delaware

Preparation of resource reports in support of this FERC third party EIS. Responsibilities will include coordination with USCG and Delaware and Maryland governmental entities, review of plans and design, and preparation of Socioeconomics, Land Use, and Visual Resource Reports.

Calypso LNG Terminal – Broward County Florida

Social Science lead for this USCG third party EIS. Responsibilities included coordination with USCG and Florida governmental entities, review of public meeting and written comments, and management of authors, preparing Cultural Resources, Socioeconomics, Marine Transportation, and Marine Use, and Visual analysis.

Broadwater LNG Terminal – Long Island Sound New York and Connecticut

Social Science lead for this high profile FERC third party EIS. Responsibilities include coordination with USCG and the New York Department of State, participation in highly charged public meetings, and management of authors preparing Purpose and Need, Socioeconomics, Land Use and Visual Resource analysis. Responsible for FERC review of Coastal Zone Management (CZM) consistency.

Compass Port LNG Terminal – Alabama

Social Science lead for this high profile USCG third party EIS. Responsibilities included coordination with USCG and Alabama governmental entities, review of public meeting and written comments, and management of authors preparing Socioeconomics and Land Use analysis.

TORP LNG Terminal – Alabama

Preparation of resource reports in support of this USCG EIS. Responsibilities included coordination with USCG and Alabama governmental entities, review of plans and design, and preparation of Socioeconomics and Land Use Reports.

Casotte Landing LNG Terminal – Pascagoula Mississippi

Social Science lead for this FERC third party EIS. Responsibilities included coordination with USCG and the Mississippi government agencies and management of authors preparing Purpose and Need, Socioeconomics, and Land Use analysis. This EIS was prepared using novel data collection and assessment methodology due to the fluid environment that evolved following Hurricane Katrina.

Carthage to Perryville Pipeline Project – Texas and Louisiana

Social Science lead for this FERC third Party EIS. Responsibilities included coordination and management of authors preparing Socioeconomic, Purpose and Need, and Land Use portions of the EIS. The project was a 100 plus mile natural gas pipeline system traversing Texas and Louisiana. This FERC third party EIS was published in record time.

KM Pipeline Project – Texas and Louisiana

Social Science lead for this FERC third Party EIS. Responsibilities included coordination and management of authors preparing Socioeconomic, Purpose and Need, and Land use portions of the EIS. The project was a natural gas pipeline system traversing over 100 miles in Texas and Louisiana.

Calypso Pipeline Project – Florida

Social Science lead for this FERC third Party EIS. Responsibilities included coordination and management of authors and development of a rigorous and litigation worthy assessment of Environmental Justice. The project was a natural gas pipeline system proposed to make landfall in southern Florida.

Greenbrier Pipeline Project – West Virginia, Virginia and North Carolina

Social Science lead for this FERC third Party EIS. Responsibilities included coordination and management of authors and development of a rigorous and litigation worthy

assessment of Environmental Justice. The project was a 280-mile natural gas pipeline system with two compressor stations.

Patriot Pipeline Project – West Virginia, Virginia and North Carolina

Provided technical input and analysis in support of Socioeconomic and Land Use analysis of this interstate natural gas pipeline.

Certifications

> OSHA – Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-Hour Training

Publications and Presentations

> Wakefield, J.R. 2015. Oil Spill Data Collection: Beyond the Emergency Response Plan. Presented at the APPEA Health, Safety, and Environment Meeting. Perth, Australia.

> Wakefield, J.R. 2015. Natural Resource Damage Assessment: Measuring Injury to Natural Resources for NRDA. Presented at AEHS Annual Meeting. San Diego, CA.

> Wakefield, J.R. 2014. Overview of NRDA Scaling. NRDA short course presented at the 2104 Meeting of the North Atlantic Chapter of SETAC. Amherst, MA.

> Wakefield, J.R. 2014. From Damages to Restoration: Key NRDA concepts. NRDA short course presented at the 2104 Meeting of the North Atlantic Chapter of SETAC. Amherst, MA.

> Wakefield, J.R., Reilly, P., Elmore, L., Holly, L., and R. Klosowski. 2011. Deepwater Horizon Ephemeral Data Collection: Carcass Stranding and Oiling Rate Data to Help Evaluate Acute Avian Mortality. Presented at SETAC Gulf Oil Spill Focused Topic Meeting. Pensacola, Fl.

> Wakefield, J.R. 2011. The Effect of Oiling on Avian Survival Rates. Presented at SETAC Gulf Oil Spill Focused Topic Meeting. Pensacola, Fl.

> Wakefield, J.R. and P. Reilly. 2011. Productivity of Colonial Waterbirds and Seabirds Breeding in the Northern Gulf of Mexico Following the Deepwater Horizon Accident. Presented at 32nd annual North American SETAC meeting. Boston, MA.

> Wakefield, J.R., Noel, L., Gable, K., Fidler, S., and P. Reilly. 2011. Nearshore Avian Densities in the Northern Gulf of Mexico: Changes from May 2010 to May 2011. Presented at 32nd annual North American SETAC meeting. Boston, MA.

> Wakefield, J.R., Reilly, P. Elmore, L., and P. LaLancette. 2011. Deepwater Horizon Ephemeral Data Collection: Oiling Rate Data for Use in Evaluating Acute Avian Mortality. Presented at the Waterbird Society's 34th Annual Meeting, Grand Isle, Nebraska.

> Wakefield, J.R., Reilly, P. Elmore, L., and P. LaLancette. 2011. Deepwater Horizon Ephemeral Data Collection: Carcass Stranding Data to be used in Estimating Acute Avian Mortality. Presented at the Waterbird Society's 34th Annual Meeting, Grand Isle, Nebraska.

> Wakefield, J.R. 2009. Assessment of Beached Bird Modeling. API publication 355.

> Wakefield, J.R., and J. McNutt (2008). An ecological Framework for REA. Proceedings of the 2008 International Oil Spill Conference. Savanna Georgia.

> Wakefield, J.R. 2007. Economic Valuation of Natural Resource Damages: The Trustees Perspective. Presented to the National Advanced Conference on Natural Resource Damage Litigation. July 2007.

> Wakefield, J.R., Markarian, R. and A. Davis. Integrating Transport, Fate, and Effects Modeling into Cooperative NRDA. Presented at the 2007 meeting of the Northeastern Chapter of SETAC.

> Wakefield, J.R. and T. Tomasi. 2004. Economic Measurement of Natural Resource Damages: What a Long Strange Trip it has been. Presented at Rutgers, Natural Resource Damages: a NJDEP Seminar.

> Tomasi, T., Wakefield, J.R, and H. Byrd. 2003. Habitat Equivalency Analysis: Implications for Endangered Species. Presented at the 2003 International Oil Spill Conference.

> Wakefield, J.R., Tomasi, T. and H. Byrd. 2003. A Simulation Model to Predict Spill-Induced Bird Mortality Using Beached Carcass Data. Proceedings of the 2003 International Oil Spill Conference.

> Wakefield, J.R. and G. Parsons. 2003. Selection of a Socially Efficient Erosion Response along the Atlantic Coast of Delaware. Shore and Beach.

> Wakefield, J.R. 2001. An Efficient Erosion Response for the Atlantic Coast of Delaware. Presented at the Annual Meeting of the American Shore and Beach Preservation Association. Washington, DC. Outstanding Presentation.

> Di Meo, C. Wakefield, J.R. and C. Carey. 1999. A New Device for Sampling Small Volumes of Water from Marine Micro-environments. Deep Sea Research. 46:1279-1287

> Wilber, A., Orbacz, E., Wakefield, J.R. and P. Gaffney. 1997. Mitochondrial Genotype Variation in a Siberian Population of the Japanese Scallop, Patinopecten yessoensis journal of Shellfish Research. 16:541-545.

> Wakefield, J.R. and G. Parsons. 1998. A SAS Compiler for the EPA's Water Use Survey. Available: gparsons@udel.edu.

> Wakefield, J.R. 1996. Population Genetics: Studies and Applications. Presented at the St. Jones Lecture Series. Dover, DE.

> Wakefield, J.R. 1996. Sequence Variation in the Mitochondrial Large Subunit (16S) Ribosomal Gene of the American Oyster, Crassostrea virginica. Thesis submitted to the University of Delaware.

> Wakefield, J.R. and P. Gaffney. 1996. DGGE Reveals Additional Population Structure in American Oyster Populations. Presented at the 88th Annual Meeting of the National Shellfisheries Association. Baltimore, MD.