

Matthew F. Bingham, Principal Economist

Veritas Economic Consulting, LLC

1851 Evans Road, Cary, NC 27513

PRACTICE AREAS

- Custom Models
- Regulatory Compliance
- Regulatory Impact Analysis
- Policy Analysis
- NRDA
- Exposure Assessment

EXPERTISE

- Mathematical Modeling
- Bioeconomic Analysis
- Statistical Analysis
- Market & Nonmarket Valuation

EDUCATION

M.S., Economics,
University of North
Carolina at Chapel Hill,
1996

B.A., Economics, North
Carolina State University,
Raleigh, NC, 1992

RECENT PUBLICATIONS

- Johnson, F.R., M.F. Bingham, and B. Kanninen. 2006. "Experimental Design for Stated Choice Experiments." In *Valuing Environmental Amenities Using Stated Choice Studies: A Common Sense Approach to Theory and Practice*, ed. B. Kanninen. Dordrecht, The Netherlands: Springer.
- Kinnell, J.C., M.F. Bingham, E.A. Hastings, R. Ray, V. Craven, and M. Freeman. 2007. "A Survey Methodology for Collecting Fish Consumption Data in Urban and Industrial Water Bodies (Part 1)." *Journal of Toxicology and Environmental Health, Part A* 70:477-495.

Mr. Bingham has led Veritas' custom modeling design and development efforts to evaluate and address complex market and non-market valuation questions. Mr. Bingham's specific experience includes leading the design and development of Veritas' Environmental Policy Simulation Model (EPSM) that evaluates the effects of potential regulations on electricity production, pricing, and reliability; commercial and recreational fishing models for North Atlantic and Mid-Atlantic Coastal, Great Lakes, California Coast, and numerous U.S. inland fisheries; and Veritas' Alternative Restoration Options Model that evaluates the costs and benefits of restoration alternatives. Mr. Bingham has more than 15 years of experience in applying microeconomic theory, econometrics, statistics, and bioeconomic modeling in Veritas' development and evaluation of custom economic models.

Mr. Bingham has presented research results, prepared regulatory submittals, or provided expert testimony to the U.S. Environmental Protection Agency (USEPA), U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (FWS), the California Regional Water Quality Control Board, Pennsylvania Department of Environmental Protection (PADEP), Texas Commission on Environmental Quality (TCEQ), Texas Parks & Wildlife, Michigan Department of Natural Resources (MDNR), Michigan Department of Environmental Quality (MDEQ), Grand Traverse County Commissioners, and City of Traverse City, Michigan.

KEY PROJECTS

Preparing a national analysis of the economic and reliability impacts associated with a required closed-cycle cooling retrofit of existing once-through cooled systems (Electric Power Research Institute)

Economic Evaluation of Commercial and Recreational Fishery Impacts Associated with Current and Future Power Plant Operations in the following 13 states: California, Connecticut, Florida, Illinois, Indiana, Massachusetts, Michigan, Montana, Ohio, Pennsylvania, Rhode Island, Texas, and Virginia

Estimation and Comparison of the Benefits and Costs of Alternative Impingement and Entrainment (IM&E) Reduction Options: Salem Harbor and Manchester Street Generating Stations (Dominion)

Economic Issues Regarding Best Technology Available for Canal Generating Station (Mirant)

Economic and Social Analysis of Varying Policy Alternatives for the Boardman River Dams, Including Evaluating the Fishery Impacts of Each Alternative (Boardman River Dams Committee)

Developed a custom model to evaluate the range and uncertainties of the costs and benefits of various options for a large Northeast power plant to comply with numerous regulations (Confidential)

Experience

Veritas Economic Consulting, Cary, NC
Principal Economist, 2006 to present

Triangle Economic Research, Durham, NC
Senior Economist, 2000 to 2006
Economist, 1997 to 2000

Walt Disney Attractions, Hong Kong
Risk Analyst, 1997

Environmental Controls Technology, Raleigh, NC
Head Statistician, 1995 to 1997

University of North Carolina, Chapel Hill, NC
Course Developer, 1996
Economics Instructor, 1992 to 1996

Areas of Specialization

316(a) and 316(b) Assessments and Compliance Strategies

- Evaluated potential economic benefits resulting from thermal discharge reductions for a confidential client
- Currently conducting strategic assessments to identify cost-effective 316(b) compliance options at facilities throughout the United States.
- Led 316(b) Benefits Valuation Studies at two nuclear plants.
- Extensively evaluated USEPA's methodology for determining the biological effects of impingement and entrainment (I&E) reductions and the corresponding estimates of the economic benefits associated with I&E changes.
- Assisted in Triangle Economic Research's work with the Utility Water Act Group (UWAG) to provide comments on the development of the 316(b) rule
- Assisted in Triangle Economic Research's valuation of more than 100 fisheries throughout the United States, including marine, estuary, lake, and river environments using state-of-the-art economic-valuation methods.
- Assisted in performing transfer-based fishery valuation assessments at dozens of sites throughout the United States.
- Assisted in conducting dozens of habitat equivalency analyses (HEAs) to relate environmental impacts to habit offset requirements.

Statistical Analysis

- Led development and administration of a computer-assisted telephone interview (CATI) survey of Michigan anglers.
- Used time-series techniques to evaluate timber product linkages.
- Employed data simulation, Bayesian updating, and Markov modeling to model drug selection.

- Evaluated the influence of elicitation techniques on elicited values using panel and limited dependent variable techniques.
- Used longitudinal panel techniques to analyze evidence of economic decision-making in stated preference problems.
- Used longitudinal panel techniques to evaluate the influence of health state on pharmaceutical preferences.
- Used random utility modeling for natural resource damage assessment.
- Employed selection modeling techniques to account for participation decisions in contingent valuation studies.

Health Economics

- Co-authored a literature review on the relevance of SP methods for evaluating insulin treatments.
- Reviewed papers for health economics journals.
- Conducted an analysis of the state of existing literature in health economics.
- Evaluated the usefulness of nonmarket valuation techniques for applications in health economics.
- Developed model for predicting market share of unique pharmaceutical products.
- Evaluated the influence of health state on insulin preferences.
- Participated in SP survey development to evaluate insulin treatments.
- Developed SP experimental design for evaluating insulin treatments.
- Developed SP experimental designs for evaluating HIV testing preferences.

Survey Design and Administration

- Participated in design, pretesting, and administration of a mail survey of Wisconsin residents.
- Developed experimental design for a conjoint survey on preferences of Wisconsin anglers.
- Developed an experiment to evaluate the influence of conjoint design on experimental outcomes.
- Participated in developing a computer-based survey of North Carolina and Texas residents.
- Participated in developing a stated preference (SP) survey for diabetes treatment preferences.
- Developed experimental design for an SP survey of diabetes treatment preferences.

Natural Resource Damage Assessment (NRDA)

- Analyzed survey data to evaluate modeling decisions for travel-cost resource-valuation methods.
- Investigated the effects of regression diagnostics on travel-cost modeling.
- Examined survey data to assess its value for natural resource damage assessment.
- Employed structural modeling techniques to assess the impact of site quality variables on travel cost-based value estimates.
- Explored issues associated with on-site survey data for recreation-demand modeling.
- Analyzed survey data using random utility methods.

- Applied count data modeling techniques to travel-cost recreation-valuation problems.
- Researched the influences of calculation methods on consumer surplus estimates.
- Studied the influence of effluents on housing values using hedonic methodologies.

Property Valuation

- Provided economic modeling support in the matter of *Mary Louise Fairey, et al. v. the Exxon Corporation, Standard Oil Company, et al.*
- Helped assess groundwater damages at the South Valley Superfund Site in New Mexico (General Electric).

Exposure Assessment

- Analyzed fish-consumption data from the Passaic River Creel/angler Survey.
- Developed and administered an exposure assessment survey for a confidential client.
- Analyzed data from an exposure assessment survey for a confidential client.

Restoration Evaluation and Planning

- Provided economic and social analysis of the Boardman River Dams for the Boardman River Dams Committee.
- Participating in ongoing evaluation of potential economic benefits resulting from alternative restoration projects for a confidential client.

Membership

International Association of Maritime Economists
Association of Environmental and Resource Economists
American Economic Association
American Water Resources Association
American Fisheries Society

Publications

Santoianni, D.A., M.F. Bingham, D.M. Woodard, and J.C. Kinnell. 2008. "Power from Animal Waste—Economic, Technical, and Regulatory Landscape in the United States." *Journal of EUEC* Volume 2, Paper #01. Available at <http://www.euec.com/journal/documents/pdf/Santoianni.pdf>.

Kinnell, J.C., M.F. Bingham, E.A. Hastings, R. Ray, V. Craven, and M. Freeman. 2007. "A Survey Methodology for Collecting Fish Consumption Data in Urban and Industrial Water Bodies (Part 1)." *Journal of Toxicology and Environmental Health, Part A* 70:477–495.

Ray, R., V. Craven, J. Kinnell, M. Bingham, M. Freeman, and B. Finley. 2007. "A Statistical Method for Analyzing Data Collected by a Creel/Angler Survey (Part 2)." *Journal of Toxicology and Environmental Health, Part A* 70:496–511.

Ray, R., V. Craven, M. Bingham, J. Kinnell, E. Hastings, and B. Finley. 2007. "Human Health Exposure Factor Estimates Based Upon a Creel/Angler Survey of the Lower Passaic River (Part 3)." *Journal of Toxicology and Environmental Health, Part A* 70:512–528.

Johnson, F.R., M.F. Bingham, and B. Kanninen. 2006. "Experimental Design for Stated Choice Experiments." In *Valuing Environmental Amenities Using Stated Choice Studies: A Common Sense Approach to Theory and Practice*, ed. Barbara Kanninen. Dordrecht, The Netherlands: Springer.

- Kinnell, J.C., M.F. Bingham, A.F. Mohamed, W.H. Desvousges, T.B. Kiler, E.K. Hastings, and K.T. Kuhns. 2006. "Estimating Site-Choice Decisions for Urban Recreators." *Land Economics* 82(2):257–272.
- Bingham, M.F., J.P. Prestemon, D.J. MacNair, and R. Abt. 2003. "Market Structure in U.S. Southern Pine Roundwood." *Journal of Forest Economics* 9(2):1–21.
- Bingham, M.F., A.F. Mohamed, and W.H. Desvousges. 2003. "Hedonic Analysis of Stigma-Based Losses from Groundwater Contamination." Submitted for publication.
- Hauber, A.B., F.R. Johnson, and M.F. Bingham. 2001. "Measuring Stated Preferences for Medical Interventions." *ISPOR News* 7(5):5–6.
- Bingham, M.F., F.R. Johnson, and D. Miller. 2001. "Modeling Choice Behavior for New Pharmaceutical Products." *Value in Health* 4(1):32–44.
- Bingham, M.F., and G. Smith. 2001. "The Role of Health State Experience in Longitudinal Conjoint Analysis of Patient Preferences." *Value in Health* 4(2):194–195.
- Johnson, F.R., and M.F. Bingham. 2001. "Evaluating the Validity of Stated-Preference Estimates of Health Values." *Swiss Journal of Economics and Statistics* 137(1):49–64.
- Smith, G., M.F. Bingham, F.R. Johnson, and B. Bolinder. 2001. "Does Patient Experience Matter? Type II Diabetes Patients' Stated Preferences for Insulin Therapies." *Value in Health* 4(2):115–116.
- Bingham, M.F., and D.J. MacNair. 1999. "An Empirical Comparison of Minimum Absolute Deviations and Ordinary Least Squares Estimates of Consumer Surplus for Beach Recreation." Submitted for publication.
- Bingham, M.F., F.R. Johnson, and L. Bell. 1998. "Vox Populi: Stated Preferences for Pharmaceutical Innovations." *Value in Health* 1(1):76.

Working Papers

- Bingham, M.F., T.H. Bingham, J.C. Kinnell, K.E. Mathews, C.M. Spagnardi, and D.M. Woodard. 2010. "Economic and Social Analysis of the Boardman River Dams." Veritas Working Paper No. 2010-02. Cary, NC: Veritas Economic Consulting, LLC.
- Bingham, M.F., K.E. Mathews, J.C. Kinnell, and A.R. Morton. 2006. "What Is Significantly Greater? Properties of Benefit-Cost Comparisons under Section 316(b) of the Clean Water Act." Veritas Working Paper No. 2006-01. Cary, NC: Veritas Economic Consulting, LLC.
- Whaley, J.S., M.F. Bingham, J.C. Kinnell, and R.W. Blye. "Estimating Annual Impingement and Entrainment from Sample Counts." Veritas Working Paper No. 2006-03. Cary, NC: Veritas Economic Consulting, LLC.
- Johnson, F.R., K.E. Mathews, and M.F. Bingham. 2000. "Evaluating Welfare-Theoretic Consistency in Multiple-Response, Stated-Preference Surveys." TER Technical Working Paper No. T-0003. Durham, NC: Triangle Economic Research.
- Johnson, F.R., and M.F. Bingham. 2000. "Measuring Stated Preferences for Pharmaceuticals: A Brief Introduction." TER Working Paper No. G-0002. Durham, NC: Triangle Economic Research.

Johnson, F.R., W.H. Desvousges, M.C. Ruby, D. Stieb, P. De Civita, and M.F. Bingham. 1997. "Eliciting Stated Health Preferences: An Application to Willingness to Pay for Longevity." TER Working Paper No. T-9704. Durham, NC: Triangle Economic Research.

Selected Reports

Bingham, M.F., K.E. Mathews, and J.C. Kinnell. 2009. *Economic Issues Regarding BTA for Canal Generating Station*. Cary, NC: Veritas Economic Consulting.

Kinnell, J.C., M.F. Bingham, C.M. Spagnardi, G.S. Crownfield, D.M. Woodard, and V.R. Satyan. 2008. *Estimation and Comparison of the Benefits and Costs of Alternative IM&E Reduction Options: Salem Harbor Generating Station*. Cary, NC: Veritas Economic Consulting.

Bingham, M.F., J.C. Kinnell, K.E. Mathews, and D.M. Woodard. 2008. *Assessing the Economic and Community Impacts Associated with a Theoretical Closure of Buckeye Technology's Foley Plant: Preliminary Results*. Cary, NC: Veritas Economic Consulting.

Kinnell, J.C., M.F. Bingham, C.M. Spagnardi, J.S. Whaley, D.A. Santoianni, R.W. Blye, Jr., G.B. Waterfield, B.W. Lees, and J.S. Raulli. 2008. *Development of Annual Current and Baseline Impingement Mortality and Entrainment Estimates: Eddystone Generation Station, Eddystone, PA*. Cary, NC: Veritas Economic Consulting.

Bingham, M.F., K.E. Mathews, A.R. Morton, D.M. Woodard, E.S. Abrams, and Z. Li. 2008. *Economic and Social Analysis of the Boardman River Dams: Quantification of Existing Conditions*. Prepared for Boardman River Dams Committee. Cary, NC: Veritas Economic Consulting.

EPRI and Veritas Economic Consulting, LLC. 2007. *Huntington Beach Generating Station Benefit Valuation Study*. Palo Alto, CA: EPRI.

Bingham, M.F., D.M. Woodard, J.C. Kinnell, J. Mion, and C. Elmore. 2007. *Consideration of Gizzard Shad Impingement in 316(b) Cost Effectiveness Analysis: Final Report*. Prepared for Consumers Energy Company. Cary, NC: Veritas Economic Consulting.

Desvousges, W.H., M.F. Bingham, J.C. Kinnell, and A.F. Mohamed. 2005. *Comments on Potential Nonuse Values for Proposed Phase III Cooling Water Intake Regulations: Final Report*. Prepared for the Utility Water Act Group, American Chemistry Council, American Forest and Paper Association, American Iron and Steel Institute, American Petroleum Institute, and American Public Power Association. January 24. Durham, NC: Triangle Economic Research.

Desvousges, W.H., M.F. Bingham, J.C. Kinnell, J. Whaley, and K.E. Mathews. 2005. *Evaluation of the EPA's 316(b) Phase III Rule Willingness to Pay Survey: Final Report*. Prepared for The Utility Water Act Group, American Chemistry Council, American Forest and Paper Association, American Iron and Steel Institute, American Petroleum Institute, and American Public Power Association. August 8.

Kinnell, J.C., M.F. Bingham, R. Blye, J. Raulli, P. Jacobsen A.F. Mohamed, and K. Kuhns. 2005. *Proposal for Information Collection Clean Water Act Section 316(b): Handley Generation Station, Fort Worth, TX*. Prepared for Exelon Generation Company, LLC. June 1.

Kinnell, J.C., M.F. Bingham, R. Blye, J. Raulli, P. Jacobsen, A.F. Mohamed, and K. Kuhns. 2005. *Proposal for Information Collection Clean Water Act Section 316(b): Eddystone Generation Station, Eddystone, PA*. Prepared for Exelon Generation Company, LLC. April 28.

Desvousges, W.H., M.F. Bingham, J.C. Kinnell, A.F. Mohamed, and K. Kuhns. 2005. *Review and Response to the EPA's Response to Comments from the American Chemistry Council et al. and Accompanying Triangle Economic Research (TER) Report*. Prepared for The Utility Water Act Group, American Chemistry Council, American Forest and Paper Association, American Iron and Steel Institute, American Petroleum Institute, and American Public Power Association. April 20.

Bingham, M.F, J.C. Kinnell, A.F. Mohamed, and M. Hrebren. 2005. *Proposal for Information Collection: Brunner Island*. Prepared for PPL. April 15.

Bingham, M.F, J.C. Kinnell, A.F. Mohamed. 2005. *Proposal for Information Collection: Karn-Weadock Generating Stations*. Prepared for Consumers Energy Company. April 8.

Desvousges, W.H., M.F. Bingham, J.C. Kinnell, and A.F. Mohamed. 2005. *Comments on Potential Nonuse Values for Proposed Phase III Cooling Water Intake Regulations: Final Report*. Prepared for The Utility Water Act Group, American Chemistry Council, American Forest and Paper Association, American Iron and Steel Institute, American Petroleum Institute, and American Public Power Association. January 24.

Bingham, M.F, J. Kinnell, A.F. Mohamed. 2004. *Proposal for Information Collection: J.H. Campbell Plant*. Prepared for Consumers Energy Company. October 1.

Bingham, M.F, W.H. Desvousges, and A.F. Mohamed. 2003. *Comments on Benefit Estimation of EPA's Proposed Phase II 316(b) Rule as Summarized in the Notice of Data Availability: Final Report*. Prepared for The Utility Water Act Group. June 2.

Desvousges, W.H., D.M. Clark, M.F. Bingham, A.F. Mohamed, S.M. Small, and D.F. Ludwig. 2002. *Comments on the Benefit Estimates of EPA's Proposed Phase II 316(b) Rule: Final Report*. Prepared for the Utility Water Act Group. Durham, NC: Triangle Economic Research.

Selected Presentations

Bingham, M.F, J.C. Kinnell, and K.E. Mathews. 2006. "What Is Significantly Greater?" Presented at American Fisheries Society Conference, Lake Placid, New York. September 13.

Bingham, M.F., K.E. Mathews, and J.C. Kinnell. 2006. "What Is Significantly Greater? Properties of Benefit-Cost Comparisons under Section 316(b) of the Clean Water Act." Presented at the Utility Water Act Group (UWAG)/Electric Power Research Institute (EPRI) Conference, Atlanta, Georgia. September 6–7.

Kinnell, J.C., M.F. Bingham, and K.E. Mathews. 2006. "Evaluating Recreational, Commercial, and Nonuse Benefits Associated with 316(b) Compliance." Presented at the Utility Water Act Group (UWAG)/Electric Power Research Institute (EPRI) Conference, Atlanta, Georgia. September 6–7.

Whaley, J.S., K.E. Mathews, C. Spagnardi, M.F. Bingham, and J.C. Kinnell. 2006. "Approaches for Estimating Annual Impingement and Entrainment from Sample Counts." Presented at the Utility Water Act Group (UWAG)/Electric Power Research Institute (EPRI) Conference, Atlanta, Georgia. September 6.

Kuhns, K.T., M.F. Bingham, J.C. Kinnell, and A.F. Mohamed. 2005. "Cost-Benefit Analysis and Its Use in Determining Compliance with the 316(b) Phase II Rule." Presented at Camp Resources XIII, Wilmington, NC. August 12.

Desvousges, W.H., and M.F. Bingham. 2004. "Benefit-Cost Analysis and 316(b) Compliance." Presented at the UWAG/EPRI 316(b) Legal Advisory Session, Atlanta, GA. May 12.

Kinnell, J.C., M.F. Bingham, and K.E. Mathews. 2002. "Critique of Current Risk Assessment Practices for Fish Consumption." Presented at the Society for Risk Analysis Annual Meeting, New Orleans, Louisiana. December.

Bingham, M.F. 2002. "Providing for Construct Validity Tests in Experimental Designs." Presented at the 2002 W-133 Conference, Monterey, CA. February.

Kinnell, J.C., M.F. Bingham, E.A. Keohane, and W.H. Desvousges. 2002. "Using Intercept and Count Data to Estimate the Population of Anglers in an Urban and Industrial River." Presented at the 2002 W-133 Conference, Monterey, CA. February.

Bingham, M.F., G. Smith, and J. Teague. 2000. "Stated Preferences in a Clinical Trial: Incorporating a Choice-Based Survey with a Randomized Controlled Trial." Presented at the international meeting of the International Society for Pharmacoeconomics and Outcomes Research, Washington, DC. May.

Bingham, M.F., G. Smith, and W.H. Desvousges. 1999. "A Cognitive Approach to Modeling the WTP Decision Under Dichotomous Choice and Open-Ended Contingent-Valuation Survey Formats." Presented at the American Agricultural Economics Association Meeting, Nashville, Tennessee. August.

Kinnell, J.C., M.F. Bingham, and W.H. Desvousges. 1999. "Sequencing Effects in Valuing Multiple Environmental Programs." Presented at the American Agricultural Economics Association meeting in Nashville, Tennessee. August.

Bingham, M.F., D.J. MacNair, and J. Prestemon. 1998. "Structural Change and Cointegration in Southern Timber Markets." Presented at the SOFEW Meetings in Williamsburg, Virginia. March.

Bingham, M.F., D.J. MacNair, and R.W. Dunford. 1998. "MAD About BLUE: An Empirical Comparison of Minimum Absolute Deviations and Ordinary Least Squares Estimates of Consumer Surplus." Presented at the American Agricultural Economics Association Meeting, Salt Lake City. August.