



Captiva Erosion Prevention District

FINAL APPORTIONMENT REVIEW,
VALIDATION, AND CERTIFICATION
SERVICES FOR THE 2025 CAPTIVA
RENOURISHMENT PROJECT

May 7, 2026

PREPARED FOR
Captiva Erosion Prevention District

PREPARED BY
Integral Consulting Inc.

integral



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May 7, 2026

Subject: Proposal for Final Apportionment Review, Validation, and Certification Services

The Captiva Erosion Prevention District (District) is undertaking an essential step to advance its beach renourishment program via the validation and certification of its apportionment model for the 2025 renourishment project. Integral Consulting Inc. (Integral) is pleased to provide this proposal to assist the District in this effort by undertaking a focused review and certification of the apportionment model.

Integral brings extensive experience supporting coastal communities by developing economic and policy analysis frameworks used to assess coastal resiliency investments. This proposal has been calibrated to the District's needs, which we understand to be a targeted professional evaluation that confirms the integrity of the adopted methodology, validates the logic and calculations within the apportionment model, and provides the District's Board of Commissioners (Board) with a certification.

Our team for this engagement is lean and senior. Dr. Andrew Bechard brings deep experience working in Florida on coastal challenges. His broader coastal portfolio includes sand renourishment and sediment management projects in Southern California and in St. Croix at Great Pond Bay. He has direct familiarity with the physical, financial, and stakeholder dimensions of shoreline protection projects.

Integral has already conducted a preliminary review of the Tentative Apportionment Excel model prepared for the District's 2025 bond program and understands its benefits-based structure, storm and recreational benefit allocation, and resulting millages. This understanding allows us to focus immediately on verification and certification, supporting the District's schedule and its objective of adopting the final apportionment in advance of statutory deadlines.

This proposal represents a firm offer for 90 days. I am authorized to negotiate and execute contracts on behalf of Integral. Please contact us with any questions or requests for clarification. We appreciate the opportunity to support the District on this assignment and look forward to assisting the Board with a certification of the final apportionment.

Sincerely,

A handwritten signature in black ink, appearing to read "Theodore Tomasi". The signature is fluid and cursive, written in a professional style.

Theodore Tomasi, Ph.D.
Senior Principal

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Appendix A. Resumes

Firm Qualifications and Experience

The Captiva Erosion Prevention District (District) seeks an experienced, impartial consultant to independently review, validate, and certify its final apportionment for a major beach renourishment project. Integral Consulting Inc. (Integral) brings the focused experience required to support the District by providing an objective assessment and professional opinion to the apportionment model that is both technically sound and clearly communicated for consideration by the District's Board of Commissioners (Board).

Integral brings decades of experience supporting coastal communities on beach renourishment, erosion control, and benefits-based cost allocation for shoreline protection projects. Our work focuses on supporting public agencies in the evaluation of project benefits using technically defensible methods to help decision makers advance coastal projects that balance storm protection, recreational value, environmental stewardship, economic efficiency, and statutory requirements. Integral's approach emphasizes scientific rigor and a consistent focus on work products that are transparent and suitable for governing board decision making. Across these efforts, we have consistently translated complex technical and economic analyses into clear and actionable findings that enable our clients to move their programs forward with confidence.

Relevant Project Experience

Integral staff maintains the following relevant project experience:

- Independent creation and implementation of benefits-based assessment and apportionment models supporting coastal and shoreline protection projects
- Coastal and environmental economics applied to beach renourishment, erosion control, coastal resilience, and public finance decision making
- Analysis of storm protection and recreational benefits associated with beach and shoreline investments
- Harmful algal bloom (HAB) analysis and stakeholder engagement throughout Southwest Florida, including property valuation, support for community outreach, and beach recreation access valuation
- Conservation easement and land valuation assessments in Southwest Florida, dealing with coastal property markets, valuation frameworks, and public-sector decision contexts
- Sand restoration and coastal sediment management projects in Southern California and in St. Croix, including work with living shorelines at Great Pond and Great Pond Bay.

This combination of coastal economics expertise, hands-on experience with beach and sediment restoration, and familiarity with Florida coastal conditions allows Integral to provide the District with a thorough review of its final apportionment, supporting Board adoption while remaining squarely within the District's adopted methodology and limited scope objectives.

Project Team

The project's economic team comprises 1) Andrew Bechard, who will serve as Project Lead; 2) Will Cooper, who will be the Project Manager; and 3) staff economists Claire Munaretto and Nicole Buecker, who will provide targeted support to enhance quality assurance and cost-effectiveness. **Appendix A includes resumes for all staff.**



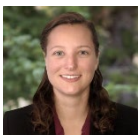
Andrew Bechard, Ph.D., Consulting Economist, brings extensive experience directly relevant to the District's mission and geographic context. His work throughout Southwest Florida has addressed coastal water quality challenges, harmful algal bloom impacts, land and conservation valuation, and community engagement related to shoreline and environmental change. Beyond Florida, his experience with sand restoration and sediment management projects in Southern California and St. Croix provides a broad perspective on the physical, economic, and stakeholder dimensions of beach renourishment and erosion prevention initiatives. He has extensive experience creating and reviewing Excel-based models, verifying accuracy across files, and handling and managing large data sets, such as the Captiva parcel-level assessment data. Dr. Bechard will lead the review of the apportionment model, create the summarized findings memorandum, present results, and participate in Board meetings, as needed.



Will Cooper, Director of Ecology & Environmental Economics, will be the Project Manager and the primary point of contact for this effort. He will be responsible for project management, coordination with District staff, schedule and budget control, and quality assurance for all deliverables.



Andy Wycklendt, P.E., Senior Engineering Advisor, brings extensive coastal engineering experience to the District's work on Captiva. His project experience includes post-storm beach monitoring and recovery evaluation for Captiva Island beaches, as well as Technical Advisor roles in Blind Pass Inlet and Redfish Pass Inlet in Lee and Sarasota counties. Mr. Wycklendt has also provided technical leadership on beach nourishment and coastal structure projects at Lido Key, Longboat Key, Coquina Beach, Boca Raton, and Jupiter/Carlin Beach, among others, giving him comprehensive, ground-level familiarity with the regulatory environment and physical processes that shape coastal engineering practice across Florida. He will provide advisory support on an as-needed basis.



Claire Munaretto, Senior Economist, will provide targeted analytical and quality control support for the review of the final apportionment model. She will assist with the structured review of calculations and documentation, support consistency checks, and ensure that review findings are clearly and accurately reflected in written materials. Ms. Munaretto will undertake discrete technical support tasks under the direction of Mr. Cooper.



Nicole Buecker, Economist, will provide document coordination, review tracking, and preparation support for memorandum and presentation materials. Her role will be to assist with organization, formatting, and internal quality assurance to facilitate an efficient review process and the timely delivery of deliverables.

Technical Approach

Understanding of Project Objectives

The District is seeking an independent, professional review and certification of its final apportionment for a recently proposed beach renourishment project. This is a limited-scope engagement intended to verify the technical integrity and methodological consistency of an apportionment model that has already been developed and refined by the District. The District 1) has adopted its benefits methodology; 2) has completed a tentative apportionment in spring 2025 using 2024 “Just” values; and 3) will internally incorporate all required updates, including 2025 property values, homestead exemption data, final project costs, and grant offsets. While the total project cost is estimated at roughly \$30 million, we understand that, due to grants and federal and county cost sharing, the estimated net assessable amount is to be approximately \$17 million. No new benefits methodology, economic study, or reallocation of benefits is part of the current assignment.

We understand that the District’s objective is to obtain an independent validation confirming that 1) the updated final apportionment accurately implements the adopted methodology; 2) the Excel-based model is internally sound; and 3) the resulting outputs are suitable for Board consideration and adoption. The District’s request is focused on confirmation, clarity, and defensibility—not redevelopment. Accordingly, the final deliverables consist of a reviewed and validated Excel model, a concise written memorandum summarizing findings, a professional certification or opinion, and participation in a Board meeting to present results.

We also understand the importance of schedule certainty. Proposals are due May 7, 2026, with contract approval anticipated by May 11, 2026. The final apportionment is targeted for presentation on June 8, 2026, with follow-up or revisions potentially occurring through July 2026. Final Board adoption is required prior to September 1, 2026, to meet Lee County Tax Collector deadlines. Optional services—such as additional Board meetings, spreadsheet update assistance, litigation support, or sworn affidavits—are excluded from the base scope and, consistent with the District’s intent to maintain cost efficiency, are not priced into the proposed engagement. We can provide cost estimates for these optional tasks at the District’s request.

Approach Summary: Tasks and Deliverables

Task	Key Activities	Key Deliverables
Task A: Update Inputs (optional)	Input updated property values, parcel variables, and homestead discounts into model, along with any new values for zone assignment and/or recreation share	Updated Excel model
Task 1: Review, Audit, and Identify Errors	Review and identify any errors in model	Review document of file and notation of errors
Task B: Make Corrections/Edits to Errors (optional)	Update model to correct any errors found	Updated Excel file and model
Task 2: Provide the Memorandum, Certification, and Presentation	Develop the memorandum, presentation, and professional opinion on the model	Memorandum, board presentation, meeting attendance, and professional opinion

We will support the District in reviewing, editing, and presenting results of the apportionment through various media, such as a professional memorandum and Board presentation.

Technical Approach

Our approach is structured to provide the District with an efficient, independent, and technically rigorous review that aligns precisely with the District’s adopted methodology, internal update process, and Board schedule. Please note that the lettered tasks (Tasks A and B) are optional, but it is necessary to execute the numbered, prescribed tasks (Tasks 1 and 2).

Task A. Update Inputs (optional)

We will obtain the 2025 parcel-level information necessary to update the “Tentative Apportionment” section of the model. This section will come via the District or the county assessor’s office. In concert with homestead discounts and any new recreation shares or zone assignments, we will update the inputs of the “Tentative Apportionment” section so that the millages and cost shares can be calculated.

Task 1. Review, Audit, and Identify Errors

Upon receipt of the updated final apportionment Excel model and supporting materials, we will conduct a systematic audit of formulas, calculations, and internal logic across the workbook. This review will focus on ensuring that 1) benefit categories, allocation factors, and roll-ups are correctly applied; 2) links between sheets function as intended; and 3) totals reconcile consistently with updated costs, exemptions, and values provided by the District.

We will confirm that the updated model remains fully consistent with the District’s prior benefits analysis and adopted methodology, and we will identify any calculation errors, structural inconsistencies, or documentation issues that could affect certification or Board confidence. Where

issues are identified, we will provide clear recommendations for correction by District staff, preserving the District's control over data updates while ensuring accuracy and transparency.

Task B. Make Corrections/Edits to Model (optional)

If any issues are identified in the model during Task 1, the District will decide to make corrections internally or work with Integral to implement the necessary corrections. This task, if undertaken, will initiate another review after corrections are made to ensure accuracy before Integral's endorsement of the model accuracy.

Task 2. Provide the Memorandum, Certification, and Presentation

Following completion of the technical review, we will prepare a concise written memorandum summarizing our review procedures, key findings, and professional conclusions in language suitable for Board review and inclusion in the administrative record. This memorandum will follow the Stronge memo, "Prior Benefits Analysis Report," from the 2020–2021 project. We will also provide a professional certification or opinion supporting Board consideration of the final apportionment. Finally, we will participate in a Board meeting remotely to present results, respond to questions, and confirm that the Board's direction has been fully addressed. This step ensures not only technical validation but clear communication and closure, enabling the District to proceed toward final apportionment adoption within the required statutory timeframe.

Potential Unbudgeted Tasks: Additional Board Meetings and Potential Litigation

Additional Board meetings and any litigation/expert testimony support is available if requested and can be discussed, as needed. These tasks are not included into the current fee estimate.

Proposed Project Timeline

Our schedule allows us to focus immediately on verification and certification, supporting the District's schedule and its objective of adopting the final apportionment in advance of statutory deadlines:

- **Week of May 11–15, 2026 | Authorization and Materials Transfer**

Following Board approval of the contract, the District will provide the updated final apportionment Excel model and any supporting documentation necessary for review, including confirmation of updated property values, homestead exemptions, final project costs, and grant offsets. If optional Task A is chosen, Integral will use this week and the following week to update the data. A brief kickoff call (if desired) will confirm scope, points of contact, file structure, and Board expectations.

- **Weeks of May 18–29, 2026 | Technical Review and Audit**

Integral will conduct a comprehensive review of the Excel-based apportionment model, including an audit of formulas, internal logic, benefit allocations, and roll-ups. This review will confirm consistency with the District's adopted benefits methodology and identify any calculation errors, inconsistencies, or documentation issues.

- **Late May 2026 | Optional, Mid-Point Check-In**

A brief progress meeting, if requested, can be held to confirm review status, flag any emerging issues, and ensure alignment before finalizing corrections and documentation.

- **Week of June 1–5, 2026 | Issue Resolution and Documentation**

Any identified issues will be communicated to the District with targeted recommendations for correction. District staff will implement any agreed-upon changes internally or request Integral to make necessary changes. We will verify that revisions are correctly applied and that the final model is internally consistent and ready for certification.

- **Week of June 1–8, 2026 | Memorandum, Certification, and Board Materials**

Integral will prepare a concise written memorandum summarizing review procedures, findings, and professional conclusions. A certification or professional opinion suitable for Board consideration will be finalized, along with a brief presentation summarizing results for the Board workshop or meeting.

- **June 8, 2026 | Board Presentation**

Integral will attend a Board meeting remotely to present findings, answer questions, and support Board consideration of the final apportionment.

- **June 9–July 13, 2026 | Follow-Up and Refinements (if needed)**

If requested by the Board, Integral will address limited follow-up questions or minor refinements to documentation or presentation materials to support final adoption.

- **By September 1, 2026 | Final Objective**

The Board adopts the Final Apportionment in advance of statutory deadlines, allowing timely submission to the Lee County Tax Collector.

Fee Proposal

We have structured our efforts to follow the scope of services laid out in the request for proposals. The fee proposal is divided into two tasks, as prescribed, with a fixed price budget of \$20,325.

If the District decides to exercise the two proposed optional tasks—Task A (input updates) and Task B (corrections/edits to errors)—Integral proposes a fixed price budget of \$33,583 (inclusive of the two prescribed tasks priced at \$20,325).

Task	Fee
Task 1 – Review, Audit, and Identify Errors	\$11,618
Task 2 – Provide the Memorandum, Certification, and Presentation	\$8,707
Total	\$20,325
Optional Tasks	Fee
Task A – Update Inputs	\$6,629
Task B – Make Corrections/Edits to Errors	\$6,629

Assumptions and Exclusions

This proposal is based on the following assumptions and exclusions, which are intended to maintain clarity of scope, cost efficiency, and appropriate allocation of responsibility.

Assumptions

This engagement assumes that the District will provide the final apportionment Excel model and all supporting materials in a timely manner and in a format that is fully functional and reviewable using standard Excel software. All data inputs—including updated property values, homestead exemption data, final project costs, grant offsets, benefit factors, and zoning designations—will be prepared and updated by District staff prior to or during the review period, unless this responsibility is assigned to Integral under Task A.

For the optional Task A, Integral assumes that it will take no more than 20 hours to make corrections in the input models and update property values and discounts. If, upon access to the input models, Integral determines that it will take more than 20 hours to edit and update the models, we reserve the right to invoice the District for the additional burden hours.

It is further assumed that the Excel model provided represents the District's finalized implementation of its adopted benefits methodology and that no material changes to methodology, benefit categories, or allocation framework will be introduced during the engagement unless explicitly agreed to in writing.

Exclusions and Limitations

This engagement is limited to independent review, validation, and certification of the District's existing final apportionment model. Integral will not develop a new or revised benefits methodology, perform a novel economic or impact study, reallocate benefit categories, or modify the District's adopted approach in any way. No engineering analyses, coastal modeling, or reassessment of physical project design assumptions are included.

Integral's professional opinion and certification will apply solely to the review work performed, including verification of mathematical accuracy, internal consistency, and alignment of the Excel model with the District's adopted methodology as implemented. While Integral will stand behind the quality and integrity of its review, Integral does not assume responsibility for, nor will it defend, the underlying methodology itself or the inputs provided by others. This material includes, but is not limited to, engineering decisions, coastal design assumptions, benefit apportionment factors, assessed property values, storm zones, or other inputs that materially affect the model but are outside the scope of this review.

Optional services such as additional Board meetings beyond those specified, litigation or expert testimony support, sworn affidavits, or direct spreadsheet modification are expressly excluded from this

proposal and are not priced into the budget unless specifically requested and authorized by the District in writing.

Appendix A. Resumes



Andrew Bechard, Ph.D.

Consulting Economist

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dbechard@integral-corp.com

EDUCATION & CREDENTIALS

Ph.D., Economics, University of Rhode Island, Kingston, Rhode Island, 2022

M.B.A., Business Administration, University of Rhode Island, Kingston, Rhode Island, 2021

M.A., Economics, University of South Florida, Tampa, Florida, 2018

M.A., Mathematics, Rhode Island College, Providence, Rhode Island, 2017

M.Ed., Education, Providence College, Providence, Rhode Island, 2017

B.A., Mathematics and Economics, College of the Holy Cross, Worcester, Massachusetts, 2015

CONTINUING EDUCATION

OSHA 40-Hour HAZWOPER

OSHA 8-Hour HAZWOPER Supervisor

First Aid/CPR/AED Certified

eRailSafe Certified (2024)

PROFESSIONAL AFFILIATIONS

Member of Association of Environmental and Resource Economists

Member of Environmental Business Council of New England

Dr. Andrew Bechard is a resource economist with nearly 10 years of experience in assessing the economic impacts of environmental issues, particularly harmful algal blooms and natural resource damages. He provides rigorous economic insights using the advanced statistical analysis of complex environmental and economic data sets that drive data-informed decision-making for industry leaders, policymakers, and litigators. He actively contributes to numerous peer-reviewed journals as both an author and a reviewer, and his research is cited in the 2022 U.S. Congress Committee on Commerce, Science, and Transportation report on the South Florida Clean Coastal Waters Act of 2021. Dr. Bechard is a dedicated member of several professional organizations, including the Association of Environmental and Resource Economists and the Environmental Business Council of New England.

Relevant Experience

COASTAL RESILIENCE

Sand Renourishment and Dune Restoration, California — Researched recreational benefits to shoreline extension and renourishment in Southern California. Discussed coastal flooding impacts to property values, coastal business and tourism. Examined ecological benefits of dune restoration to threatened and endangered species.

Living Shoreline Assessment, St. Croix — Assisted in the planning of restoration to Great Pond Bay via mangrove planting and improved tidal flow. Examined impacts to juvenile native fish species and increased probability of survival.

Harmful Algal Bloom Impacts, Florida — Assessed the impacts of red tide on local economies and communities in Southwest Florida. Worked with government agencies to better understand public knowledge and perception of the issues, and improved strategies for mitigation.

ENVIRONMENTAL ECONOMICS

Carbon Market Feasibility, West Coast, United States — Provided economic analysis involving the tradeoffs, potential revenue, and costs of entering and participating in a carbon credit market.

Impacts of Climate-Related Policies on Fuel Prices, West Coast, United States — Provided economic analysis involving the impacts of climate-related policies on consumer prices for gasoline and fuel.

Impacts of Climate-Related Policies on Supply Chain, Louisiana — Provided economic analysis involving the impacts of climate-related policies on supply chain prices for select chemicals.

Certainty of Greenhouse Gas Emissions and Sustainability Goals, Oklahoma — Conducted a Monte Carlo analysis to advise clients on uncertainty surrounding their greenhouse gas emissions estimates.

Net Environmental Benefit Analysis, Australia; Brazil; California; Israel; North Sea; Trinidad and Tobago — Provided analysis around the economic and environmental impacts of various decommissioning options of an end-of-life oil rig.

NATURAL RESOURCE DAMAGE ASSESSMENT

Natural Resource Damage Litigation Support Service, Arkansas, California, Missouri, and Texas — Assisting in the defense of several claims for damages to natural resources from oil releases with potential injury to ecological services and human uses of resources.

PEER REVIEWER

Environmental Health Insights, Frontiers in Marine Science, Frontiers in Protistology, Harmful Algae, International Journal of Dynamics and Control, Journal of Sports Economics, Marine and Freshwater Harmful Algae and Protists

STATISTICAL ANALYSIS

DDx in Greater Ontario Vineyards, Toronto, Canada — Provided analysis involving the statistical significance of the presence and causes of DDx in vineyards. Demonstrated understanding of fate and transport of these chemicals in the context of the potentially impacted sites.

Metals in Fly Ash, California — Provided analysis involving the statistical significance of the presence and causes of fly ash in landfills. Demonstrated understanding of fate and transport of these chemicals in the context of the potentially impacted sites.

Lead in Telecommunication Cables, United States — Provided analysis involving the statistical significance of the presence and causes of lead in areas around telecommunication cables. Demonstrated understanding of fate and transport of these chemicals in the context of the potentially impacted sites.

OFFSHORE ENERGY

Net Environmental Benefit Analysis, Australia; Brazil; California; Israel; North Sea; Trinidad and Tobago — Provided analysis around the economic and environmental impacts of various decommissioning options of an end-of-life oil rig.

PUBLICATIONS

Bechard, A., and C. Lang. 2024. The human health effects of harmful algal blooms in Florida: The importance of high-resolution data. *Harmful Algae* 132:102584.

Bechard, A., C. Lang, and S. Pearson-Merkowitz. 2024. Voter approval of bond referendums: The role of bond amount and ballot characteristics. *State Politics & Policy Quarterly* 24 (1):53–76.

Bechard, A. 2023. Seafood consumption during harmful algal blooms: The impact of information regarding safety and health. *Harmful Algae* 123:102387.

Bechard, A. 2020. Economic losses to fishery and seafood related businesses during harmful algal blooms. *Fisheries Research* 230:105678.

Bechard, A. 2020. The economic impacts of harmful algal blooms on tourism: an examination of southwest Florida using a spline regression approach. *Natural Hazards* 104:593–609.

Bechard, A. 2020. External costs of harmful algal blooms using hedonic valuation: The impact of *Karenia brevis* on southwest Florida. *Environmental and Sustainability Indicators* 5:10019.

Bechard, A. 2020. Gone with the wind: Declines in property values as harmful algal blooms are blown towards the shore. *The Journal of Real Estate Finance and Economics*. doi: 10.1007/s11146-020-09749-6.

Bechard, A. 2020. Harmful algal blooms and tourism: The economic impact to counties in southwest Florida. *Review of Regional Studies* 50.

Bechard, A. 2020. Discount functions and the use of the memoryless property in dynamic economic analysis. *International Journal of Dynamics and Control* 8(3). doi: 10.1007/s40435-020-00615-0.

Bechard, A. 2019. Red tide at morning, tourists take warning? County-level economic impacts of harmful algal blooms in southwest Florida. *Harmful Algae* 85:101689.



Will Cooper

Senior Consulting Economist, Practice Director - Ecology and Environmental Economics

Denver, CO
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EDUCATION & CREDENTIALS

M.S., Economics, Universitat Pompeu Fabra, Barcelona, Spain, 2005

B.A., Economics, University of Virginia, Charlottesville, Virginia, 2002

CONTINUING EDUCATION

Machine Learning (2020)

DeepLearning.AI TensorFlow Developer (2020)

Applied Data Science (2020)

Modern Big Data Analysis with SQL (2020)

PROFESSIONAL AFFILIATIONS

American Bar Association: Section of Environment, Energy, and Resources

Private Sector Alliance for Disaster Resilience Societies—United Nations Office for Disaster Risk Reduction

Association of Environmental and Resource Economists

Society for Benefit–Cost Analysis

Mr. Will Cooper has more than 20 years of professional experience as an economist, specializing in the economic analysis of public policies, the valuation of natural resources, and natural disaster risk and reduction strategies. His primary areas of focus have been on the appropriate use of quantitative methods to study the economic impacts of public investments and climate change and adaptation strategies related to coastal erosion, floods, drought, and wildfires. He also has significant experience valuing natural resources and estimating impacts on ecosystem services, such as recreation and tourism. He specializes in econometrics and quantitative models and their application to environmental analyses. He has developed automated tools and analytical programs for use in labor analysis, energy, transportation, mining, health, economic forecasting, and cost analysis. Analyses performed by Mr. Cooper have been published in the Federal Register, and he has co-authored publications that have appeared in peer-reviewed journals.

Relevant Experience

COASTAL RESILIENCE

Benefit–Cost Analysis of Flood Protection and Hazard Mitigation, New Jersey — Led a rigorous analysis estimating the various benefits and costs of the construction of hazard mitigation infrastructure to minimize the impacts of future floods and environmental disasters. The analysis included a detailed analysis of the hazard mitigation benefits, including: impacts on residential and commercial real estate, commercial revenues, transportation infrastructure, energy and water utilities, infrastructure loss of function, and potential impacts on residents of the protected area, such as fatalities and displacement effects. The analysis used the Federal Emergency Management Agency Benefit–Cost Toolkit and accounted for the increasing risk of flooding due to climate change.

Naval Base Ventura County Climate Vulnerability Assessment and Adaptation, Ventura, California — Supporting a comprehensive climate vulnerability assessment and adaptation planning effort for Naval Base Ventura County (NBVC), Point Mugu. The project evaluates current and future risks to critical military infrastructure, natural systems, and mission readiness from coastal, hydrologic, and groundwater-driven hazards, including sea level rise, compound flooding, and shoreline change. Field data collection, numerical modeling, and geospatial analysis are integrated to characterize exposure, sensitivity, and adaptive capacity across the installation. Vulnerability findings address potential physical damages, fiscal impacts, and ecosystem services across both built and natural environments, and are synthesized into GIS-based decision-support products for installation planners. The project provides NBVC Point Mugu with a defensible technical foundation for long-term resilience planning in support of Department of Defense and Naval Facilities Engineering Systems Command climate adaptation objectives.

CLIMATE IMPACT ASSESSMENT

Incorporating Uncertainty into Climate Change Adaptation Measures, Colorado — Developed a methodological approach using a case study of numerous adaptation options for a flood and wildfire high-risk zone along US-34 between Loveland and Estes Park, Colorado. The approach used three precipitation forecasts and an eight-scenario wildfire scheme using the Keetch-Byram Drought Index to evaluate the cost-effectiveness of three primary adaptation options. The study concluded that the most cost-effective alternative is not necessarily the most robust option but the one that is cost effective under the most precipitation and wildfire scenarios.

Climate Change Adaptation Microgrid Case Study, California — Contributed to an economic analysis of installing microgrids in various locations throughout the state and the cost-effectiveness of their installation and potential use during periods of wildfire risk. The study provided the client with a decision-making tool for the investment in adaptation capital prioritized by wildfire risk, cost-effectiveness, and population affected.

STATISTICAL MODELING

Valuation of Climate-Related Amenities in Property Markets, Washington, DC — Served as the principal econometrician for the development of an empirical model to quantify the relationship between specific climate attributes and property values using the hedonic modeling framework. The purpose of this effort was to better understand how climate change affects human behavior by quantifying how much people value climate amenities in their living decisions. This framework can then be used for projecting the economic impacts of climate change using climate model predictions for how global warming can affect different regions in the U.S.

Estimating the Economic Benefits of Brownfields Cleanup and Redevelopment, Washington, DC — Served as the principal econometrician for an effort to develop a framework for estimating the benefits of brownfields cleanup and redevelopment. The analytical framework involved developing a hedonic housing value model to analyze the market capitalizations of brownfields on surrounding neighborhoods. The analysis showed that proximity to brownfields had a substantial negative impact on housing prices, and all else equal, cleaning up brownfields significantly improved neighborhoods and local housing markets.

Metropolitan Disaster Planning, Washington, DC — Conducted a study to explore the applicability of the American Housing Survey in disaster planning contexts. The project included developing a simulation methodology to assess the impacts to critical variables in post disaster situations and later applied it to the Miami–Ft. Lauderdale, Florida, Metropolitan Statistical Area.

NATURAL RESOURCE DAMAGE ASSESSMENT

Natural Resource Damage Litigation Support Services, Confidential Sites, Mid-Atlantic United States — Conducting economic analysis in support of the defense of several statewide natural resource damage claims arising from historical releases of semivolatile organic compounds, including economic valuation of alleged injuries to ecological services and human uses of affected resources.

Natural Resource Damage Litigation Support Services Related to Land Loss, Confidential Sites, Louisiana — Conducting economic assessment of alleged impacts of historical oil and gas development activities on coastal resources at specific Louisiana sites, including quantification of ecosystem service losses and evaluation of damage methodologies.

PUBLICATIONS

Tomasi, T., R.W. Cooper, and D. Anning. 2024. On the discount rate in environmental damage cases. *Environmental Claims Journal* 12:1–31. <https://doi.org/10.1080/10406026.2024.2440574>.

Johnston, E., J. Bluestein, J. Liu, J. Cohen, J. Kanaan, and W. Cooper. 2020. Characterization of fugitive methane emissions from commercial buildings in California. California Energy Commission. Publication Number: CEC-500-2020-048.

Rodehorst, B., W. Cooper, D. Ryder, J. Lennon, C. Dorney, R. Kafalenos, and R. Hyman. 2018. Using life cycle cost analyses (LCCAs) to evaluate climate change adaptation measures for transportation projects: a Colorado case study (No. 18-04966).

Cooper, W., F. Garcia, D. Ryder, D. Pape, and B. Witherell. 2016. Climate change adaptation case study: Benefit–cost analysis of coastal flooding hazard mitigation. *Journal of Ocean and Coastal Economics* 3(2): Article 3.

Cooper, W., E. Johnston, and K. Segal. 2016. The economic impacts of marijuana sales in the state of California. *White Paper ICF*, 16.

Sussman, F., B. Saha, W. Cooper, B. Bierwagen, C. Weaver, P. Morefield, and J. Thomas. 2014. Estimates of changes in county-level housing prices in the United States under scenarios of future climate change. *Climate Change Economics* 5(3):1450009.

PRESENTATIONS/POSTERS

Cooper, W., D. Anning, S. Harvey, and T. Tomasi. 2023. Evaluating the coastal valuation literature for equitable coastal management. The American Shore & Beach Preservation Association National Coastal Conference, Providence, RI. October 11–13.

Ryder, D., W. Cooper, and B. Rodehorst. 2017. A case study of incorporating uncertainty into climate change adaptation measures. The Society of Benefit Cost Analysis Conference, Washington, DC. March 15–17.



Andrew Wycklendt, P.E., BCCE

Senior Engineering Advisor

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EDUCATION & CREDENTIALS

M.S., Ocean and Resources Engineering, University of Hawaii, Honolulu, Hawaii, 2005

B.S., Ocean Engineering, Florida Atlantic University, Boca Raton, Florida, 2003

Professional Engineer, Civil, Hawaii (License No. 14493)

Professional Engineer, Civil, Alaska (License No. 176309)

Professional Engineer, Civil, Florida (License No. 71604)

Professional Engineer, Civil, Louisiana (License No. 45361)

ACOPNE Board Certified Coastal Engineer

CONTINUING EDUCATION

American Academy of Underwater Sciences Diving Safety Officer and Scientific Diver

PROFESSIONAL AFFILIATIONS

President, Hawaii Shore and Beach Preservation Association (HSBPA)

Director, American Shore and Beach Preservation Association (ASBPA)

Mr. Andrew Wycklendt is a board-certified coastal engineer (BCCE) through the Academy of Coastal, Ocean, Port and Navigation Engineers (ACOPNE), a subsidiary of the American Society of Civil Engineers; with only 80 board-certified coastal engineers worldwide, this is the highest certification given to a professional engineer within the field of coastal engineering. He has more than 20 years of experience designing and implementing a diverse portfolio of coastal restoration, shoreline protection, storm damage reduction, flood mitigation, beach stabilization, sediment management, dredging, navigation, and waterfront structure projects along Pacific, Atlantic, Gulf, and Arctic coasts. His project experience includes dredge and fill (for disposal, nourishment, or restoration), coastal structure (breakwaters, groins, jetties, revetments, seawalls), and marine-related upland structures (beach access stairs, boardwalks, boat ramps, docks, piers, quays). He has worked within barrier island, headland and embayment, estuarine, deltaic, cliff, pocket, perched, and open coastal systems to restore or nourish beaches, marshes, and other habitat that can be classified as either sand, mixed sediment, vegetated, cobble, boulder, or volcanic.

Mr. Wycklendt is versed in all aspects of the coastal engineering discipline; he provides technical leadership and manages broad-based coastal engineering projects, inclusive of team coordination and collaboration, to support field surveys, coastal site characterizations, coastal process and hazards analyses, coastal vulnerability assessments, coastal adaptation planning, coastal policy recommendations, surf science analyses, numerical model development, engineering design, regulatory authorizations, bid package development, construction project administration and oversight, and litigation matters. He excels at collaborating across disciplines to effectively convey complex information to colleagues, stakeholders, and the public.

Relevant Experience

COASTAL ENGINEERING

Captiva Post-Storm Assessment for Hurricane Ian, Lee County, Florida — Served as Technical Advisor to support a post-storm beach monitoring assessment for Captiva Island beaches.

Redfish Pass Inlet Management Study, Lee County, Florida — Served as Technical Advisor to support the inlet management study that evaluated the use of the inlet as a sustainable sediment source for future beach nourishment along adjacent beaches and to balance the sediment budget. This was supported by a Delft3D numerical modeling study of the Redfish Pass inlet and adjacent beaches along Captiva Island.

Blind Pass Inlet Management Study, Lee County, Florida — Served as Technical Advisor to support the inlet management study that evaluated the use of the inlet as a sustainable sediment source for future beach nourishment along adjacent beaches and to balance the sediment budget. This was supported by a Delft3D numerical modeling study of the Blind Pass ebb shoal complex and the adjacent beaches along Captiva and Sanibel islands.

Panama City Beach Nourishment, Bay County, Florida — Served as Technical Advisor to support the deployment of an ADCP and the processing and analysis of collected data to provide wave, current, and water level measurement data and an accompanying field operation and analysis report.

Passage Key Inlet Management Study, Manatee County, Florida — Served as Technical Advisor to support the inlet management study that evaluated the use of the inlet as a sustainable sediment source for future beach nourishment along adjacent beaches and to balance the sediment budget. This was supported by a Delft3D numerical modeling study of the Passage Key ebb shoal complex and the northern end of Anna Maria Island.

Lido Key Beach Nourishment, Sarasota County, Florida — Served as Technical Advisor to support engineering design of the Lido Key Beach Nourishment project.

Gateway Triangle Modeling Study, Collier County, Florida — Served as Technical Advisor to support stormwater modeling within the Gateway Triangle development area.

Jupiter/Carlin Beach Nourishment Monitoring, Palm Beach County, Florida — Served as Technical Advisor and Project Engineer to support the collection and analysis of beach monitoring data.

Collier Creek Navigation and Shoreline Stabilization, Collier County, Florida — Served as Technical Advisor to support numerical modeling used to evaluate structural and sediment management alternatives to address scouring, erosion, and navigation challenges through Collier Creek. A sand management plan was also developed to integrate nearby coastal projects, such as the Hideaway Beach nourishment and Collier Creek navigation dredging projects.

Coquina Beach and Longboat Pass Feasibility Study, Manatee County, Florida — Served as Technical Advisor to support numerical modeling used to evaluate structural alternatives for stabilizing Coquina Beach without disrupting the net sediment transport balance.

Pass-A-Grille Terminal Groin Assessment, Manatee County, Florida — Served as Technical Advisor to support the structural assessment of the Pass-A-Grille terminal groin.

Longboat Key North End Structural Stabilization, Sarasota County, Florida — Served as Project Engineer to analyze the effects of permeable adjustable groin structural stabilization on adjacent beaches.

Sebastian Inlet District Technical Advisory Committee Numerical Modeling Analysis, Indian River County, Florida — Served as Technical Advisor and Project Engineer to complete a Delft3D morphological modeling study used to evaluate downdrift impacts associated with the Sebastian Inlet jetty.

Boca Raton Post-Storm Assessment for Hurricane Nicole, Palm Beach County, Florida — Served as Technical Advisor and Project Engineer to complete a post-storm beach monitoring assessment for Boca Raton beaches.

Indian River County Post-Storm Assessment for Hurricane Dorian, Indian River County, Florida — Served as Technical Advisor and Engineer of Record to complete a post-storm beach monitoring assessment for Sector 3, Sector 5, and Sector 7 of the Indian River County Dune Restoration Project.

Sandsprit Park Boat Ramp Sustainability Improvements, Martin County, Florida — Served as Project Manager and Engineer of Record to develop an adaptation plan and complete engineering tasks needed to implement an adaptable design for the docks, boat ramp, bulkheads, and parking lot for the Sandsprit Park Boat Ramp.

Sunset Beach Groin Evaluation Study, Pinellas County, Florida — Served as Technical Advisor to support a coastal structure assessment.

Stuart Causeway Boat Ramp Sustainability Improvements, Martin County, Florida — Served as Project Manager and Engineer of Record to develop an adaptation plan and complete engineering tasks needed to implement an adaptable design for the docks, boat ramp, and parking lot for the Stuart Causeway Boat Ramp.

Shell Key North Pass and Grand Canal Feasibility Study, Pinellas County, Florida — Served as Technical Advisor to support advanced numerical modeling used to investigate the physical processes driving sediment transport and morphological change in the study area, evaluate the potential closure of Grand Canal, and evaluate the feasibility of conceptual sediment management engineering design alternatives.

96th Street Construction Access Bulkhead, Martin County, Florida — Served as Project Manager and Engineer of Record to collect topographic and geotechnical data, complete engineering and design tasks, permit, and develop a bid package for a channel dredging, sheet pile quay wall, berthing dolphin, and staging area grading project to support the loading of construction barges.

St. Lucie Inlet South Jetty Repair, Martin County, Florida — Served as Project Manager and Engineer of Record to evaluate storm damage and develop repair plan for the St. Lucie Inlet South Jetty.

Breakers Breakwater Modification, Palm Beach, Florida — Served as Project Engineer to complete a feasibility analysis for repairing the T-groin field at The Breakers Hotel.

Robinson Preserve Restoration, Manatee, Florida — Served as Project Engineer to support a tidal exchange analysis to assess circulation and residence (flushing) time using the Delft3D numerical model.

Elmer’s Island Restoration Feasibility Assessment, Jefferson Parish, Louisiana — Provided technical and administrative leadership as Principal in Charge to evaluate the feasibility of a proposed habitat restoration project adjacent to the pipeline canals on the Elmer’s Island Wildlife Management Area.

Breton Sound Restoration Feasibility Assessment, Plaquemines Parish, Louisiana — Provided technical and administrative leadership as Principal in Charge to evaluate the feasibility of restoring the wetland within Breton Sound to historical conditions.

Orleans Restoration Feasibility Assessment, Orleans Parish, Louisiana — Provided technical and administrative leadership as Principal in Charge to evaluate the feasibility of a proposed habitat restoration project adjacent to a pipeline canal on the Orleans Landbridge just south of Counterfeit Pass.

Terrebonne Parish Flood Insurance Study, Terrebonne Parish, Louisiana — Served as Technical Advisor to support flood insurance study modeling conducted for a Letter of Map Revision (LOMR) request.

North Shore Beach Management Plan, Island of O’ahu, Hawai’i — Providing technical and administrative leadership as Principal in Charge to develop a comprehensive, actionable beach management plan needed to maintain continuous beach access along the highly dynamic shoreline that extends from Paumalū (Sunset Point) to Kap’o (Sharks Cove) on the North Shore of O’ahu.

City and County of Honolulu Critical Infrastructure Adaptation, Island of O’ahu, Hawai’i — Providing technical and administrative leadership as Principal in Charge to develop and demonstrate a methodology that can be used to identify near-, mid-, and long-term adaptation actions or adaptation pathways for high-priority City and County of Honolulu critical infrastructure assets while considering various sea level rise scenarios.

Hawai’i Department of Transportation Coastal Adaptation Economic Assessment, Islands of Maui and Hawai’i, Hawai’i — Providing technical leadership as Senior Engineering Advisor to support an economic cost-benefit analysis by evaluating coastal processes, hazards, and risk vulnerabilities for existing conditions and various adaptation strategies considered for implementation at different time scales for Route 310 in Kihei, Maui, and Route 19 in Hilo, Hawai’i.

Kikiaola Harbor Bypassing, Island of Kaua’i, Hawai’i — Providing technical leadership as Senior Engineering Advisor to support engineering design, permitting, and bid package development for a sand bypassing project at Kikiaola Harbor.

City of Carpinteria Living Shoreline, Santa Barbara County, California — Providing technical leadership as Senior Engineering Advisor to support coastal process analysis, numerical modeling, and engineering design for a living shoreline project along Carpinteria City Beach.

Naval Base Ventura County Adaptation Plan, Ventura County, California — Providing technical leadership as Senior Engineering Advisor to support the Phase 1 vulnerability assessment for a climate change adaptation study at Naval Base Ventura County, Point Mugu.

Adamson House Living Shoreline, Los Angeles County, California — Providing technical leadership as Senior Engineering Advisor to support engineering feasibility and technical studies to design a living shoreline project at Malibu Surfrider State Beach.

PRESENTATIONS/POSTERS

Wycklendt, A. 2025. North Shore Beach Management Plan. National Coastal Conference (ASBPA). Long Beach, CA. October 10–13.

Wycklendt, A., and H. Vollmer. 2023. Using technology to improve shoreline access. National Coastal Conference (ASBPA). Providence, RI. October 10–13.

Wycklendt, A. 2018. Hawaii’s small scale beach restoration program overview. Hawaii Shore and Beach Preservation Association (HSBPA) Annual Conference.

Wycklendt, A. 2014. Local and federal funding for mainland beach restoration projects. HSBPA Beach Restoration Workshop. December 5.

Thomson, G., L. Benedet, A. Wycklendt, and C. Day. 2009. Incorporating overwash into the design of beach nourishment projects along uninhabited barrier islands. Conference of Beach Preservation and Technology. St. Pete Beach, FL. February 18–20.



Claire Munaretto

Senior Economist

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EDUCATION & CREDENTIALS

M.S., Agricultural and Applied Economics, University of Illinois at Urbana-Champaign, Illinois, 2017

B.S., Agriculture and Consumer Economics, University of Illinois at Urbana-Champaign, Illinois, 2015

CONTINUING EDUCATION

OSHA 40-Hour HAZWOPER

OSHA 8-Hour HAZWOPER Supervisor

First Aid/CPR/AED Certified

Ms. Claire Munaretto is an environmental economist with 10 years of experience in economic analysis, policy analysis, and research. Ms. Munaretto has conducted social, economic, and environmental justice analyses for private, federal, and state clients. She also has substantial experience valuing natural resources and estimating impacts on ecosystem services, such as recreation and tourism. She specializes in econometrics and quantitative models and their application to environmental analyses.

Relevant Experience

COASTAL RESILIENCE

Analysis of Flood Risk and Infrastructure Damages, Florida — Assessed the impacts of flooding on hospital, airport, port, and transportation infrastructure and identified the corresponding economic impacts. Where possible, this analysis quantified and monetized the impacts, and identified secondary, or cascading impacts that might otherwise not be in a typical benefit-cost analysis.

Business Case Analysis for Stormwater Resiliency, Miami Beach, Florida — Supported a hedonic analysis, and the neighborhood and citywide business cases, which assessed various investment scenarios (no action vs. public vs. private) and stormwater events (king tide, 5-year, 10-year, and hurricane) that incorporate sea level rise. Utilized stormwater inundation data to assess whether resiliency investments are cost effective at the neighborhood level and then scaled to the citywide level to discuss the costs of inaction. These analyses included the assessment of property damage impacts, property taxes, insurance payments, city operational costs, traffic impacts, business revenue and closure impacts, and tourism.

NATURAL RESOURCE DAMAGE ASSESSMENT

Natural Resource Damage Litigation Support Services Related to Land Loss, Confidential Sites, Louisiana — Supporting the assessment of impacts of historical oil and gas development activities on coastal resources for specific sites in Louisiana.

Recreation Survey and Risk Assessment, Oklahoma — To support relicensing a dam in a region impacted by metals from historical mining activities, developed and administered a comprehensive recreation use survey and conducted stakeholder interviews to characterize exposure patterns. Applied survey data to refine human health risk analyses, ensuring accurate characterization of recreational user exposures to metals in the reservoir and informing risk management strategies for the relicensing process.

CLIMATE CHANGE

Provincewide Climate Risk Assessment, British Columbia — Supported the development of a strategic provincewide climate risk assessment that identified 15 climate-related risks, from flooding to wildfire to health impacts, which could be used to prioritize adaptation responses. Managed the development of strategies and a framework to address risk events.

Climate Adaptation and Resilience Assessment, Mammoth Lakes, California — Conducted a natural capital assessment for the town of Mammoth Lakes, California, as part of its climate adaptation and resilience assessment. The natural capital assessment involved an estimation of the value of ecosystem services provided by natural areas in the region. This assessment also evaluated how ecosystem service values may be affected over time by climate change and by management activities to support sustainable outdoor recreation.

OFFSHORE ENERGY

Preliminary Baseline Environmental Assessment for Current Energy Conversion Device Off the Southeast Florida Coast — Provides technical support to conduct a desktop environmental assessment to provide critical information for an environmental impact statement (EIS). Compiles publicly available data and guidance from regulatory agencies to create a repository necessary to perform an evaluation of environmental conditions for the potential project development along the Florida southeast coast. Performs the desktop study data collection in accordance with Bureau of Ocean Energy Management and National Oceanic and Atmospheric Administration standards and guidelines. Identifies environmental information gaps to evaluate the system's potential environmental impacts. These studies are expected to provide key information for complying with the regulatory and permitting procedures.

Coastal Virginia Offshore Wind Draft EIS, Virginia — Supported the preparation of the draft EIS for the 3,000-MW wind project from up to 205 WTGs. Led two chapters of the EIS: demographics, employment, and economics, and environmental justice. All chapters evaluated baseline conditions of their topic areas and potential impacts as a result of the offshore wind farm for proximal counties. The demographics, employment, and economics chapter evaluated populations, housing, income, employment, and industries in the area. The environmental justice chapter evaluated minority and low-income populations and whether they would be disproportionately affected by the construction and operation of the offshore wind farm.

Coastal Virginia Offshore Wind (CVOW) South (formerly known as Kitty Hawk North) Draft EIS, North Carolina — Supported the preparation of the draft EIS for the 1,000-MW wind project from up to 69 WTGs. Led four chapters of the EIS: demographics, employment, and economics; environmental justice; recreation and tourism; and land use. All chapters evaluated baseline conditions of their topic areas and potential impacts as a result of the offshore wind farm for proximal counties. The demographics, employment, and economics chapter evaluated populations, housing, income, employment, and industries in the area. The environmental justice chapter evaluated minority and low-income populations and whether they would be disproportionately affected by the construction and operation of the offshore wind farm. The recreation and tourism chapter evaluated onshore, coastal, and offshore recreation, and the land use chapter evaluated how baseline land and infrastructure would be affected by the offshore wind operation.

FEASIBILITY STUDIES

Enhancing the Resilience of Vulnerable Families in Mexico City to the Impacts of Climate Change on Water, Mexico — Developed a feasibility study seeking to enhance resilience of the most vulnerable population in Mexico City to climate change impacts on water through enhancing knowledge and communication to manage future climate risks, scaling up access to domestic rainwater harvesting systems (RWHS), developing financial products and services dedicated to promoting RWHS adoption, and creating public policy instruments to support the sustainable deployment of RWHS.

NATURAL RESOURCES ASSESSMENT

Economic Impacts of Commercial Fisheries in Monterey County — Crafted a detailed economic impact analysis of the commercial fishing industry in Monterey County, California (2020–2024). It uses data from the California Department of Fish and Wildlife and applies the Regional Input-Output Modeling System (RIMS II) multipliers to estimate the industry's direct, indirect, and induced economic contributions to the local economy. The report aims to provide a baseline for assessing potential social and economic losses due to climate change and to support future analyses on the broader economic value of Monterey Bay's ecosystem.

RECREATION

Valuing Urban Beaches in Chicago: Distribution of Benefits across Race and Income, Chicago, Illinois — Conducted a valuation of Chicago's public beaches using survey data to conduct a travel cost analysis considering socioeconomic demographics. Created and administered the survey used as well as performed data analysis on the results. Conclusions, which were drawn from the data and literature to better inform how the public good is used, found the Chicago beaches to be an extremely valuable public good to the metropolitan area.



Nicole Buecker

Economist

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EDUCATION & CREDENTIALS

B.S., Economics with a Minor in Environmental Science and Terrestrial Resource Management, University of Washington, Seattle, Washington, 2018

CONTINUING EDUCATION

Master's and Ph.D. Coursework in Agriculture and Resource Economics, University of California Davis, Davis, California, 2020

Ms. Nicole Buecker is an environmental economist and spatial analyst with a particular focus on the management of forests, fisheries, and coastal resources. She specializes in GIS, and she is experienced in recreation demand modeling, econometrics, and human use interactions with ecosystem functions. Ms. Buecker applies her skills in natural resource damage assessment and marine spatial planning to inform planning, policy, and regulatory decision-making.

Ms. Buecker works across multiple dimensions of climate change resilience and adaptation, including wave and tidal energy resource assessment on the Pacific coast, the identification of site constraints and opportunities for renewable energy developments, the assessment of carbon capture opportunities for venture capital investments, and the analysis of funding and financing options for implementation of coastal resilience policies, including managed retreat.

Relevant Experience

COASTAL RESILIENCE

Climate Vulnerability Assessment Asset Loss Evaluation and Cost-Benefit Analysis of Adaptation Alternatives, Santa Cruz County, California

— Applied asset exposure results, derived from an advanced, in-house, climate exposure model, to assets throughout Santa Cruz County to predict expected structure, land, value, and tax revenue losses for the County; analysis spanned present conditions to 100 years into the future. Used asset loss calculations, recreation value, habitat value and engineering and maintenance costs in cost-benefit analysis comparing baseline (non-action) with adaptation alternatives such as beach nourishment, groins, and retreat.

Citywide Climate Adaptation Planning, Half Moon Bay, California — Assisted in prioritizing various adaptation strategies using multicriteria decision analysis techniques. Considered impact, viability, equity, and cost, among other factors, to develop weighted, consistent, and transparent recommendations for policymakers and decision-makers.

Managed Retreat Feasibility and Strategy Report, Hawaii — Alongside various specialist contributors, evaluated the viability of various funding and financing mechanisms, both preestablished and novel, for the successful implementation of a beach management program in Hawaii. The final report, published by the Office of Planning and Sustainable Development, was the first of its kind in the state and will serve as a major steppingstone toward future development planning.

GIS ANALYSIS

Natural Resource Damage Investigation and Litigation Support Services, Confidential Sites — Regularly perform GIS analysis of and produce figures for the defense of local and statewide claims for natural resource damages and their related site investigations. Analyses include deployment of specialized tools as well as bespoke procedures and methods.

Academic Research on Recreational Infrastructure, Washington — Wrote a white paper in close collaboration with the Mountains to Sound Greenway Trust to elucidate the relationships between classic macroeconomic indicators and recreational land acquisition in the Central Cascades region of Washington State. The white paper contains approximately 64,000 data points gathered from private and public sources, such as the Internal Revenue Service, the U.S. Forest Service, and Zillow. The paper was written to be accessible to both advanced and new audiences, and its data were used to produce graphs, GIS maps, causal statistical analyses, and a detailed discussion of results, bias, and limitations.

ENVIRONMENTAL ECONOMICS

Surf Recreation Valuation, Santa Cruz World Surf Reserve, California — Assisted with the computational analysis of survey respondents regarding their visitation to and enjoyment of the Santa Cruz World Surf Reserve using GIS and specialist statistical packages in R. Results were applied to a travel-cost model to estimate the recreators' monetary value of the resource.

Academic Research on Fisheries Permit Structures, Washington — Investigated the comparative impacts of individual transferrable quota, limited entry, and open access permit formats on market entry costs in the short and long term. This theoretical work was to inform policy that implements these various permit structures. Applied economic frameworks, such as discounting, marginal decision-making, game-theory, and opportunity cost.

Academic Research on Recreational Infrastructure, Washington — Wrote a white paper in close collaboration with the Mountains to Sound Greenway Trust to elucidate the relationships between classic macroeconomic indicators and recreational land acquisition in the Central Cascades region of Washington State. The white paper contains approximately 64,000 data points gathered from private and public sources, such as the Internal Revenue Service, the U.S. Forest Service, and Zillow. The paper was written to be accessible to both advanced and new audiences, and its data were used to produce graphs, GIS maps, causal statistical analyses, and a detailed discussion of results, bias, and limitations.

FISHERIES

Academic Research on Fisheries Permit Structures, Washington — Investigated the comparative impacts of individual transferrable quota, limited entry, and open access permit formats on market entry costs in the short and long term. This theoretical work was to inform policy that implements these various permit structures. Applied economic frameworks, such as discounting, marginal decision-making, game-theory, and opportunity cost.

RISK ASSESSMENT

Carbon Capture Investment, Washington and British Columbia — Considered the feasibility of a multimillion-dollar carbon capture business and subsequent investment. Performed competitive analyses, business plan and risk evaluations, and policy analyses of domestic and international energy and environmental topics. Incorporated advanced statistical methods into the business and risk assessment in novel ways. Verbally presented a recommendation along with a comprehensive written report.

RENEWABLE ENERGY

Wave and Tidal Energy Viability Assessment, California — Assessed opportunities and constraints on the emergent wave and tidal energy industry along the coast of California. Analyzed statewide and regional energy use, policy, geography, and wave and tidal energy dynamics for a resulting report for the California Energy Commission.

Carbon Capture Investment, Washington and British Columbia — Considered the feasibility of a multimillion-dollar carbon capture business and subsequent investment. Performed competitive analyses, business plan and risk evaluations, and policy analyses of domestic and international energy and environmental topics. Incorporated advanced statistical methods into the business and risk assessment in novel ways. Verbally presented a recommendation along with a comprehensive written report.

NATURAL RESOURCE DAMAGE ASSESSMENT

Natural Resource Damage Litigation Support Services, Confidential Sites, Mid-Atlantic United States — Assisting in the defense of several statewide claims for damages to natural resources from historical releases of semivolatile organic compounds with potential injury to ecological services and human uses of resources. Involvement included advanced GIS for analysis and report figures, programming in both Python and R, and application of environmental economic theory.