Integral Consulting Inc.
200 Washington Street
Suite 201
Santa Cruz, CA 95060

telephone: 831.466.9630
facsimile: 831.466.9670
cjones@integral-corp.com

Craig A. Jones, Ph.D.
Principal

PROFESSIONAL PROFILE

Dr. Craig Jones is a principal ocean and environmental engineer with 18 years of experience in developing engineering and science programs for government agencies and the private sector to characterize and quantify transport of sediments and associated contaminants. His experience includes riverine, lacustrine, estuarine, and coastal processes involving hydrodynamics, waves, and sediment transport. Dr. Jones continues to develop of state-of-the-science techniques to utilize field measurements and modeling analysis to quantify processes in all aquatic systems. He actively participates in the design of field activities and instrumentation to collect specific data in support of clients' needs. Dr. Jones is adept at incorporating these data into the most effective levels of analysis, from empirical to numerical modeling, necessary to efficiently address the project needs.

Dr. Jones has testified in federal court and in front of public utility commissions as an expert on environmental issues and regulatory concerns, including sediments and contaminants in support of allocation activities. Dr. Jones continues to work on preparation of materials for various environmental litigation cases in the United States.

CREDENTIALS AND PROFESSIONAL HONORS

Ph.D., Mechanical and Environmental Engineering, University of California, Santa Barbara, California, 2000
M.S., Fluid Mechanics (minors: Environmental Ocean and Environmental Engineering) University of California, Santa Barbara, California, 1996
B.S., Coastal Engineering, Texas A&M University, Galveston, Texas, 1994

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers
American Geophysical Union
Marine Technology Society
American Shore and Beach Preservation Association
International Association of Great Lakes Researchers

RELEVANT EXPERIENCE

Marine and Sediment Services

Contaminated Sediment Transport Evaluation, Berry's Creek Study Area, New Jersey—Serving as project manager for field and modeling studies related to the risk assessment and remedial investigation of the Berry's Creek Study Area (BCSA) wetland in New Jersey. The BCSA is a tidal wetland/marsh adjacent to the Hackensack River. Historical releases of contaminants into the BCSA have resulted in the need for an RI/FS for the site. The study goals are to characterize the fate and transport of sediment-bound contaminants. Responsibilities include the design and implementation of the sediment transport investigation for the site. Implemented the field investigation, maintaining five permanent current and water quality monitoring stations while also employing real-time storm monitoring using vessel-mounted systems. The data are being used to develop a quantitative description of hydrodynamics and sediment transport in the system, providing contaminant fate and transport input to the risk analysis and remedial selection and design.

Marine Renewable Energy Support, Sandia National Laboratories—Serving as project manager for the development of tools and techniques to improve performance, lower costs, and accelerate the deployment of marine and hydrokinetic energy technologies. The project has evaluated all aspects of marine and hydrokinetic resource characterization and environmental evaluations, through applied research and developing tools and methods to improve device performance and minimize environmental disturbance. Of particular importance to this project is the development and application of software tools and guidance for the marine renewable energy industry.

United Heckathorn Superfund Site, Richmond, California—Served as project manager for a DDT fate and transport study that was performed for the Lauritzen Channel as part of a focused feasibility study. The objectives were to develop a quantitative contaminant fate and transport conceptual site model and DDT mass balance for the Lauritzen Channel, based on available analyses, and assess trends in DDT mass and concentration in the channel. Overall, the sediment transport analysis showed that the Lauritzen Channel is accumulating relatively clean sediment from San Francisco Bay. There are distinct regions with different sediment transport and accumulation characteristics in the channel that were characterized. For example, the west side of the channel, which experiences the highest vessel activity in relatively shallow regions, was investigated through the use of propeller scour modeling. The results of the analysis showed overall that the average DDT concentrations in the young bay mud sediment are decreasing in the channel.

Development of a Guide for Assessing Sediment Transport at Navy Facilities, U.S. Navy—Authored a U.S. Navy guidance document to ensure that sediment investigations and remedial actions are successful and cost effective. The guidance provides information on evaluating sediment transport at contaminated sediment sites, and describes how to use sediment transport information to support sediment management decisions. The

framework developed in this report has been applied at three demonstration sites: Hunters Point Naval Shipyard (HPS) in San Francisco, California; Bremerton Naval Complex in Puget Sound, Washington; and Naval Station Newport in Newport, Rhode Island.

Development of a Real-Time Wave Assessment Tool, ARPA-E, U.S. Department of Energy—Supporting wave energy converter (WEC) development by collaborating with key WEC technologists to develop, test, and validate a wave measurement buoy that will be capable of providing real-time wave-by-wave information. This could increase WEC capture efficiency by up to 330 percent, potentially reducing the cost of wave power below $0.10 per kWh. Was primary inventor of transformational technology that can be networked to measure and relay real-time wave properties at a fraction of the cost of current systems.

Hamilton Wetland Restoration, San Pablo Bay, California—Served as project manager for the assessment of an open-water dredge material storage facility for beneficial reuse and restoration of Hamilton Wetlands in California. Evaluations were conducted for a temporary dredge material transfer facility in San Pablo Bay to support the restoration at the former Hamilton Army Airfield and surrounding land. The aquatic transfer facility (ATF) is designed to handle 24 million cubic yards of material over a 10- to 15-year operational life. Knowledge of the fate of the dredged material in and around the ATF, developed using SEDflume and modeling studies, was critical to the selection of an optimal location for the ATF, and for guiding the design and configuration so that impacts to the surrounding environment will be minimized.

Sediment Transport Investigation, Lower Passaic River, New Jersey—Led the development of a conceptual site model of sediment transport in the Passaic River. Historically, the Lower Passaic River below the Dundee Dam has been contaminated with a range of contaminants of potential concern. Since the most significant transport pathway for these hydrophobic contaminants is by transport of the sediments to which they are sorbed, sediment transport is a key system-wide process to understand when evaluating environmental risk and any remedial selection. Led the preparation of documents detailing the sediment transport processes important to the site while providing technical review of sediment transport analyses being conducted by EPA.

Remedial Investigation and Feasibility Study, Hunters Point Naval Shipyard, California—During the feasibility study phase of the work at HPS, provided the U.S. Navy with advice and analysis regarding the stability of PCB-contaminated sediments onsite. The work included the development of an agency-approved work plan, collection of cores for SEDflume analysis, and analysis of data to provide a "weight of evidence" approach to sediment stability at HPS. Managed field work and analysis associated with the sediment and contaminant transport investigation, and acted in a technical advisory capacity to the U.S. Navy and local and federal regulatory agencies. Managed the evaluation of the mobility of bottom sediment in areas of potential chemical contamination in the vicinity of HPS, in south San Francisco Bay, California. Also performed analysis of PCB releases into the bay, which were utilized in the feasibility study to select remedial options.

Dredge Disposal, Santa Cruz, California—Co-managed the design and implementation of the third inner Santa Cruz Harbor dredge monitoring program. Before these dredge monitoring programs, it was considered too great a risk to release sediment containing more than 20 percent mud into the surf zone because it might have damaging effects on the coastal environment. The project demonstrated negligible sedimentary changes occurred on the beaches and in nearshore benthic habitats of the Santa Cruz Bight during the dredging period. A variety of data collection efforts were utilized to monitor the experimental dredging event, including local stream flow, wave, and current data collection; beach and offshore sediment sampling; pre- and post-dredging multi-beam surveys and benthic habitat mapping; and sediment transport modeling.

DDT Transport Investigation, Lago Maggiore, Italy—Served as project manager for a DDT transport investigation of the Toce River, Lake Mergozzo, and Lago Maggiore. The investigation was conducted to better understand hydrodynamic processes and the stability of sediments and contaminants in the area. Led the field investigation and modeling team and development of state-of-the-art, 3-dimensional, hydrodynamic and sediment transport models to investigate sediment transport in the Toce River and depositional patterns in Lago Maggiore. The model was successfully used to evaluate the patterns of contaminant deposition. The data were used to develop a risk assessment for the site.

Sediment and Contaminant Transport Investigation, Augusta Bay, Sicily, Italy—As a part of the Augusta Bay contaminated sediment investigation, developed and implemented a study to gain a better understanding of the transport of sediments and contaminants in the bay. The study goals were to develop a conceptual site model describing the key site processes and compile and collect site data to provide an adequate understanding of these processes. Led the field investigation and modeling team and developed a quantitative conceptual site model and state-of-the-art, 3-dimensional, hydrodynamic and sediment transport models to investigate sediment transport in Augusta Bay. A key process of interest was propeller scour during ship motion. Developed innovative techniques to determine sediment resuspension during ship movement events. The data and analysis were being used to develop remedial alternatives for evaluation in a feasibility study.

Remedy Effectiveness Monitoring, Anacostia River, Washington, DC—Managed the analysis of sediment stability in the vicinity of the Washington Navy Yard on the Anacostia River to provide a better understanding of the integrity of capping material and transport of contaminants of potential concern at the site. The studies provided rationale for the field study design, specifically selection of locations for sediment erosion rate measurements using SEDflume and current measurements using Acoustic Doppler Current Profiler deployments. The study focused on the collection and analysis of data to assess the remedial options of capping and monitored natural recovery employed at the site. Also performed a numerical analysis of sediment transport on the native and capped material using typical and extreme hydrodynamic conditions in the Washington Navy Yard region.

Contaminated Sediment Dredging, Ashtabula River, Ohio—An environmental dredging and disposal project was conducted by EPA to remove PCB-contaminated sediments from the Ashtabula River. Served as a technical lead in a program that was implemented to determine the nature and source of contaminated residuals during a typical dredging operation. Led efforts to monitor water quality and bathymetric variability during the Ashtabula River navigational and environmental dredging and disposal project. Conducted both fixed and mobile current and water quality measurements near the dredging operations. In addition, water quality moorings were deployed upstream and downstream of the project to measure background conditions at the project extents. Conducted analysis to determine the nature and source of residuals post-dredging.

Technical Advisor, San Francisco Estuary Institute—Acted as an advisory member of a contaminated sediment advisory group for the Estuary Institute. In addition, continue to provide technical advice on the development of modeling studies to evaluate water quality issues in the San Francisco Bay region.

Evaluation of Sediment Transport, Chalk River Laboratories, Atomic Energy of Canada Limited—The Ottawa River contains a region of sediment offshore of Atomic Energy of Canada Limited's Chalk River Laboratories that has been shown to have above background levels of radioactivity, some of which is in the form of sand-sized radioactive particles. The sediments have been evaluated in past studies and do not currently pose a direct environmental or human health threat; however, assessments of human health risk must consider the possibility of sediment erosion and transport to shallow water areas. Responsible for investigating sediment erosion potential and sediment transport trends in the vicinity of the contaminated footprint. Initial studies were conducted using numerical models to predict river hydrodynamics, wind-wave production, and general sediment transport trends. The hydrodynamic model was refined using high-resolution bathymetry, and sediment erosion studies were conducted on the site's sediments; the sediment was found to be at low risk of transport during extreme events.

Dredge Material Transport, Delong Mountain Terminal, Alaska—Managed a project evaluation of erosion of a dredged material mound near the Delong Mountain Terminal in northwest Alaska, which is subject to various storm events. The evaluation was based on the combined hydrodynamics of Environmental Fluid Dynamics Code and the sediment transport algorithms of SEDZLJ. To help evaluate the physical processes and possible impacts due to dredge material placement from the Delong Mountain Terminal Navigation Improvements Project, a numerical modeling analysis of dredge mound erosion and transport was conducted. The model assisted the U.S. Army Corps of Engineers in developing the optimal methods and locations for dredge material placement to minimize future erosion and subsequent channel infilling.

Platform Usumacinta Investigation, Gulf of Mexico, Mexico—Conducted a geophysical survey and a seafloor geotechnical sampling program to investigate shallow soil conditions near a mat-supported drilling rig and offshore platform that encountered a failure in 2007. The study presented the results of a field and laboratory program to investigate geotechnical

engineering properties of the site for a forensic evaluation of the failure. Overall operational conditions and pre-conditioning of the seafloor in the region coupled with a large storm event contributed to the failure. The team was able to make recommendations that could be used in future operations.

Prediction of Optical Variability in Dynamic Nearshore Environments, Santa Cruz, California—The objective of this project was to develop a system for forecasting marine optical conditions in the surf zone for the purpose of improving naval operations. Successful, rapid identification of mine-like objects in nearshore coastal oceans is critical for safe passage of the U.S. Navy fleet. Developed an *in situ* optical forecast model so the fleet will be able to deploy remote drifters, combine drifter data with meteorological and oceanographic data within the model, and predict optical properties along a coastline of interest. The models have been developed and validated with field measurements in Santa Cruz, California, and Waimanalo, Hawaii. Physical and optical characterization can be conducted on multiple temporal and spatial scales spanning a wide, dynamic range of conditions with the system.

Hydrodynamic Analysis of the Lower Fox River, Green Bay, Wisconsin—Managed a study to develop an extensively validated hydrodynamic model of Reach 3 and 4 of the Lower Fox River to support cap design in the river. Detailed velocity profile measurements were used to validate shear stresses so that a cap stability analysis could be conducted under design flow conditions. The U.S. Geological Survey (USGS) conducted all data collection efforts and provided more than 100 total velocity profiles over four sampling events. The data, combined with continuous velocity measurements at the mouth of the Fox River by a USGS acoustic velocity meter, allowed for the development and refinement of a hydrodynamic model of Reaches 3 and 4. The model was shown to reproduce measured velocities and shear stress to allow for confident cap design evaluations.

Mare Island Naval Shipyard Stability Analysis, Mare Island, California—Managed a project to better characterize the stability and potential for future exposure of munitions of environmental concern (MEC) and potential unexploded ordnance in the sediment offshore of Mare Island Naval Shipyard. Sediment cores were collected and analyzed to evaluate sedimentation and sediment stability through the radioisotope and SEDflume analysis. Based on the long-term morphological change of the mudflats, it is possible for MEC to be exposed but there is no probability of MEC mobilizing. The results were carried forward into an engineering feasibility study of shoreline restoration.

Litigation Support

Expert Report, Direct Testimony, Cross Examination, and Rebuttal Testimony on behalf of Appleton Papers Inc. and NCR Corp. (Case No. 10-c-910)
Participated as an expert on behalf of the defendants, in an action brought against Appleton Papers and NCR by the United States. Provided an expert report and testimony to demonstrate that the defendants were not liable for the entire harm to the Lower Fox River due to the discharge of PCBs. Developed a numerical model of hydrodynamics, sediment transport, and PCB transport to show that PCBs discharged from multiple parties on the

river could be apportioned by discharger. Provided testimony and rebuttal testimony in the 2013 trial in the U.S. District Court Eastern District of Wisconsin.

Expert Report and Testimony to the San Francisco Public Utilities Commission on behalf of the Surfrider Foundation (Application A.12-04-19)
In review of an application for a water supply project, provided an expert report and testimony on behalf of local stakeholders. The testimony reviewed the proposed brine discharge system for California American Water's Monterey Peninsula Water Supply Project. It also discussed brine mixing and dilution in marine environments. It finally discussed the modeling that will be necessary to accurately analyze the project's brine discharge and the design of appropriate facilities for that discharge.

PATENTS AND AWARDS

United States Utility Patent No. 61/857,057 (provisional). A device and method for measuring wave motion.

Recipient of J.C. Stevens Award, recognizing excellence in a paper published by the American Society of Civil Engineers. The paper is in the field of hydraulics, including fluid mechanics and hydrology. See Jones and Gailani (2009) below.

SELECTED PUBLICATIONS

Jones, C.A., and B.E. Jaffe. 2013. Influence of history and environment on the sediment dynamics of intertidal flats. *Mar. Geol.* 345:294-303.

James, S.C., C.A. Jones, M.D. Grace, and J.D. Roberts. 2010. Advances in sediment transport modeling. *J. Hydraul. Res.* 48(6):754-763.

James, S.C., E. Seetho, C.A. Jones, and J.D. Roberts. 2010. Simulating environmental changes due to marine hydrokinetic energy installations. *Oceans 2010*. September:1-10.

Jones, C., and J. Gailani. 2009. Discussion of "comparison of two techniques to measure sediment erodibility in the Fox River, Wisconsin" by T. Ravens. *J. Hydraul. Eng.* 135(5):432-434.

James, S.C., M.D. Grace, M.A. Ahlmann, C.A. Jones, and J.D. Roberts. 2008. Recent advances in sediment transport modeling. World Environmental and Water Resources Congress 2008. *American Society of Civil Engineers*. May:1–10.

Jones, C., and S. Watt. 2008. Modeling of wave driven circulation and water quality in nearshore environments. World Environmental and Water Resources Congress 2008. *American Society of Civil Engineers*. May:1–10.

Zimmerman, J.R., J.D. Bricker, C. Jones, P.J. Dacunto, R.L. Street, and R.G. Luthy. 2008. The stability of marine sediments at a tidal basin in San Francisco Bay amended with activated carbon for sequestration of organic contaminants. *Water Res.* 42:4133-4145.

Blake, A.C., D.B. Chadwick, P.J. White, and C.A. Jones. 2007. User's guide for assessing sediment transport at Navy facilities. Technical Report 1960. Available at: http://www.epa.gov/superfund/health/conmedia/sediment/pdfs/Sed_transport_guide_2007.pdf. U.S. Navy, SPAWAR Systems Center, San Diego, CA.

James, S.C., C.A. Jones, J.D. Roberts, M.A. Ahlmann, and D.A. Bucaro. 2006. Sediment transport and water quality model of Cedar Lake, *EOS Transactions*, American Geophysical Union, 87(52), H23B-1511.

Luo, X., W. Lick, and C.A. Jones. 2006. Modeling the sediment-water flux of hydrophobic organic chemicals due to bioturbation. Ninth International Conference on Estuarine and Coastal Modeling. *American Society of Civil Engineers.* July:468–485.

Jones, C.A., S.C. James, J.D. Roberts, and P.L. Shrestha. 2005. Continuous treatment of cohesive and non-cohesive sediment dynamics in a three-dimensional hydrodynamics model. Ninth International Conference on Estuarine and Coastal Modeling, 9A.

James, S.C., C.A. Jones, and J.D. Roberts. 2005. Consequence management, recovery and restoration after a contamination event. Sandia National Laboratories, Los Alamos, NM.

Jones, C.A., T.S. Jung, and W. Lick. 2001. Use of accurate erosion rates in sediment transport modeling. International Association of Great Lakes Research.

Jones, C.A., and W. Lick. 2000. An accurate model of sediment erosion and transport. International Association of Great Lakes Research.

Lick, W., Z. Chroneer, C.A. Jones, and R. Jepsen. 1997. A predictive model of sediment transport. Fifth International Conference on Estuarine and Coastal Modeling. *American Society of Civil Engineers*. October:389–399.

INVITED PRESENTATIONS

01/15—Ocean Waves Workshop 2015 paper presentation titled "Evaluating Sediment Stability at Offshore Marine Hydrokinetic Energy Facilities."

01/15—Eighth International Conference on Remediation of Contaminated Sediments: Short course titled "Evaluating Sediment Transport: Tools, Techniques, and Application to Site Management."

SELECTED PRESENTATIONS/POSTERS

Jones, C., G. Chang, K. Nelson, and T. Martin. 2015. Field and modeling characterization of wetland hydrodynamics. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.

Chang, G., C. Jones, and T. Martin. 2015. Near-bed sediment dynamics in the Berry's Creek tidal estuary. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.

Thompson, R., K. Gustavson, C. Jones, and P. White. 2015. Investigating DDT fate and transport at the United Heckathorn Superfund site. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.

Martin, T., P. de Haven, C. Jones, D. Glaser, and N. Kelsall. 2015. Evaluation of natural recovery in the Berry's Creek Study Area. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.