



Application for Appointment to Whatcom County Boards and Commissions

Public Statement

THIS IS A PUBLIC DOCUMENT: As a candidate for a public board or commission, the information provided will be available to the County Council, County Executive, and the public. All board and commission members are expected to be fair, impartial, and respectful of the public, County staff, and each other. Failure to abide by these expectations may result in revocation of appointment and removal from the appointive position.

Title	<i>Field not completed.</i>
First Name	Kathryn
Last Name	Ketteridge
Today's Date	10/13/2019
Street Address	1504 24th Street
City	Bellingham
Zip	98225
Do you live in & are you registered to vote in Whatcom County?	Yes
Do you have a different mailing address?	<i>Field not completed.</i>
Primary Telephone	360-319-8069
Secondary Telephone	<i>Field not completed.</i>
Email Address	ketteridge.coastal@gmail.com
1. Name of Board or Committee	Marine Resource Committee
Marine Resource Committee Position:	Relevant Scientific Experience
2. Do you meet the residency, employment, and/or affiliation requirements of the position for which you're applying?	Yes
3. Which Council district do you live in?	District 1
4. Are you a US citizen?	Yes

5. Are you registered to vote in Whatcom County? Yes

6. Have you declared candidacy (as defined by RCW 42.17A.055) for a paid elected office in any jurisdiction within the county? No

7. Have you ever been a member of this Board/Commission? No

8. Do you or your spouse have a financial interest in or are you an employee or officer of any business or agency that does business with Whatcom County? Yes

If yes, please explain

I work for Anchor QEA, which has in the past done some work for Whatcom County. I do not personally do any work for Whatcom County at this time.

You may attach a resume or detailed summary of experience, qualifications, & interest in response to the following questions

Ketteridge Kathryn resume 8 3019.pdf - attached

9. Please describe your occupation (or former occupation if retired), qualifications, professional and/or community activities, and education

I am a senior managing coastal engineer with Anchor QEA at present. I have about 20 years of experience in that field; working in academic, non-profit, and consulting environments. I have a B.S. in Civil Engineering and a M.E. and Ph.D. in Ocean Engineering. I am serving currently on the ASCE Sea Level Change Subcommittee and will be a primary author on the guidance document being developed by that group (geared towards resiliency design guidance for ports). I have been involved in marine focused research and projects on the Atlantic, Pacific, and Gulf Coasts, and have focused on the Puget Sound area for the last decade. I have been in Bellingham since 2008.

10. Please describe why you're interested in serving on this board or commission

I am passionate about conserving and restoring the marine environment. Based on 20 years of experience working in the coastal science/engineering field, I have a practical understanding of how our marine resources are used and valued by governmental entities, industry, tribes, and the general public (and many others). These uses and values are often contrary to each other, and it is challenging to find the right balance to ensure that these resources will be around when my children are my age. My kids are now older (two off to college, one in high school), and I have more time to focus on giving back to my community. I value and admire the work conducted by the MRC, and feel that my technical background could be of value to the group. Thank you for your consideration.

References (please include daytime telephone number):

John Blum (retired) 360--220-0694
Jen Allen (Port of Bellingham) 360-920-6578
Paul Schlenger (ESA, SRFB Technical Review) 206-601-1405
Jessica Cote (Blue Coast Engineering) 425-218-4503

Signature of applicant:

Kathy Ketteridge

Place Signed / Submitted

Bellingham, WA

KATHRYN E. KETTERIDGE, PH.D., P.E.

1504 24th Street, Bellingham, WA 98225

(360) 319-8069

kketteridge@gmail.com

Professional Profile

Dr. Ketteridge has more than 18 years of experience in management, analysis and design of a wide variety of hydraulic/coastal engineering, restoration, enhancement, and development projects on the East, West, and Gulf coasts. She has managed projects from stakeholder and public visioning and conceptual design through construction. She brings focused and proven technical proficiency to the team in the areas of numerical modeling of tidal hydrodynamics, wave transformation and sediment transport, development of coastal design criteria, design of hard and soft (with nature) shoreline protection, dredging and dredged material management, and impacts of climate change on project implementation and sustainability. She currently manages an office of 27 diverse engineers and scientists and is the coastal engineering technical lead for the west coast at her current company. She has also taught undergraduate and graduate courses at Stevens Institute of Technology (where she is an alumna) in fluid dynamics and general and dynamic oceanography.

Areas of Expertise

- Project management for multi-disciplinary scientific/feasibility studies and engineering design projects.
- Sea level rise and future flooding evaluations, including development of adaptive management strategies for proposed civil works.
- Dredge prism/remedial cap design for contaminated and maintained dredging works.
- Hydrodynamic (1D, 2D, and 3D) and sediment transport modeling (including littoral drift) for feasibility studies and engineering design projects.
- Large and small team management and oversight
- Wave transformation modeling, including combined wave and tidal current modeling.
- Wave loads and scour for structures.
- Sediment transport and sedimentation evaluations, including geochronological and sediment cores studies.
- Propeller wash velocity modeling and associated scour evaluation.
- Full design through construction for breakwaters, revetments, shoreline restoration and dredging works.

Professional Experience

Anchor QEA, (Bellingham, WA), May 2018 to Present

Senior Managing Engineer, Senior Associate, Bellingham Office Lead

- Senior Associate with company and Bellingham Office Lead.
- Technical lead for coastal/ocean engineering for the west coast. Technical and marketing lead for sea level rise evaluation/adaptation for the Pacific Northwest region.
- Project management of interdisciplinary planning, engineering, and modeling projects, including client, subcontractor, stakeholder and community.
- Design engineer for coastal protection structures, in-water engineered caps, dredging, and coastal and estuarine restoration works.

Confluence Environmental Company (Bellingham, WA), April 2017 to April 2018

Principal Coastal Engineer

- Principal of company leading strategic planning, marketing and project management of coastal engineering, hydraulic modeling, and restoration market sector and projects.

- Project management of interdisciplinary planning, engineering, and modeling projects, including client, subcontractor, stakeholder and community engagement as needed for project success.
- Technical project work, including data collection, modeling, engineering design (calculations, drawings, specifications).

Anchor QEA, (Bellingham, WA), February 2008 to April 2017

Senior Managing Engineer, Associate

- Associate with company. Technical lead for coastal/ocean engineering practice for the west coast. Technical lead for sea level rise evaluation/adaptation company wide.
- Project management of interdisciplinary planning, engineering, and modeling projects, including client, subcontractor, stakeholder and community
- Technical engineering work, including data collection, modeling, and engineering design (calculations, drawings, specifications).
- Technical work on in-water remediation projects, including task management for SFR/FS process, development of physical conceptual site models, hydrodynamic and sediment transport modeling, recontamination evaluations, and dredge/cap design.

PBS&J, (Tampa, FL), June 2004 to January 2008

Project Manager

- Senior member of the coastal and waterfront group, responsible for marketing and project management of coastal engineering, hydraulic modeling, and restoration projects primarily in Florida and the Gulf region.
- Project management of coastal engineering projects, including breakwater design, dredging, port master planning, and shoreline stabilization work.
- Technical project work, including data collection, modeling, and engineering design (calculations, drawings, specifications).

Han-Padron Associates, (New York, NY), March 2002 to October 2003

Senior Coastal Engineer

- Technical lead for coastal engineering sub-group responsible for developing coastal/ocean engineering design criteria for port structures and design of breakwaters/revetments.
- Performing technical project work, including data collection, modeling, and engineering design (calculations, drawings, specifications).

Stevens Institute of Technology, (Hoboken, NJ), September 1997 to September 2001

Research Assistant, Post-Doctoral Researcher, and Adjunct Professor

- Fully-funded PhD student and research assistant in the Department of Civil, Environmental and Ocean Engineering. Conducted research on beach processes in the field and conducted physical model studies as part of coastal engineering and naval architecture research work. Taught undergraduate level course in Water Resources.
- Post-Doctoral Researcher; funding for one-year experiment to evaluate the impacts of particle size distribution of suspended sediment on turbidity and suspended sediment concentrations as measured by optical backscatter (OBS) instruments.
- Adjunct Professor; taught two graduate level classes (1) Oceanography for Engineers and (2) Dynamic Oceanography

Education, Licensure, and Professional Organizations

- Stevens Institute of Technology, Ph.D., Ocean Engineering, 2001
 - Dissertation: *A laboratory study of suspended sediment dynamics under waves for non-uniform sands.* (GPA 4.0)
- Stevens Institute of Technology, M.E., Ocean Engineering, 1997
 - Thesis: *Impacts of permeability on beach profile change under waves.* (GPA 3.9)
- University of Maryland, B.S., Civil Engineering (water resources concentration), 1993
- Professional Engineer:
 - State of Washington, #52805
 - State of Florida, #63094
- Professional Organizations:
 - ASCE/COPRI (member) and ASCE Sea Level Change Subcommittee (participating member)
 - Washington Coastal Hazards Resilience Network (member)
 - NFWF Coastal Resilience Fund (technical review for 2018 grant cycle)

College Courses Taught

Stevens Institute of Technology

- *Undergraduate Level Fluid Mechanics (CE 342, Lecture and Study Sessions)*
 - Course Description from Catalog: Fluid properties: fluid statics, stability of floating bodies, conservation of mass, Euler and Bernoulli equations, impulse-momentum, principle, laminar and turbulent flow, dimensional analysis and model testing, analysis of flow in pipes, open channel flow, hydrodynamic lift and drag. Practical civil engineering applications are stressed.
 - Role: Assisted professor with the course by preparing lecture notes, giving select lecture sessions and leading study sessions. Graded homework and exams.
- *Graduate Level Oceanography (OE 589)*
 - Course Description from Catalog: Geophysical description of the earth; the extent, shape, and structure of ocean basins; relief of the sea floor; chemistry of sea water; geochemical balances; physical properties of water and sea water; solar and terrestrial radiation; evaporation and precipitation over the oceans; dissolved gases in sea water; distribution of variables; and general oceanic circulation.
 - Role: Adjunct Professor for the class. Responsible for developing all class materials, including lecture notes and presentations, homework assignments and exams. Conducted all lecture sessions and grading of assignments and exams. Developed and implemented a semester-long study project to track sailors in the Volvo around the world sailing race to assist students with an understanding of real-world applications to what we were learning in class (i.e. ocean currents, wind waves, etc.). Developed grading system and assigned final grades.
- *Graduate Level Dynamic Oceanography (OE 633)*
 - Course Description from Catalog: Gravity and rotation of earth, continuity considerations, dynamic equations of motion, gradient currents, stationary accelerated currents, turbulence, analysis of temperature-salinity diagrams, internal friction and modification of geostrophic currents, wind-driven currents, and horizontal circulation of wind-driven current.
 - Role: Adjunct Professor for the class. Responsible for developing all class materials, including lecture notes and presentations, homework assignments and exams. Conducted all lecture sessions and grading of assignments and exams. Developed grading system and assigned final grades.

ATTACHMENT 1: Representative Project Experience

COASTAL ENGINEERING IN SUPPORT OF REMEDIATION PROJECTS:

Whatcom Waterway Cleanup and Marina Development, Port of Bellingham, Bellingham, WA. *Senior Engineer/Task Manager.* Responsible for coordination of coastal engineering tasks for the project, which included wave and current modeling, sediment transport and stability evaluation, dredge prism design, remediation of an existing berm breakwater, and design assistance for a system of new concrete floats. Assisted with the development and analysis of a field data collection program to collect wave and current data in Whatcom Waterway, as well as one location within Bellingham Bay, to support modeling calibration and development of wave design criteria in the Waterway. Developed design criteria, including analysis of mooring loads, for a concrete float system within the Waterway. Conducted hazards and adaptive design evaluation for proposed alternatives due to sea level rise and tsunami risk.

East Waterway Supplemental Remedial Investigation/ Feasibility Study (RI/FS), Port of Seattle, Seattle, WA. *Task Manager and Technical Lead for the STE.* Evaluated the Sediment Transport Evaluation (STE) efforts for the supplemental RI/FS for the East Waterway. The project involves assessing and modeling the hydrodynamics and sediment transport processes within the East Waterway, including contributions from stormwater and CSOs that discharge into the waterway. Responsible for coordinating all numerical modeling and field data collection efforts in support of the STE, including communication with stakeholders and agencies.

Esquimalt Harbour Remediation Project Sedimentation Evaluation, Public Works Canada, Victoria, British Columbia. *Senior Coastal Engineer.* Developed a geochronological sediment core sampling plan for Esquimalt Harbour to estimate net sedimentation rates in the harbor. Seven locations for geochronological core sampling were identified based on surface sediment gradations and known vessel operations in the harbor. Core locations were targeted in areas where sediment deposition was expected to occur with minimal disturbance due to propeller wash from vessels. Analyzed the data collected from the geochronological cores to estimate net sedimentation rate due to both Cesium 137 and Lead 210 data for each individual core, as well as harborwide averages of net sedimentation rate.

Victoria Harbour Hydrodynamic and Sediment Transport Modeling, Public Works Canada, Victoria, British Columbia. *Task Manager and Senior Coastal Engineer.* Responsible for developing and implementing a three-dimensional hydrodynamic model (EFDC) and sediment transport model (SEDZLJ) for Victoria Harbour. The purpose of the modeling effort was to track potential sediment sources to the harbor from various stormwater and groundwater inputs. In addition, coordinated and managed water quality sampling activities in the harbor as part of the data collection and modeling effort for the project.

COASTAL ENGINEERING IN SUPPORT OF PORT AND INFRASTRUCTURE PROJECTS:

Terminal 5 West Waterway Metocean Evaluation, FOSS Maritime Company, Seattle, WA. *Project Manager/Lead Coastal Engineer.* Assisted with a due diligence evaluation to develop metocean information (currents, sustained wind, wind gust, and wind-wave) in the West Waterway (WW) as needed for preliminary design of a proposed berth at Terminal 5, including design for vessels with significant height. Leveraged existing hydrodynamic model results to conduct a feasibility-level evaluation of peak currents in the WW, developed predictions of extreme winds in the project area, and conducted an evaluation of wind-wave conditions.

Hydrodynamic Loads, Container Crane, Gulfport, MS. *Lead Coastal Engineer.* To inform design of tie-downs for a proposed dock-side crane, provided hydrodynamic (wave and current) loads to the Container Crane design team consistent with the 100-year return event analysis used for a prior design effort.

Loading calculations completed included: (1) breaking wave and surge current loads based on the 25-yr, 50-yr, and 100-yr return period storm event design, (2) wave uplift loads based on the same storm events, (3) buoyancy force on the crane based on elevated water levels associated with storm surge, and (4) combinations of loads representative of expected conditions during storm events at the site. Contributed to technical memorandum that summarized the load calculations.

Performance Evaluation of Coastal Armoring Structures in the State of Florida during the 2004 Hurricane Season, Florida Department of Environmental Protection (FDEP), Statewide throughout FL. *Senior Coastal Engineer.* Responsible for a statewide evaluation of hurricane-induced damages to coastal protection structures during the 2004 hurricane season. The effort included compilation and review of existing data, surface modeling from pre- and post-storm LIDAR, development of GIS database for delivery to the FDEP, and comparison of actual damages to accepted engineering methods for design of coastal protection structures. The final deliverable to the FDEP included a ranking system to be used for future post-hurricane inspections by the agency.

Leeway Sailing Center Coastal Hazards Analysis, City of Long Beach, Long Beach, California. *Lead Coastal Engineer.* Responsible for conducting an existing and future coastal hazards analysis for the Leeway Sailing Center located in Long Beach, California. The work was to support proposed renovations to the buildings and fixed piers located at that project site. The work included developing exposure information for the project site and vicinity, including estimates of winds, waves and water levels to evaluate present day and future coastal hazards that could impact the facility and surrounding areas. Impacts due to sea level rise estimates; combined with storm flooding, for the years 2050 and 2064 (the end of the design life for the structures) and 2100 (as an extreme case) were evaluated following guidance developed by the California Coastal Commission. Vulnerability assessment was completed for the combination of storm and sea level rise impacts for present day and future conditions for site and upland infrastructure and site and adjacent shorelines. An adaptation plan was also developed for the facility for long-term management of the site based on sea level rise estimates at 2064 and 2100.

University of California – Irvine (UCI), Rowing Center Coastal Hazards Analysis, Newtown Beach, CA. *Senior Coastal Engineer.* Responsible for conducting an existing and future coastal hazards analysis for UCI's rowing center. Impacts due to sea level rise estimates for the years 2039 (the end of design life for the deck) were evaluated following guidance developed by the California Coastal Commission (CCC). The methods and format of this evaluation have been well received by the CCC as responsive to their requirements, and have been recommended by the CCC to other permit applicants. The work included developing exposure information for the project site and vicinity, including estimates of winds, waves, and water levels to evaluate present-day and future coastal hazards that could impact the facility and surrounding areas. A vulnerability assessment was completed for the combination of storm and sea level rise impacts for present-day and future conditions for site and upland infrastructure and site and adjacent shorelines. An adaptation and monitoring plan was developed for years beyond 2039.

Martinez Ferry Terminal Feasibility Evaluation, WETA (with KPFF), CA. *Project Manager/Lead Coastal Engineer.* As project manager and lead coastal engineer, Dr. Ketteridge was responsible for developing and implementing a 2-D wave model to evaluate breakwater design alternatives to protect a proposed new passenger ferry terminal at Martinez, CA. Work included compilation and evaluation of available metocean data, analyses of operational and extreme wave climates, development and implementation of a wave transformation model, development of design criteria for float and gangway design, and design of breakwater concepts. Additional work included conceptual level navigation channel and dredge prism design, analysis of dredge disposal alternatives and sedimentation issues, and costing support.

Lummi Island Quarry Remediation and Restoration, Lummi Island, Washington. *Project Manager/Lead Coastal Engineer.* The project was funded through a Rose Foundation Grant provided to the Northwest Straits Foundation and Lummi Island Heritage Trust to develop a mine reclamation and restoration plan for the abandoned Lummi Island Quarry. Work on the project included site reconnaissance, development of workable reclamation plan with WA DNR, development of a 30% design level integrated reclamation/restoration plan, passive park design, and facilitation of public and stakeholder meetings to develop consensus for future work.

Coastal Engineering Evaluation of Existing Seawall, City of Homer, Homer, Alaska. *Senior Coastal Engineer.* Was responsible for evaluation of an existing Seawall built along the north-western shores of Kachemak Bay in the city of Holmer, Alaska. The project included analyses of the extreme wind/wave climate at the site and associated seaward erosion and structural damage to the seawall due to numerous high water level and wave events. Suggestions for improvements to the current seawall design were also included in the final evaluation.

West Shore Lake Pontchartrain Proposed Levee Evaluation, U.S. Army Corps of Engineers (Corps) New Orleans District, New Orleans, LA. *Senior Engineer.* Responsible for the coastal engineering evaluation of a proposed new levee for the St. John the Baptist parish located along the western shore of Lake Pontchartrain. The evaluation included review of Corps ADCIRC modeling of hurricane surge for the area and development of analytical procedures to determine propagation of waves across the flooded marshlands and wave overtopping design criteria along the entire length of the proposed levee project.

Caloosahatchee River Bridge Expansion – Bridge Hydraulic Report, Florida Department of Transportation, FL. *Senior Numerical Modeler/Senior Engineer.* Responsible for the plan, design, and implementation of a numerical modeling scheme to estimate river and floodplain hydraulics along Interstate 75 for the 100- and 500-year return period flood events (both from hurricane surge and riverine flows). The results of this model were used to predict scour at the bridge piling for these extreme events. Planned and managed a field data collection effort in support of the modeling, including field measurements of water surface elevation and currents. The model utilized for the project was the two-dimensional finite element model FESWMS.

COASTAL ENGINEERING PROJECTS IN SUPPORT OF RESTORATION WORK:

Otter Point Restoration Project, Columbia River Estuary Study Taskforce, Lewis and Clark River, OR. *Tidal Modeling Lead.* Responsible for conducting tidal hydrodynamic analysis and modeling. Specific objectives for the Otter Point Restoration project included: (1) restore floodplain connectivity, (2) increase in-stream salmon habitat through this connectivity, and (3) enhance riparian conditions through native plantings. A two-dimensional model (RMA2) was utilized to determine tidal inundation and flow velocities within the project area for existing conditions and for proposed restoration alternatives.

T-117 Habitat Restoration Project, Zero-Rise Analysis, Port of Seattle, Seattle, WA. *Senior Coastal Engineer/Tidal Modeler.* Provided coastal engineering services and tidal hydrodynamic modeling to complete a zero-rise analysis for the lower Duwamish River in support of restoration work at T-117. Work included revising the existing FEMA Hec-Ras model for the Duwamish River at the site location to reflect proposed conditions, model simulations, and determination of zero-rise in the Duwamish River due to proposed work. Dr. Ketteridge coordinated directly with King County to obtain approval of the zero-rise study to facilitate project permitting.

Keyport Lagoon Restoration, U.S. Navy, Naval Base Kitsap, Keyport, WA. *Project Manager/Senior Coastal Engineer,* Responsible for developing two-dimensional tidal circulation and wave models to evaluate the performance of proposed ecological restoration alternatives to restore the lagoon to a tidal estuary. Also

developed marine design criteria for the proposed new bridge to be built across the new inlet (post-restoration). Work included wind-wave hindcasting, an evaluation of design storm parameters and associated wave loads, and shoreline protection requirements for the various project elements. Scour analysis in the nearshore area and in the lagoon after the project were also evaluated. Design plans were developed for the preferred alternative for the 30 percent design level.

Nearshore Restoration at Snohomish County Shoreline Sites, Snohomish County Public Works Surface Water Management, Snohomish County, WA. *Project Manager/Senior Coastal Engineer.* Responsible for evaluating coastal processes (wave climate, sediment transport, beach response) along 4 miles of shoreline between Mukilteo and Everett in Puget Sound, Washington, and completing a prioritization and alternatives evaluation for proposed beach nourishment/ restoration activities in the project reach. The work involved an extensive stakeholder process, including three workshops, to develop and refine proposed alternatives and development of final designs for two preferred alternatives. The preferred alternatives included restoration at Howarth Park (City of Everett park) and placement without grading at up to five targeting locations within the reach. Developed construction documents and provided bid support and construction assistance for the project. Projects were constructed in 2016. Also assisted the County with development of the physical and biological monitoring plan for the project sites, currently underway.

Squalicum Estuary Restoration, Port of Bellingham, Bellingham, WA. *Senior Coastal Engineer.* Responsible for design of a berm breakwater and beach nourishment in support of ecological restoration of saltmarsh habitat at the mouth of Squalicum Creek and the adjacent estuary and shoreline. The work included development of a two-dimensional wave model to evaluate waves at the project area and optimize performance of the proposed breakwater and beach design. The breakwater was designed to be a dynamically stable structure (berm breakwater) to reduce the size of the armor rock to meet both habitat and stability requirements as proposed by Washington Department of Fish and Wildlife for the project. The project also included development of final design and specifications for the project and monitoring plan post-construction. Project was completed in 2014.

Seahurst Park, Burien Parks and Recreation, WA. *Senior coastal engineer.* Dr. Ketteridge was responsible for evaluating coastal processes (wave climate and sediment transport) at the project site. The work included wind-wave hindcasting and shoreline change modeling using models developed by the USACE (STWAVE and GENESIS). The modeling efforts were used to evaluate proposed alternatives and inform performance and maintenance costs for the preferred alternative. The project includes significant bulkhead removal and soft shoreline restoration project with public access on Puget Sound. Phase 2 100 percent construction documents include green stormwater infrastructure. The project received a national Best Restored Beach Award from the American Shore and Preservation Association in 2010.

Big Quilcene Estuary Restoration, Hood Canal Salmon Enhancement Group, Quilcene, WA. *Tidal Modeling Lead.* Led modeling team on the project to develop and implement a three-dimensional unsteady tidal hydrodynamic and salinity model for the Big Quilcene River and Estuary to inform design and selection of proposed restoration alternatives to reconnect portions of the floodplain at the estuary mouth. Work included review of oceanographic data collected for the model calibration, model grid development, model calibration (water levels, salinity, and currents), development of model boundary conditions, completion of model simulations, and synthesis and reporting of model results. Presented results to project stakeholders to facilitate selection of a preferred alternative.