

# Kara R. Scheu, Ph.D.

## Consultant



### Education and Credentials

Ph.D., Civil and Environmental Engineering, Stanford University, Stanford, California, 2016

M.S., Civil and Environmental Engineering, Stanford University, Stanford, California, 2011

B.S., Aerospace Engineering, University of Southern California, Los Angeles, California, 2010

### Continuing Education and Training

First Aid and CPR certified (2011–present)

Hazardous Waste Operations and Emergency Response 40-Hour Certification (2016)

Hazardous Waste Operations 8-Hour Refresher Certification (2017–present)

### Professional Affiliations

Member of American Geophysical Union

Member of Association for the Sciences of Limnology and Oceanography

Member of The Oceanography Society

## Professional Profile

Dr. Kara Scheu is a physical limnologist and oceanographer specializing in physical mechanisms that drive sediment and contaminant transport. She has 8 years of experience with field measurements and instrumentation, data analysis, and hydrodynamic and sediment transport modeling. Dr. Scheu has coordinated, planned, and executed large in situ field deployments measuring hydrodynamic and sediment transport, and processed and analyzed large data sets. She has also set up, calibrated, and validated a variety of hydrodynamic and sediment transport models to assess sediment and contaminant transport due to physical processes. Dr. Scheu has experience working in an array of environments including rivers, lakes, estuaries, and the coastal ocean, and has collaborated with international clients to successfully implement field studies.

## Relevant Experience

### Hydrodynamics and Sediment Transport Modeling

*Matilija Dam Removal Ecosystem Restoration, Ventura, California*—Served as the lead modeler and project manager for the dam removal project. Removal of the Matilija Dam has the potential to provide much-needed sediment to the Ventura River Lagoon and the coastal ocean, restoring critical habitat. To evaluate the influences of the restored sediment loading to the lagoon and nearshore habitats, a suite of sediment transport modeling tools is being employed to characterize both the initial sediment pulse released from dam removal and the subsequent restored river sediment loads. These modeling tools were used to evaluate changes in water quality and to evaluate shoreline and nearshore habitat evolution under the joint effects of the Ventura River watershed, wave and tidal ocean processes, and sea level rise. The dam removal project and associated modeling are part of a comprehensive long-term effort to support ecosystem restoration of the Ventura River watershed for multiple benefits.

*San Mateo Vulnerability Assessment and Adaption Plan, San Mateo County, California*—Involved in vulnerability assessment and adaption plan development for southern San Mateo County to respond to sea level rise and supported AB 691 development based on California State Lands Commission guidance.



***Sediment Transport from Dense River Plumes, Lake Maggiore, Italy***—Performed high-fidelity 3-dimensional numerical hydrodynamic and sediment transport modeling of river plumes, which was validated with field observations. In a stratified system, these river plumes can intrude into the middle of the water column and the trajectory will be modified by rotation of the earth. The extent and variability of sediment and contaminant transport are therefore affected by the ambient conditions in the system. Used the numerical model to investigate scenarios that drive sediment to different regions of the system, and to determine regions of interest and rates of natural recovery.

***Dredging and Disposal Evaluation, Cook Inlet, Alaska***—Analyzed the impacts of proposed dredging and disposal operations on sedimentation and turbidity using a combination of near- and far-field modeling. Conducted near-field modeling of dredge and disposal operations using the U.S. Army Corps of Engineers (USACE) Automated Dredging and Disposal Alternatives Modeling System (ADDAMS) suite of dredge and disposal tools. Developed and validated a 3-dimensional surface water model of Cook Inlet, Alaska, to evaluate far-field transport of suspended solids associated with dredging and disposal activities. The analysis was conducted in support of Federal Energy Regulatory Commission permitting for proposed construction operations.

***Stormwater Fate Modeling, Portland, Oregon***—Set up and utilized a numerical model (Delft3D) to simulate sediment transport from a stormwater outfall into the Willamette River. The modeled sediment deposition maps were used to inform design of a source control system.

***Thermal Plume Modeling, Hawaii***—Developed a surface water model in Delft3D to evaluate the impact of a warm groundwater discharge on temperature within the coastal ocean. This evaluation was performed to support discharge permitting.

## **Marine Services**

***Sediment Transport Dynamics, Lake Maggiore, Italy***—Planned and executed a field deployment with hydrodynamic and sediment measurements to investigate sediment and contaminant transport dynamics in Lake Maggiore, Italy. Utilized spatial and temporal data analysis of field measurements to access mechanisms driving sediment transport and to investigate natural recovery of the system.

***Sediment Transport Dynamics, Baker Bay, Washington***—Deployed instrumentation to measure sediment transport in a shallow, tidally driven embayment. Processed measurements to provide time series data of water column currents, wave properties, and total suspended solids from acoustic and optical measurements. Time series measurements were used to generate net sediment transport fluxes and circulation in the system. Processed data was used to inform dredge operations for the USACE Portland District.

## **Litigation Support**

***Sediment and Transport Modeling, Confidential Site***—Supported testifying expert on sediment and contaminant transport modeling for Superfund site allocation. Assisted in modeling sediment transport and presentation of results.



**Contaminant Runoff and Dilution, Confidential Site**—In support of litigation expert, evaluated contaminant run-off using Revised Universal Soil Loss Equation (RUSLE) methods and estimated in-stream dilution, downstream transport, and floodplain deposition.

## **Publications**

Scheu, K.R., D. Fong, S. Monismith, and O. Fringer. 2018. Modeling sedimentation dynamics of sediment-laden river intrusions in a rotationally-influenced, stratified lake. *Water Resources Research* 54(6):4084–4107.

Scheu, K.R. 2016. Sediment transport due to river plumes in stratified, rotationally-influenced lakes. Ph.D. Thesis. Stanford University, Stanford, CA.

Scheu, K.R., D. Fong, S. Monismith, and O. Fringer. 2015. Sediment transport dynamics near a river inflow in a large alpine lake. *Limnol. Oceanogr.* 60:1195–1211.

## **Invited Presentations/Panels/Peer Reviews**

Sedimentation dynamics from inflow intrusions into a large alpine lake. USGS Pacific Coastal and Marine Science Center Seminar Series. March 2016.

Sediment transport due to river inflows into a large alpine lake. Kavli Institute of Theoretical Physics at University of California, Santa Barbara, GEOFLOWS Conference (Particle-laden flows in nature). December 2013.

## **Presentations/Posters**

Scheu, K., S. McWilliams, D. Revell, and C. Jones. 2020. Modeling the effects of dam removal on coastal lagoon dynamics over multiple time scales. Platform presentation at 2020 Ocean Sciences Meeting, San Diego, CA. February 17–21.

Egan, G., M. Cowherd, F. Spada, K. Scheu, A.J. Manning, C. Jones, G. Chang, O. Fringer, and S. Monismith. 2020. Cohesive Sediment Erosion in a Shallow, Wave- and Current-Driven Flow. Poster presentation at 2020 Ocean Sciences Meeting, San Diego, CA. February 17–21.

McWilliams, S., K. Scheu, C. Jones, and D. Revell. 2019. Matilija Dam ecosystem restoration—A comprehensive modeling approach. Poster presentation at Localizing California Waters: Ventura to SLO, Ojai, CA. April 29–30.

Scheu, K., C. Flanary, K. Raghukumar, C. Jones, L. Ziliani, B. Groppelli, S. Ceccon, and D. Bocchiola. 2019. Evaluating climate change effects on natural recovery of a contaminated sediment site. Platform presentation at Tenth International Conference on the Remediation and Management of Contaminated Sediments, New Orleans, LA. February 11–14.



Egan, G., M. Cowherd, F. Spada, K. Scheu, A. Manning, C. Jones, S. Monismith, G. Chang, and O. Fringer. 2018. In situ observations of near-bed turbulence and cohesive sediment transport. Oral presentation at the American Geophysical Union Fall Meeting, Washington, DC. December 10–14.

Scheu, K., C. Flanary, K. Raghukumar, C. Jones, L. Ziliani, and D. Bochiola. 2018. Evaluation of climate change effects on natural recovery in an alpine lake. Platform presentation at Society of Environmental Toxicology and Chemistry North America 39th Annual Meeting, Sacramento, CA. November 4–8.

Chang, G., F. Spada, G. Egan, A. Manning, K. Scheu, M. Cowherd, S. Monismith, C. Jones, and O. Fringer. 2018. Optics and acoustics for near-bed particle characterization and quantification of turbulence. Poster presentation at the Ocean Optics Conference (OOXIV), Dubrovnik, Croatia. October 7–12.

Scheu, K., D. Fong, S. Monismith, and O. Fringer. 2018. The role of lateral boundaries in sediment transport due to river plumes in rotational, stratified environments. Platform presentation at 2018 Ocean Sciences Meeting, Portland, OR.

Scheu, K., D. Fong, S. Monismith, and O. Fringer. 2016. Sedimentation dynamics of sediment-laden river intrusions in a large alpine lake. Poster presentation at 2016 Ocean Sciences Meeting, New Orleans, LA.

Scheu, K., D. Fong, S. Monismith, and O. Fringer. 2015. Modeling sedimentation dynamics of a sediment-laden river plume in a large alpine lake. Poster presentation at Gordon Research Conference—Coastal Ocean Modeling, Biddeford, ME.

Scheu, K., D. Fong, S. Monismith, and O. Fringer. 2014. Seasonal variability of sediment deposition into a large alpine lake. Platform presentation at 2014 Ocean Sciences Meeting, Honolulu, HI.

Scheu, K., D. Fong, S. Monismith, and O. Fringer. 2013. Seasonal variability of sediment and contaminant transport Lake Maggiore, Italy. Platform presentation at Physical Processes in Natural Waters, Gold Coast, Australia. [Award for Best Presentation]

Scheu, K., O. Fringer, S. Monismith, D. Lin, and R. Luthy. 2012. Rotational effects on sediment and DDT transport within a large lake (Lake Maggiore, Italy). Poster presentation at 2012 Ocean Sciences Meeting, Salt Lake City, UT.

