The U.S. Army Corps of Engineers submits the following information per requirements in the Water Resources Reform and Development Act of 2014, Section 1044(c)(4)(B).

<table>
<thead>
<tr>
<th>Entity Conducting the Review</th>
<th>Battelle</th>
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<tbody>
<tr>
<td>Outside Eligible Organization:</td>
<td>505 King Avenue</td>
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<tr>
<td></td>
<td>Columbia, OH 43201</td>
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<th>Dates of Review</th>
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<tr>
<td>Review Initiation:</td>
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<td>Type I IEPR Final Report Submittal:</td>
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**Reviewer Names and Qualifications**

<table>
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<tr>
<th>Gretchen Greene, Ph.D.</th>
<th>Plan Formulation/Economics</th>
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<td>For more than 25 years, Dr. Greene, a principal economist with Greene Economics, LLC, has specialized in water resource economics, environmental valuation, regional economic impact assessment, benefit-cost analysis, regulatory analysis, population projections, urban water demand forecasting, and public infrastructure investment. She also has Civil Works planning experience on numerous projects related to water resources, including dam feasibility, levee alterations, flood protection, port development, navigation benefits, and ecosystem service payments. She earned her Ph.D. in food and resource economics from the University of Florida in 1998.</td>
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Dr. Greene has extensive experience in economic analysis of water resource development, having worked on numerous Indian Water Rights litigation cases that hinge on benefit-cost analyses following the Principles and Guidelines for Water Resource Development, using the National Economic Development (NED) approach. She also led the Dredged Material Management Study titled “Risk-Based Analysis of the Lewiston Levee,” part of a dredged material management Environmental Impact Statement (EIS) for the Snake River system in which she estimated flood damage reduction benefits of the Lewiston Levee system. Dr. Greene also prepared a benefit-cost economic analysis of various dredge plans, levee alterations, and dredged material disposal options for USACE Walla Walla District. For this effort, she estimated flood damage reduction benefits using the Hydrologic Engineering Center-Flood Damage Reduction Analysis (HEC-FDA) model; environmental benefits and costs were evaluated separately. The model and results were performed and presented in a manner consistent with USACE Engineering Manual 1110-2-1619, Risk Based Analysis for Flood Damage Reduction Studies (USACE, 1996). She also developed and analyzed a dredging alternatives analysis involving open water as one alternative for the Kishon River in Israel and presented the results of the analysis at the Society of Environmental Technology and Chemicals. Another recent project analyzed the status of Port Hueneme navigation in California for a climate adaptation project.
Dr. Greene has more than 20 years of experience working with USACE. For Savannah USACE, she worked on a Water Supply Reallocation Report for the City of Thomson, Georgia (Chasman & Associates). She also has reviewed and completed several navigation benefit analyses for the Columbia River system, including an analysis of the socioeconomic implications of developing an additional marine terminal at the Port of Portland based on shipping forecasts. Dr. Greene has studied marine transportation as part of the economic analysis of rules that currently govern the transfer of oil within Washington State waters. This effort focused on the costs and benefits associated with changes in oil transfer safety procedures affecting vessels and four different types of marine facilities that transfer oil on or over state waters. In addition, she recently worked with the Marine Institute of Ireland on a national marine spatial planning process.

Dr. Greene has used the USACE plan formulation process as a contractor to USACE. The process forms the basis for benefit-cost analysis that she uses every day as an economist. She is familiar with the Institute for Water Resources (IWR) Planning Suite and has more than 20 years of experience using the USACE six-step planning process (following Engineer Regulation 1105-2-100) for a number of projects, including the Lewiston Levee project; a Water Supply Reallocation Report for the Savannah District; and an analysis of recreational benefits of a Proposed Water Storage Facility on the Fort Apache Indian Reservation in Arizona. She also used the USACE six-step planning process in her context as a reviewer for Fargo Moorhead FRM, the Port Fourchon Integrated Section 203 Feasibility Report and EIS, and the Savannah Harbor General Reevaluation Report and Transportation Cost Savings Model. Most of the projects described above also included an element of NED benefits calculation and review.

Dr. Greene is an active member of the Population Association of America, the Western International Economic Association, the American Agricultural Economic Association, and the Society for Benefit-Cost Analysis.

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**Jason P. Stutes, Ph.D.**

Dr. Stutes is a nearshore ecologist with over 19 years of expertise related to water resource environmental evaluation and review and National Environmental Policy Act (NEPA) compliance for deep draft navigation (DDN) and other nearshore infrastructure projects. His specific expertise focuses on the analysis of project-level effects (e.g., dredged material placement, shading, and other habitat modifications) on nearshore ecosystems under the Endangered Species Act (ESA), Fish and Wildlife Coordination Act, and NEPA. Dr. Stutes has a comprehensive understanding of environmental laws and compliance measures for deep draft/dredging projects in Puget Sound waters, based not only on the number of ESA-listed species (and their critical habitat) that must be taken into account, but also on relevant Puget Sound Dredged Material Management Program (DMMP) guidance as well as Washington State’s Model Toxics Control Act (MTCA). His expertise also includes a familiarity with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Superfund compliance in many cases.

Dr. Stutes is an expert in Pacific Northwest biology, specifically knowledge of endangered species including salmonids, marine mammals, shore birds, and rock fish. Dr. Stutes has performed numerous habitat surveys and functional assessments for nearshore projects ranging from simple boat launches for municipalities to multimodal piers for world-class ports. Many of these projects focus on footprint effects on habitats that support a diverse assemblage of animals and plants, including shellfish, macroalgae, and eelgrass. This experience demonstrates his proficiency in navigating the permit process for nearshore projects and evaluating them for project-related impacts, ESA-listed species utilization, restoration potential, and potential contamination threats. He has consulted for numerous multidisciplinary teams tasked with conceptualizing, designing, permitting, and implementing restoration actions in the Pacific Northwest. As a nearshore bentic
ecologist, Dr. Stutes informs the regulatory process on issues related to habitat function and ecosystem services, thereby minimizing permit timelines and maximizing the value of mitigation actions for clients. He is a recognized expert in the nearshore and benthic ecology and periodically reviews articles for international journals on the subject.

Dr. Stutes’ diverse technical expertise includes characterizing nearshore habitat, conducting long-term monitoring, characterizing food webs, constructing carbon and nitrogen budgets for estuarine settings, and sampling/processing water quality parameters. Dr. Stutes has been involved in several projects where dredging has been used to improve navigation for channels, ports, and marinas; these projects include the Jordan Cove LNG Project, the Port of Everett Jetty Island Beneficial Reuse of Dredge Spoils Project, the Alaska Pipeline Project, the Point Thomson Project, the Port of Everett South Terminal Project, the Skagway Multimodal Project, the Custom Plywood Remediation Project, and numerous marina projects. He has evaluated the impacts and recovery of these systems based on the existing infauna assemblage, size/depth of the proposed dredge, level of contamination of dredge materials, and level of intermittent disturbance due to boat traffic and scour. He has also been involved in permitting (including pre-dredge baseline studies and impact and recovery assessment) on multiple nearshore infrastructure projects (including dredging projects) in the State of Washington (Puget Sound, Bellingham Bay, Hood Canal), in Oregon (Coos Bay), and in Alaska (Cook Inlet, Beaufort Sea, Sitka Sound, Lynn Canal). He has also conducted several studies on the acoustic and water quality effects of dredging on nearshore ecosystems.

Dr. Stutes has prepared marine biological sections of numerous NEPA and Washington State Environmental Policy Act (SEPA) EISs and EAs in Washington (Port Gamble Bay Restoration Project, EHW2 Pier Project, Terminal 5 Expansion Project, Thorndyke Resources Conveyor Project, Willapa Bay Imidacloprid Application) and in Alaska (Sitka Runway expansion/fill project, Point Thomson project, Donlin Mine project, Pebble Mine project). He has supported coastal projects in the Pacific Northwest stretching from the Columbia Basin to the North Slope.

Dr. Stutes is the president of the Pacific Estuarine Research Society and serves on the board of the Coastal and Estuarine Research Federation (CERF). He has presented scientific results to regional (Alaska Marine Science Symposium) and international/national scientific meetings and conferences (CERF, Benthic Ecology Meeting Society).

**Michael Kabiling, Ph.D., P.E.**

**Hydrology and Coastal Engineering**

Dr. Kabiling is a senior engineer with Taylor Engineering, Inc., in Jacksonville, Florida, an engineering consulting firm that specializes in hydrology, hydraulic, and coastal engineering. He has more than 27 years of experience in water resources; hydrologic, hydraulic, and coastal engineering; and numerical modeling. He earned his Ph.D. in hydraulic and coastal engineering from Yokohama National University, Japan, in 1994 and is a professional engineer (PE) licensed in Florida, Georgia, South Carolina, and Washington. In his early career, he served as a hydraulic engineer and numerical modeler in hydrodynamics, water quality, and pollution transport for river rehabilitation projects. He also completed flood studies and sediment engineering works. Among the numerous projects that demonstrate his hydraulic engineering experience are the IEPR of the Port Fourchon Integrated Section 203 Feasibility Study and Environmental Impact Study (2018); Dredged Material Particle Tracking Modeling for the Port Everglades Harbor Navigation Channel Deepening and Widening Project, Broward County, Florida (2016 –2018); IEPR of the Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Feasibility Report and Environmental Impact Statement (2014-2015); Jacksonville Harbor Deepening Project Impact Assessment (2009-2014); Pasig River Rehabilitation, Manila, Philippines (1995-2001); Diagnostic Modeling System, Phase II, Duval County, Florida (2001); East Pass Vicinity Borrow Area Excavation, Okaloosa County,
Florida (2002-2003); South Carolina Coastal Storm Surge Modeling (2009); and South Carolina SC-171 Bridge Replacements over Folly River and Sol Legare Creek, Charleston County (2008-2011).

The Port Everglades Sediment Transport Modeling, Broward County, Florida, demonstrates Dr. Kabiling’s extensive understanding and experience of coastal systems. As coastal and hydraulic engineer, his sediment transport modeling work supported USACE and Port Everglades planning for navigation channel deepening and widening. For this project, Dr. Kabiling designed a field measurement program of tides, currents, and waves to support model setup and validation; developed and applied state-of-the-art modeling with integrated three-dimensional MIKE hydrodynamic, wave, and particle tracking models; applied the model to determine the fate of the dredged material plume and deposition pattern for normal and extreme tides, waves, Florida currents, and 25 dredging scenarios; and determined the best dredging method with the least deposition and suspended sediment impact. The IEPR New Haven Harbor Navigation Improvement Study, New Haven, Connecticut, demonstrates Dr. Kabiling’s familiarity with the application of USACE risk and uncertainty analyses and coastal engineering requirements for DDN feasibility studies, including his familiarity in evaluating channel design and the effects of currents, sea level rise, sedimentation, and water quality on navigation channels. The IEPR Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Feasibility Report and Environmental Impact Statement demonstrates Dr. Kabiling’s professional experience in evaluating the application of various modeling systems for sediment transport and morphology evaluation in navigation channel dredging projects. The Jacksonville Harbor Project demonstrates Dr. Kabiling’s extensive experience in DDN and channel modification. For that project, he provided project management, supervised Environmental Fluid Dynamics Code (EFDC) model validation and application for various harbor dredging scenarios, and performed quality assurance/quality control (QA/QC) model reviews. The EFDC modeling of the St. Johns River provided the means to evaluate the effect on river hydraulics, salinity, ecology, and water quality of channel deepening, channel widening at select locations, and construction of new turning basins, as well as the cumulative impacts of other projects. Dr. Kabiling’s coastal and hydraulic engineering works on five projects—Port Everglades Sediment Transport Modeling IEPR; New Haven Harbor Navigation Improvement Study, New Haven, IEPR; Port Fourchon Integrated Section 203 Feasibility Study and Environmental Impact Study IEPR; Charleston Harbor Post 45 Phase II, and Jacksonville Harbor Deepening Project—demonstrate Dr. Kabiling’s familiarity with USACE coastal engineering requirements for Civil Works projects and feasibility studies. For the Pasig River Rehabilitation Project, he supervised the implementation of field monitoring programs and conducted periodic numerical modeling of water levels, flow, and water quality in rivers and channels. He also prepared technical reports to assess probable scenarios due to various river rehabilitation programs, water quality prognoses, and pollution loads. In addition, he taught training courses on the operation and application of hydrological, hydrodynamic, advection-dispersion, and water quality numerical models.

In 2011, Dr. Kabiling worked on the Ft. Pierce Inlet Sand Bypassing Feasibility Study, Florida, where he provided project management, designed a field measurement program, supervised and performed data evaluation and numerical modeling, supervised the estimation of potential shoaling rates at proposed deposition basins near the deep-draft Ft. Pierce Inlet Navigation Channel, prepared technical reports, and recommended future tasks for engineering design and permitting of the deposition basins. This project involved expertise in DDN, dredged material disposal (upland, open-water, or ocean placement) and beneficial use, and coastal currents. Additional experience with dredged material disposal includes work on two projects: the Feasibility Study of Sediment Basins near Cut 1 of Okeechobee Waterway, Martin County, Florida (an effort that also required
experience in channel modification), and the Assessment of Canal and Embankment Impacts on Hydraulics and Sediment Transport in the Atchafalaya Basin, Louisiana (an effort that also required experience in erosion and deposition). Other erosion-related projects include the South Carolina Bridge Replacements Project mentioned above and a 2011-2012 beach erosion project called Florida Power and Light Engineering and Permitting Services, St. Lucie County, Florida. For the South Carolina Bridge Replacements Project, Dr. Kabiling designed and supervised tide and flow velocity measurements; supervised the application of the one-dimensional Hydrologic Engineering Center-River Analysis System (HEC-RAS) model of the Stono River-North Edisto River System; supervised the development and application of two-dimensional surge models at the proposed bridge locations; and supervised erosion depth estimation. For the Florida Power and Light Project, scenarios were analyzed that included a seawall to minimize shoreline erosion and submerged breakwaters to dissipate erosive wave action in the nearshore area. An integrated hydrodynamic, wave, and sediment transport model provided the means to evaluate the impact of the seawall and breakwater along the beach. As the lead modeler, Dr. Kabiling set up an integrated MIKE21 hydrodynamic, wave, and sediment transport model; calibrated and verified the performance of the hydrodynamic and wave models using available hindcasted data; and evaluated the short- and long-term performances of various submerged breakwater layouts and geometries to reduce shoreline erosion.

Dr. Kabiling’s expertise in coastal currents includes the following projects: Estimation of Waves, Coastal Currents, and Erosion at the Barrier Island, Peninsulas, and Ring Levee in Lakeshore Estates Project in St. Tammany Parish, Louisiana (2006) (managing efforts to estimate waves, coastal currents, and concomitant erosion); the Atlantic Intracoastal Waterway, Sebastian Inlet (Pelican Island), Indian River County, Florida (2006) (performing hydrodynamic and wave modeling); and the Acadiana Bays Modeling Study, Louisiana (2004) (modeling currents generated by various forces [tides, waves, and winds] and advection-dispersion of saltwater).

Dr. Kabiling is an active member of the American Society of Civil Engineers, the Association of State Floodplain Managers, the American Water Resources Association, the Florida Engineering Society, and the International Association of Hydraulic Engineering and Research.

Andrew Blystra, CPESC, P.E.

Geotechnical Engineering

Mr. Blystra is a Senior Associate Engineer with GENTERRA Consultants, Inc. with 47 years of experience in civil and geotechnical engineering. He has a M.S. in geotechnical engineering from the University of Illinois at Chicago with continued doctoral work in geotechnical engineering and engineering geology. He is a professional engineer in Pennsylvania, Michigan, Illinois, Indiana, Wisconsin, and Georgia, and is a Certified Professional in Erosion and Sedimentation Control.

In 2018, Mr. Blystra was a panel member for the IEPR for the DDN harbor improvements at New Haven, Connecticut, serving as the geotechnical engineer on the assignment. Mr. Blystra has characterized sediment to be dredged by USACE at New Buffalo Harbor, Michigan, and for two private dredging contracts at inland lakes in Michigan. He also characterized sediment upstream of existing hydroelectric projects at Norway Point, Four Mile, and Ninth Street on Thunder Bay River, Michigan. His experience includes characterizing sediment upstream and downstream of proposed hydroelectric projects in Pennsylvania at existing USACE projects at Allegheny Lock and Dam 2, Emsworth Locks and Dam, Emsworth Back Channel Dam, Montgomery Locks and Dam, Monongahela Locks and Dam 4, Maxwell Locks and Dam, Grays Landing Lock and Dam, and Point Marion and in West Virginia at the proposed hydroelectric projects at Morgantown and Opekiska Locks and Dams. Mr. Blystra has characterized sediment upstream and downstream of six proposed hydroelectric projects on the Muskingum River in Ohio; at the Williams Dam in Indiana; at the Kentucky River Lock and Dam 11 in Kentucky; and at the USACE Overton Lock
and Dam on the Red River in Louisiana. He also investigated the liquefaction susceptibility of sediment in the reservoir of the Gilboa Dam in New York.

Mr. Blystra’s experience in channel slope stability includes physical model testing of proposed hydroelectric projects on the Ohio River at the USACE Cannelton and Meldahl Locks and Dam. He also has experience evaluating channel slope stability and designing erosion reduction measures downstream from existing hydroelectric projects on the Thunder Bay River, Michigan, where over 40 erosion sites existed. In addition, he evaluated the stability of the channel slope that would result from a proposed project to add powerhouse discharges at ten locations on the Allegheny, Ohio, and Monongahela Rivers in Pennsylvania and West Virginia.

Mr. Blystra has also been responsible for drilling programs, including the identification of soils and rock at eight existing Consumers Energy hydroelectric projects in Michigan, the Norway Point and Four Mile hydroelectric projects in Michigan, and the Hatfield power canal in Wisconsin. He also was responsible for several geotechnical investigations in Georgia and Alabama. His experience includes using geophysical methods for investigating subsurface conditions; related projects include the use of ground-penetrating radar at the upper reservoir of the Ludington Pumped Storage Project, the area upstream of the Elkhart Hydroelectric Project, the Prairie Du Sac spillway and powerhouse, and the Hardy Hydroelectric Project Spillway. Mr. Blystra also has used electrical resistivity and seismic methods to conduct geophysical exploration and has extensive experience using the pressure meter in investigations.