

PERSpectives

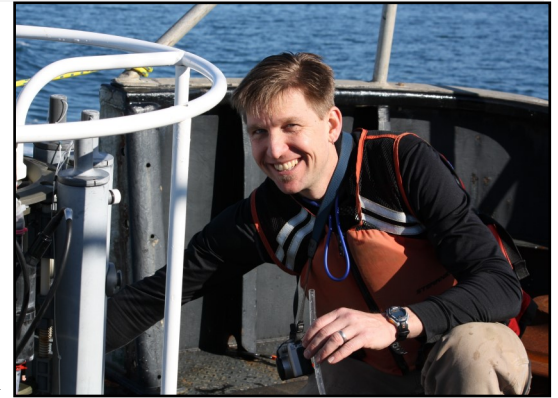
Newsletter of the Pacific Estuarine Research Society

Summer 2016

PRESIDENT'S REPORT

Greetings PERSians!

It is a pleasure to share with you the latest addition of the PERS newsletter. In this issue we hear from our new PERS President Elect Jason Stutes and have a heartfelt thanks from outgoing PERS President Gary Williams (no, Gary, thank YOU!). The Student PERSONal Profiles features Emily Grason and Stuart Munsch with some perspectives on their research and involvement in PERS. Speaking of graduate students – make sure you take a look at the funding opportunities announced in this issue and available to support graduate student research in the PNW. Contributed articles in this newsletter address long-term monitoring in the National Estuarine Research Reserve System (NERRS) and ocean observing resources supported by the Northwest Association of Networked Ocean Observing Systems (NANOOS).



Jude Apple — PERS President.

We offer a recap on the CERF Biannual Meeting held in Portland last fall and ideas regarding the involvement of PERS with CERF-wide organizational changes and opportunities. We also take a look back on the very recent 39th Annual PERS Meeting that was just held in beautiful Cheakamus, BC, and take a look ahead at next year's meeting slated to be held in Coos Bay, OR.

Warm regards,
Jude Apple
PERS President

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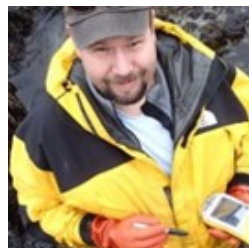
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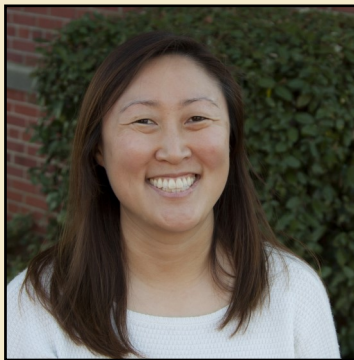
Contributed by Jude Apple, PERS President

Hello everyone and greetings from 30,000 feet above the pastures of western Texas. I am writing this while on my way back from the CERF Governing Board meeting in New Orleans and wanted to share

thoughts and reflections while they are still fresh in my mind. As you may already know, twice a year the affiliate society presidents, the CERF Executive Committee, representatives from SBI, and several members at large convene to discuss the functioning and future of CERF. Below are some of the highlights from the meeting that I wanted to share with PERS.

Welcome to Executive Director Susan Parks.

CERF recently brought on Dr. Susan Parks as the new executive director of CERF, who comes to us with a solid background of administrative and project management experience from her time with the National Research Council and her most recent post and Associate Director of Virginia Sea Grant. Susan is



an energetic, warm, accomplished (and, of course, very professional) addition to the CERF Board. It was a pleasure getting to know and work with her over the past few days. I also found out that Susan and I share similar CERF roots (and long-term commitment), with the 1997 meeting in Providence being our first conference. Welcome Susan!

Our financial position is strong. Treasurer Jim Hagy provided an excellent summary of CERF's financial status at the board meeting. CERF has the highest asset balance we have had in several years (~\$1.4M), revenue from the ESCO Journal in the form of royalties remains strong, and the CERF conference in Portland was the first in several years to generate net income (~\$140K). It is the general position of the Board that this may be a good time to invest in initiatives that support CERF's goals and mission, including but not limited to: expanding our involvement with the international community, support of affiliates in the form of business services (i.e. SBI) and resources to better engage with managers/policy-makers at regional meetings, updating web-design and expanding presence in social media, and providing professional development opportunities for graduate students and early career members.

Provision of business services for affiliates by SBI is moving forward. Each affiliate society differs in the degree to which they are prepared to have their business services supported by SBI. Some affiliates may be interested in whole-

sale adoption of SBI services, whereas others (such as PERS) would like to explore a strategic, "a la carte" approach to services that will allow continuation of some in-house activities and utilizing other services fill gaps or improve efficiency of existing infrastructure. CAERS is currently piloting SBI services and we will soon learn what piloting packages will be available for the affiliates to explore SBI's services. For more information on the services of SBI, please see the narrative from Tony D'Andrea and Gary Williams below.

CERF in Portland – great meeting, perhaps a little over scheduled. In the words of the CERF Conference Committee, CERF 2015 in Portland was, by almost any measure, a huge success. It had high and diverse attendance, an excellent scientific program including exciting keynote and plenary presentations, and a well-attended suite of additional attendee experiences. Post-conference surveys showed high levels of satisfaction from attendees for all aspects of the program. One sentiment that was shared by board members and attendees (and recognized by the conference committee) was that the action-packed conference may have felt a bit overbooked by some participants, with some noticeable conflicts in the evenings between overlapping events. The conference committee is already working on planning and logistics for the 2017 meeting in Providence RI.

CERF 2019: Get ready for po'boys and crawdads! CERF is exploring venues for the 2019 meeting, with Mobile AL and New Orleans on the short list. Stay tuned for details as they develop. Regardless of the venue we choose, it will be a festive and exciting location in the heart of bayous and estuaries of the Gulf of Mexico.

Get Involved! CERF Volunteers and Committee Members needed!

CERF is seeking volunteers for various committees in their communications division. There is some information about each of these opportunities below. For more details, or to volunteer, please contact Mary G. Lemon (mlemon7@lsu.edu) or Emily Lemagie (elemagie@coas.oregonstate.edu).

Social Media Team - This team currently co-chaired by Jeff Clements and Emily Lemagie is in charge with maintaining CERF social media outlets including our Twitter and Facebook pages. Goals for team in 2016 beyond standard maintenance of our social media sites include heading up some sort of photo or video contest that we could do via our social media sites. I think this could be a really exciting activity to be involved with that will hopefully turn into an annual event or at least an off year event. This team has made great strides in the last 2 years, setting records for outreach and engagement, but there is plenty of room for great ideas so if you have any please let us know!!

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Webinar Team - This team desperately needs members. We are shooting to have at least three webinars during 2016. If you have ideas or might be interested in giving a webinar please let us know. Our goals for a first webinar series will be on creating scientific videos. This may be followed up by a video contest hosted by the social media team for participants to share their creations.

Conference Team - This team is responsible for brainstorming, proposing, and planning sessions and workshops for CERF 2017 that are related to the general Communication, Outreach, and Career Development Committee. For 2016, this group will not be as active as the other groups particularly in the beginning of the year but if you are currently active or know others who are involved with outreach and career development programs at your respective institutions this would be a good team to become involved with.

Mentor Team - This team has not officially been created. Going through past committee minutes, I have seen this idea come up multiple times. During CERF conferences, we offer a mentor program where students have the opportunity to team up with a professional mentor based off of both individual research and professional interests (this year my mentor helped me out with my resume! -Mary). This team would be in charge of looking into a more permanent mentorship program that would be active at all times or possibly during off conference years. Obviously plenty of room for creativity within this group as well and I welcome any suggestions!

Update on Affiliate Societies and SBI business services

As many of you may know, CERF has engaged an outside agency (SBI) to manage many of its business and membership needs – including but not limited to membership directories, conference registrations, web services, and membership account management. As part of the effort to revise the CERF Strategic Plan, Gary Williams and Tony D’Andrea (PERS Past Presidents) submitted recommendations to the CERF Affiliate Society Improvement Committee regarding the needs and perspectives of PERS as it relates to engagement on the national level. A summary of these suggestions are below:

Provision of business services from CERF/SBI

PERS would like to obtain more timely and efficient CERF business support services, including CERF membership data reporting and submission of PERS dues paid through CERF. Given the long-term administrative stability that PERS has demonstrated, we are reluctant to enter into any CERF-administered financial relationships. A CERF-funded pilot program to demonstrate benefits of engaging with SBI and exploring these resources may be useful.

Membership Lists

The CERF membership data reporting and database is ineffective for mining data to provide information regarding membership decisions. The current CERF-AS committee is reviewing the database categories to improve the situation and establish a common database.

Increased CERF Financial Support of Affiliates

PERS provides considerable volunteer support to CERF. CERF financial support for speaker travel to AS meetings as well as other activities, e.g. workshops, regional collaborations, career advancements, training, etc., are all positive initiatives for the affiliate societies. PERS has taken advantage of them occasionally to bring Fred Short to Coos Bay several years ago and facilitated the establishment of a Seagrass Net site at the South Slough National Estuarine Research Reserve. Other examples include special panels at our annual meetings or a professional development workshop for our early career members.

Enhanced Communications Among AS and with CERF

PERS was originally comprised of members from California as well as the Pacific Northwest, and recent efforts have been made to strengthen interaction between PERS and CAERS. This has included discussions on AS management and administrative issues, sharing technical input, and attending AS annual meetings. There has also been sharing information on meeting sponsorship, meeting minutes and social media approaches with other affiliates. Improved communications could help ease the transition for many newly elected AS board members. Mission-orientated collaborations between CERF and AS beyond business collaborations could be valuable.

Continue to Engage and Support Students and Consider Expanding AS and Membership

PERS has always made supporting students and early career members a top priority, and recommends the use of the term “early career”. Innovative and unique benefits to early career professionals should be identified and promoted. An example is the webinar provided last summer on publishing, which was extremely popular.

CERF should support the affiliate societies as a means of attracting new members. We would like to build the PERS membership, especially in British Columbia. CERF support to PERS in reaching out to institutions and agencies would be helpful. This also includes Tribal/First Nations and expanding the AS to bring in innovative research and management approaches (e.g. mudflat research in Europe; complementary research on climate change and resources in South America, effects of climate change on resource use in estuaries and coasts in Asia). However, expansion should be considered carefully to ensure that it is within the scope and management capability of CERF and member affiliate societies.

Greetings to Jason Stutes – PERS President Elect

Welcome to Dr. Jason Stutes – our freshly minted PERS President Elect. Jason is an estuarine ecologist with over 15 years of research and consulting experience and interest in nearshore ecology and ecosystem connectivity. His primary expertise is in benthic ecology, particularly with eelgrass and macroalgal communities and the ecosystem services they provide. As a consultant, he uses his experience and training to protect nearshore habitats threatened by development and restore shorelines to a high level of function along Puget Sound and throughout the Pacific Northwest.



Jason has been a long-time participant and supporter of PERS and we were interested in hearing a little more about his thoughts about being involved with the what I can only say is the finest of all the CERF affiliates.

PERS: *Can you describe what PERS has meant to you?*

As you may know, the Pacific Northwest was not my original home. I came here because of my interest in nearshore habitat and eelgrass. I knew, as a result of my experience belonging to CERF, that the affiliate societies offer a wealth of knowledge on regional issues. Joining PERS allowed me to immediately “plug in” to the relevant issues and helped me build a new “scientific family”. That was 10 years ago and I feel so indebted to the society for all I have learned while participating.

PERS: *How has PERS and CERF been a part of your career?*



Jason conducting field work in Alaska investigating the seasonal use of salmonids in nearshore waters.

CERF (ERF back then) was a big part of my graduate training and networking. During grad school, I was able to present my research projects at various stages of completeness and get great feedback that ultimately made them better and more comprehensive. It also offered a venue to connect with some of the most respected researchers in my fields of interest.

More recently with PERS, I get to continue to present my ideas and get great feedback on regional projects AND I get a chance to interact with those up and coming students and (hopefully) provide them with the same great feedback that was so helpful in my early career.

PERS: *What are you most excited about contributing to PERS over the next few years?*

PERS is a unique organization in the PNW. Very few groups cover the breadth of topics needed to get a mechanistic understanding of how an ecosystem or watershed works. Our members study everything from microbes, to fish, to marine mammals (with some plants and invertebrates for good measure) and try to put their subject within the context of the larger system at play. I am excited because there are so many issues coming to the forefront that we as a group can provide valuable insight into. Whether it be sea-level rise, ocean acidification, or sustainable use of our nearshore environment, we PERSians have something meaningful to offer. I want to help PERS expand as that perfect platform for generating ideas and disseminating information on those subjects that matter in the PNW.

Thanks PERSians for the Opportunity and Support

The 39th Annual Meeting at the Cheakamus Centre completed my six-year term on the PERS Executive Board. I want to thank PERS for electing me and the opportunity to serve as your President. As we approach our 40th anniversary, I feel honored to join the select group of twenty individuals who have led PERS, only three of which have been Canadian. The Certificate of Recognition I received will certainly be a highlight on my office wall. I very much enjoyed my Executive Board term, first as President-Elect



Gary Williams and Jeannie Gilbert

under the very capable Steve Rumrill and ending up providing back up as Past President to the very qualified Tony D’Andrea. Interestingly, at my very first PERS meeting I attended in 1986, Jay Watson was President and Paul Fishman and Bob Emmett, all Oregonians, were part of the PERS movers and shakers at that time. Looking forward, I feel PERS is in a super position under the leadership of Jude Apple, President, and Jason Stutes, President Elect. Both are seasoned PERSians and will continue keeping

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the very special friendly nature, combined with the high quality scientific content, moving forward.

Looking back, I have several fond memories. As PERSians are aware, presidential duties include providing service to PERS as well as our parent society, the Coastal and Estuarine Research Federation (CERF), where the President serves as the Affiliate Society rep on the Executive Governing Board. On PERS, The President is well supported by the Executive Board and can count on our Treasurer, Jeannie Gilbert, to provide a guidance and advice based on her long term service. However, with CERF, I was on my own and a bit concerned about providing adequate representation for PERS. Any reservations I had about fulfilling my role on the CERF Governing Board quickly evaporated upon receiving such a warm reception from Walter Boynton, President, and Susan Williams, Past President. In fact, they both became part of my new “Famous Friends” as the AS Presidents referred to our stellar estuarine scientist colleagues. In fact, CERF was a super positive experience and as well as making new “Famous Friends”, it presented numerous opportunities.

Being located in the Pacific Northwest was fortuitous, and when Mark Wolf-Armstrong became Executive Director, we flew out from Seattle together and became immersed in an intensive exchange about estuaries, US politics and mutual acquaintances. The CERF GB meetings, held at the CERF biennial meeting in Daytona Beach, Arlie Center in Virginia, Baltimore, Dauphin Island Sea Lab in Alabama. I included additional field trips such as the kayak tour in Mosquito Lagoon outside Daytona; a day on the Washington Mall, highlighted by the Lincoln Memorial, and North American Indian Museum; New Orleans and Gulf Coast tour with NEERS President, John Brawley, to sample his favorite local brews and fresh oysters haunts; mullet tossing contest and shrimp bake at Dauphin Island; and participation in CERF’s first international conference in Mar del Plata, Argentina, followed by a side trip to the Antarctic Peninsula to check out how the penguins were handling Global Warming.

While President, we were able to revive our PERS newsletter and we initiated CERF Corner, promoted student profiles, and PERS social media. I became much more knowledgeable about organizing PERS Annual Meetings with Delta (2013) and Brackendale (2015) in British Columbia, and helping Jeannie with the Anacortes meeting (2011) and was again impressed with the generous support of PERSians. I also tried to develop closer ties with CAERS by attending annual meetings in Long Beach and Bodega Bay, CA, and working closely with Presidents Sharon Herzka and Martha Sutula.

Besides being a PERSian and all that includes, I think one initiative I am most proud of is the promotion of Tribal and First Nation inclusion in both PERS and CERF. PERSians are well versed with Tribal and First Nations, but the First Food session at the CERF conference in Portland I co-organized with Catherine Corbett, Chief Scientist, Lower Columbia River Partnership, was especially

satisfying because it was very cool and so well received by CERF. I look forward to being involved in fusion of our traditional research and Tribal/First Nations perspectives in the future. So PERSians, although we live in sobering times, there are endless opportunities for estuarine enlightenment and ways to make a positive contribution.

New Developments from NANOOS, the regional coastal ocean observing system in the Pacific Northwest

From new data sources to data visualizations to data QC manuals, the Northwest Association of Networked Ocean Observing Systems (NANOOS) and its partners continue to provide a comprehensive online clearinghouse for estuarine and oceanic data in the Northwest.

[NANOOS](#) is the Pacific Northwest Regional Association responsible for coordinating, developing, implementing and operating a Regional Coastal Ocean Observing System (RCOOS) for the Pacific Northwest as part of the U.S. Integrated Ocean Observing System (IOOS). [IOOS](#) delivers the data and information needed to increase understanding of our coastal waters so that decision-makers can take action to improve safety, enhance the economy, and protect the environment. NANOOS is a partnership of over 60 entities including industry, state agencies, local governments, tribes, non-government organizations, and educational institutions. NANOOS data and products reach users who need to make a wide range of decisions about our oceans and estuaries.

The backbone of the NANOOS enterprise is the [NANOOS Visualization System](#) - NVS, an online data portal that currently access to observations, forecasts, and satellite overlays from a wide range of ocean and coastal assets in a user-friendly format.

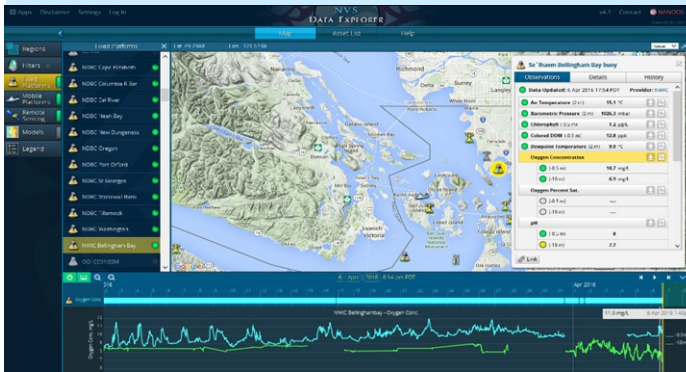
NEW DATA STREAM

Recent updates to NVS include new data streams of real time and near real time (up to past 60 days) data from a recently deployed buoy in Bellingham Bay. This buoy, funded through the [Center for Coastal Margin Observation and Prediction](#), and built and deployed through its education partner the University of Washington in partnership with [Northwest Indian College](#) and Western Washington University is collecting comprehensive suite of oceanographic data from sensors at multiple depths.

The Lummi Nation has given the new buoy its name, Se'lhaem - which was an island located in Bellingham Bay near the mouth of the Nooksack River which disappeared some time ago. The island was important to the Lummi community as a

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place for harvesting butter clams, horse clams and cockles. UW worked with the NWIC, Western WA Univ. and the Lummi Nation Natural Resources Department to site the buoy and design its features. Data from this new buoy can be found on NVS.



Recent Dissolved Oxygen readings from Bellingham Bay via the [NVS Data Explorer](#)

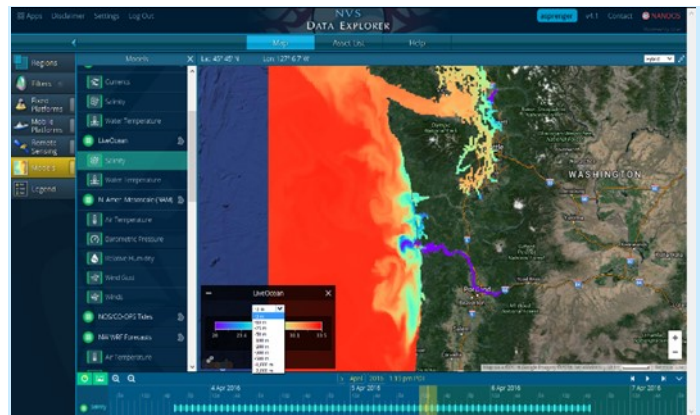
NEW INFORMATION ON DATA QUALITY

[Quality Assurance of Real Time Ocean Data](#) - QARTOD - is an endeavor by the U.S. Integrated Ocean Observing System (IOOS) Program Office to establish quality-assurance and quality-control procedures for a number of oceanographic variables. The [QARTOD website](#) provides links to manuals that are available for free download. Examples include manuals on the real-time quality control of: dissolved nutrients observations, dissolved oxygen observations in coastal oceans, in-situ current observations, in-situ temperature and salinity data, in-situ surface wave data, ocean optics data, water level data, wind data. IOOS is currently soliciting input for HF Radar Surface Currents QC Manual soliciting input on HF Radar Surface Currents, and a manual for Glider QC is in review.

NEW MODEL OVERLAY

A new model overlay available via NVS, LiveOcean, comes from the University of Washington Coastal Modeling Group. LiveOcean is a computer model simulating ocean water properties in the NE Pacific and Salish Sea. The circulation model is currently providing 3-day forecasts of temperature & salinity at multiple depths via NVS.

The project goal is to provide 3-7 day forecasts of aragonite saturation state and pH of waters entering shellfish growing areas on the coast. The project is funded by Washington State through the Washington Ocean Acidification Center (WOAC). The model system is built using existing 3D circulation-biogeochemistry hindcast models, incorporating carbon chemistry.

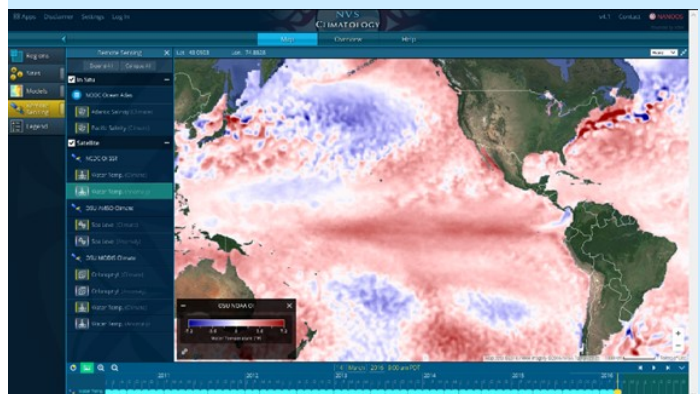


[NVS Data Explorer LiveOcean Model Overlay](#) showing salinity @ 3 m, with depth selection up to 2000 m

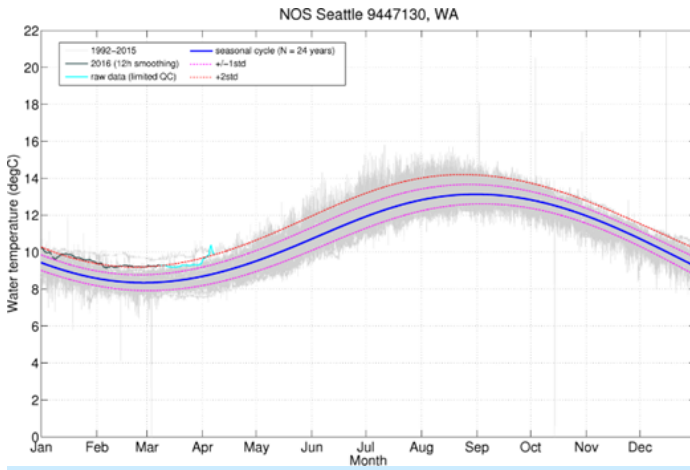
NEW DATA VISUALIZATIONS

A new web app developed by NANOOS, the [NVS Climatology App](#) compares present observations with data from previous years. We feature data from satellites and buoys and weather stations, in both cases with presentation of the typical conditions (climatology) and the departure from those conditions (anomaly), enabling users to compare current conditions against conditions measured in the past.

The web app consists of two components: climatologies from selected buoy, shore and land station sites and ocean overlays from remote sensing data. The climatologies derived for selected buoys, tide stations, and land stations are plots depicting simple statistics such as daily means and standard deviations. The data are updated on a daily basis blending data that has already been subject to stringent QC checks, with more recent data (last 45 days). Inter-annual variability plots for some buoys depict the variations in summer vs. winter conditions. The ocean overlays depict monthly averages and anomalies derived from satellite data for chlorophyll, sea surface temperatures, and mean sea levels.



[NVS Climatology Overlay of sea surface temperature anomaly from Jan 2016 from NCDL OI SST](#)



[NVS Climatology Water temperature at NOS Seattle](#)

At NANOOS, we are constantly striving to improve data access, discovery, and usability to meet the needs of marine stakeholders in the Pacific Northwest. We want to hear from you. To contact NANOOS visit: http://www.nanoos.org/contact_us/contact_us.php; For the NANOOS newsletter or follow us on social media visit: <http://www.nanoos.org/news/index.php>. If you are interested in becoming a NANOOS member visit: http://www.nanoos.org/join_nanoos/join_nanoos.php

PERSONAL Profiles – Students of PERS

In each newsletter we like to take the opportunity to highlight the work of young PERSians and recognize the important contribution students make to the advancement of estuarine science in the PNW. This issue features Emily Grason and Stuart Munsch, two graduate students at UW.

Emily Grason, PhD candidate, University of Washington Department of Biology

Emily is a great example of what it means to be a PERSian... She has expertise in a wide range of estuarine ecosystems, a desire to address ecological questions relevant to the conservation and management of estuarine resources, and recognizes the importance of public engagement, science communication and education as a component of research in the PNW. Emily has not always been in the PNW, and has quite an interesting path that has eventually led to her now being in the final stages of her dissertation research on invasive species at UW. Originally a resident of the east coast, her interest in invasive species started during her undergrad years at Bowdoin College, where she studied the effect of an



Emily working in the eelgrass of Willapa Bay as part of her dissertation research

invasive bryozoan on nudibranch food preference. Luckily the call of the PNW captured her, and following graduation Emily moved to Seattle to an Americorps position at a therapeutic horseback riding center. Eventually, Puget Sound beckoned her back to the water, and she completed a Master's degree with Ben Miner at WWU, re-

searching defensive behavior of invasive oyster drills in response to native cancrid crabs. Feeling that many questions were left unanswered, she pursued, and is now very close to completing, a Ph.D. at UW Biology with Jennifer Ruesink. Other aspects of estuarine research in her career include work as a NERR Graduate Research Fellow at Padilla Bay investigating top down controls on abundance and distribution of the invasive mudsnail, *Batillaria attramentaria*. She has worked with the Nature Conservancy to design an experimental fishing plan to test bycatch reduction gear and is currently the founding

Project Coordinator for Washington Sea Grant's Crab Team, a citizen science project to monitor for invasive European green crab along Washington's inland shorelines. Emily is an active science communicator, manager of her department's grad student blog (SciPos), Conservation Science Intern at JRS Biodiversity Foundation, and Steering Committee Member of Biodiverse Perspectives – an international graduate student blog on biodiversity science.



"RV Grason" – a testament to Emily's rapid response approach to invasive species research

Stuart Munsch, Masters Student, University of Washington Aquatic and Fisheries Sciences

PERS: Hi, Stu. Tell us a little about yourself and your research background.

My first research experience was as an intern with Naval Facilities Engineering Command where we monitored nearshore fish populations in Puget Sound by beach seining. Next, I worked in a lab at Gonzaga University exploring effects of invasive fish on rainbow trout growth. Following graduation from GU, I took a research apprenticeship at Friday Harbor Labs looking at the behavior of intertidal whelks to examine the relationship between movement, tidal patterns



and heat stress. After that, I took an internship with the Hood Canal Salmon Enhancement Group where I looked at effects of artificial nitrification on salmon abundances in streams. Most recently, I started graduate school at the University of Washington School of Aquatic and Fishery Sciences in 2011. The first portion of my graduate research investigated effects of shoreline development on fish ecology and now I'm looking more broadly at fish behavior in shallow waters.

PERS: *You've been really active in PERS over the years – regularly attending meetings, presenting your research, and even spearheading some of our social media efforts. How else do you think your time with PERS has been a benefit?*

The primary benefit has been to understand the direction of estuarine research in the region – or in the case of CERF – on a national scale. My department is pretty broad in focus and only a handful of us work on estuarine/nearshore systems, so PERS has addressed that gap. It's also been great to share research with people that I may collaborate with at some point down the road, and to practice public speaking.

PERS: *Where do you see yourself going next in your career path?*

Following graduation, I hope to work for a government agency like NOAA. From what I've seen, their work overlaps with my interests and provides a good balance of direction versus freedom that I'm looking for. Effects of shoreline development on fish have drawn considerable interest in Puget Sound and it would be great to contribute to sustainable development of its shorelines in the future.

PERS: *Do you have any advice you wish someone had given you before starting graduate school?*

Giving advice to future grad students is a pretty long topic. In short, I'd say to be prepared to be challenged in ways that are probably new and unexpected. The science side of things is a big part of the challenge, but so too are fundamental factors like creating goals when progress is rarely tangible or measurable, balancing work and life when you have a flexible schedule, dealing with failures and setbacks, understanding that criticism is a major part of the scientific process, and understanding that many of your peers are going to be much more knowledgeable than you are – particularly at the beginning. More specifically, I'd also recommend developing solid writing skills because written communication is a large part of the job. I'd also advise undergraduates to get research experience as early as possible because it's going to provide a clearer picture of what this field is like.

PERS: *Any parting thoughts on what PERS could do better to support graduate students and early career scientists?*

One of the ways that PERS could help its grad students is to have a "career speed dating" event similar to CERF, where pro-

fessionals talk to students about their jobs so that students can make an informed choice on what route they want to take (e.g., agency, academia, non-profit). At PERS in particular, it'd be great if these professionals had an idea of what jobs and/or funding might be available locally in the near future.

Long-term Monitoring in the PNW at the National Estuarine Research Reserves

Long-term monitoring of environmental parameters is an integral part of evaluating effects of climate change, decadal oscillations, and other perturbations that our estuarine ecosystems are experiencing. Within the region represented by PERS are three National Estuarine Research Reserves, including Kachemak Bay (AK), Padilla Bay (WA), and South Slough (OR). Other programs engaged in long-term monitoring of estuarine and marine ecosystems in the Pacific Northwest include the [Ocean Networks Canada](#) and the newly-established [Hakai Institute](#) in British Columbia, and the Northwest Association of Networked Ocean Observing Systems ([NANOOS](#)) – which also serves as a web portal for monitoring data programs throughout the PNW.

The National Estuarine Research Reserve System ([NERRS](#)) comprises 28 reserves throughout the US – including two in the Great Lakes. The NERRS vision is closely aligned with that of PERS – to maintain resilient estuaries and coastal watersheds where human and natural communities can thrive. This goal is achieved by practicing and promoting stewardship through innovative research, education, and training using a place-based system of protected areas. Research at the reserves focuses on continuous monitoring of water quality parameters and bio-monitoring of species of interest.

The **Kachemak Bay** Reserve is located on the Kenai Peninsula in Cook Inlet near Homer, AK. This fjord estuary experiences some of the highest tides in the world, with a tidal range of almost 10 meters! Habitats and organisms in this reserve include....



Heading south to Washington state is **Padilla Bay** – a large, shallow embayment in the central Salish Sea located east of Rosario Strait. Padilla Bay is home to one of the largest contiguous eelgrass habitats in North America, with over 8,000 acres of *Zostera* meadows within the reserve boundary. Rocky intertidal habitats are located on three small islands in the west-

ern reaches of the reserve. Finally, on the southern Oregon coast we find **South Slough** near the small town of Charleston and adjacent to Coos Bay. This reserve has extensive salt-marshes, forested uplands, eelgrass and rocky intertidal habitats.

One of the hallmarks of the NERRS is continuous monitoring (i.e. every 15 minutes) of water quality parameters at multiple sites at each Reserve. This effort began in 1995 with the initial deployment of sondes at a small number of Reserves and has now expanded to a nation-wide network of real-time water quality, weather, nutrient and chlorophyll data available to researchers and other interested users through the Central Data Management Office [web portal](#). Water quality parameters measured and reported every 15 minutes include salinity, temperature, depth, dissolved oxygen (percent saturation and mg L⁻¹), turbidity and fluorescence. Real-time data at each Reserve is available via YSI sondes deployed at telemetered stations, such as that pictured to the left. Monthly sampling is conducted at each reserve to collect additional samples for analysis of dissolved nutrients (nitrate, phosphate, ammonium, total nitrogen, total phosphorus), total suspended solids, and *in situ* chlorophyll concentrations. Monthly sampling events also entail the deployment of automated sampling devices that collect water samples every hour for a 24 hour period to be analyzed for the same dissolved nutrients listed above.

Feel free to check out real-time data and explore the Reserves at <http://nerrs.noaa.gov/>

Check out Cheakamus! Recap on the PERS 39th Annual Meeting in Squamish, B.C.

Contributed by Jude Apple, PERS President

The 2016 PERS Annual Meeting was held in March at the Cheakamus Centre in Squamish, British Columbia. Situated on

a 420 acre ecological reserve in Paradise Valley, Cheakamus features old growth forest, extensive salmon spawning habitat, amphibian ponds, and supports the largest recorded concentration of wintering bald eagles in North America. This was a beautiful, rustic setting for everyone to come together for the annual PERS meeting.

Thursday's evening social was at the beautiful and architecturally distinctive Environmental Learning Center, an open and



Cheakamus Environmental Learning Center – location of the Thursday night social, PERS banquet, and meals throughout the meeting.

airy space with large windows and structure supported by rough-hewn beams of Douglas fir.

On Thursday evening, everyone gathered in the Environmental Learning Center for the evening social to enjoy the local fare (see below), catch up with old friends – and make a few new acquaintances.

The formal meeting proceedings began on Friday morning in the Spakwus House with a welcome and invocation by Linda Williams and Randall Lewis of the Squamish nation. They shared a message that the only way we can restore the health of our “mother estuary” is for First Nations, Tribal communities, government agencies and scientists to work together in harmony. The welcome provided an excellent cultural context for the meeting and was a reminder of the long history of sustainable natural resource use that this area has seen for thousands of years.



Many species of sustainably harvested and deliciously prepared salmon were featured at the Thursday night social.

The organization of the meeting followed upon the success of the previous PERS meeting at the Talaris Center in Seattle, which used break-out sessions to foster a more interactive and inclusive experience for the attendees. This year began with a “poster blitz” – where presenters had one minute to give an overview of their poster – followed by a morning poster session and a series of “fast talk” sessions and breakout discussion groups.

Friday night was our annual banquet featuring Barbara Wernick, Senior Environmental Scientist with Golder Associates Ltd., whose talk titled “The Britannia Mine Post and Present – Reclaiming the Shoreline” provided PERSians with a historical perspective and recent successes of one of the of most ambitious restoration projects in British Columbia.

Saturday started off with a plenary talk by Bill Crawford (Emeritus Research Scientist with Fisheries and Oceans Canada) who shared long-term data on coastal waters of the Pacific Northwest and helped demystify the variable weather we have as it relates to El Nino and La Nina cycles. Jim Brennan and Leah Bendell followed with a session addressing the challenges facing aquaculture in the Salish Sea and encouraged everyone to seek a balance between exploitation of coastal areas for food production, restoration priorities, and sustainable use of estuarine ecosystems and resources.

Student Awards

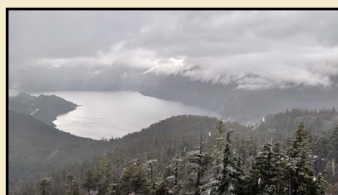
As always, students were a large part of the PERS meeting and we were pleased to see so many attending and participating. A large cohort of students from nearby Quest University in Squamish BC attended (see page 11 for more on Quest), which

was a first scientific meeting for many of them. The following awards were given to students participating in PERS: First place undergraduate talk went to Natasha Christman from University of Washington for her “fast talk” on physical and microbial drivers of hypoxia in Bellingham Bay and the award for best undergraduate poster went to Katie Gerstle from Quest University for her investigation of intertidal biodiversity in Howe Sound. The Don Heinle Award went to Aaron Eger from University of Victoria for his “fast talk” on the transferability and scalability of invertebrate distribution models and Carolyn Prentice had the best graduate student poster for her work on carbon storage in eelgrass meadows of the Pacific Northwest. Each of these students will receive a modest cash award and a one year membership to CERF. The Heinle Award also comes with a \$500 travel award to attend the next CERF biannual conference.



PERS student award recipients and PERS presidents (from left to right): Tony D'Andrea (PERS Past President), Katie Gerstle, Natasha Christman, Carolyn Prentice, Aaron Eger, Jude Apple (PERS President).

After the student awards and final luncheon, many PERSians participated in field trips that had been organized as part of the meeting. These included a tour of the Squamish River estuary restoration sites with Edith Tobe (Executive Director of the Squamish Watershed Society), tour of Quest University led by Quest students, and a ride into the mountains on the “Sea to Sky” Gondola. Pictured to the right is a view of the Squamish Estuary as seen from the top of the gondola ride.



View of the Squamish Estuary as seen from the top of the gondola ride.

Special thanks to the PERS 2016 Conference Organizing Committee for a wonderful meeting. This includes Gary Williams, Jeannie Gilbert, Edith Tobe, Colin Levings, Cynthia Durance, Jude Apple and Jason Stutes. We would also like to thank the sponsors of the 2016 PERS



PERSians enjoying the snowy suspension bridge, including Sonni Tadlock, Amy Irons, Andres Quesada from Northwest Indian College and Heath Bohlmann and Ashleigh Pilkerton from Padilla Bay NERR.

meeting: GL Williams & Associates Ltd., Squamish River Watershed Society, Fortis BC, Moffatt & Nichol, Squamish Terminals, Quest University, and Squamish First Nation.

A final note about the Cheakamus Centre – it is a model for sustainability and minimum impact. They have a serious waste reduction effort on the campus with everything being either



PERS members enjoying a sudden snowstorm at the top of the Sea to Sky Gondola, including Dan Hannafious, Jan Newton, Jude Apple, Andres Quesada, Heath Bohlmann and Ashleigh Pilkerton.

recycled, reused or composted. I noticed that the leftover hardboiled eggs at breakfast and poached salmon from the banquet became delicious egg salad and salmon salad for the final lunch. Food that wasn't reused or repurposed for our culinary pleasure was either composted or fed to the pigs on site. As hard as I tried, I wasn't able to finish off the brie and stilton. So those must be some happy pigs.

NWIC students highlight indigenous knowledge and ancient technologies at PERS

An important focus of PERS has been fostering the sustainable use and management of estuarine resources. Mainstream estuarine science and resource management have typically been grounded in Western ideologies and perspectives, yet we know that Indigenous communities have been active managers of ecosystems and food systems in the Pacific Northwest for thousands of years. Reflecting what is hopefully a growing awareness, the last two PERS meetings – as well as the recent CERF conference in Portland – have featured the contribution of research and management based in Indigenous knowledge systems. This year at PERS, Northwest Indian College students Sonni Tadlock and Amy Irons shared their research investigating ecological effects and productivity of clam gardens. Clam gardens are rock wall structures constructed by First Nations people within the intertidal area that trap sediment and extend the area for productive clam growth. Clam gardens have been shown to increase the abundance and growth rate of clams and their findings highlight the positive relationship that can exist between increased ecosystem productivity and abundance of traditional foods. Indigenous societies have developed technologies and management practices that have been shown to have positive benefits on ecosystems that have sustained resources for millennia.

Sponsors for the 2016 PERS Meeting

We would like to thank the following sponsors for their generous contribution to making the 39th a success.

- GL Williams & Associates Ltd.
- Squamish River Watershed Soc.
- Fortis BC
- Moffatt & Nichol
- Squamish Terminals
- Quest University
- Squamish First Nation



Quest University

Contributed by Marjorie Wonham, Quest University

Quest University Canada was thrilled to have the opportunity to collaborate with PERS at their 39th Annual Meeting in Squamish, BC. Quest is a new kid on the block of Canadian higher education. We focus entirely on excellence in undergraduate education, and are Canada's first independent, not-for-profit, secular university. We offer a single degree (Bachelor of Arts and Sciences), with no pre-defined majors or programs.



Quest University student Maria Yasel surveying Henderson's Checkermallow in the Squamish River Estuary.

Instead, each student crafts an individual Question that guides their selection of courses from across the disciplines, and works with a faculty mentor to conduct a Keystone (honours thesis) project to delve into one specific aspect of their broader Question. We offer small classes (maximum 20 students) on a modular block schedule, which makes for intense and focused learning experience for everyone and allows us to take advantage of serendipitous local opportunities like PERS.

As part of the PERS-Quest collaboration, the eleven students currently in a Marine Zoology class were able to volunteer as AV and timing assistants in exchange for admission to the meeting. They were exposed to a broad variety of research talks, and had the chance to meet and interact with a wide range of PERSians passionate about estuarine research – from undergraduate and graduate students, to professionals across government, industry, NGO, and academic sectors. The friendly environment of the conference, and the casual format of fast talks followed by small-group discussions, made the meeting a welcoming environment for junior scientists. Two of the students attended as regular participants and presented their posters in what couldn't have been a better first conference experience.

Comments from Quest about PERS are below:

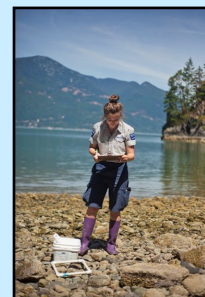
"The PERS conference was unlike any other conferences I've been to. It's a small conference but we got to talk and ask questions and connect with the attending scientists in small groups."

"It was so wonderful to experience research from a large scientific spectrum, and since the conference was held at a smaller venue it allowed for in-depth conversations with the scientists."

"It was fantastic getting to know biologists and other students, who were all excited to talk about their work!"

"The PERS community was very welcoming, especially to a collection of undergraduate students who are by no means experts in their fields of study. We were treated like equals, just like any other conference attendee, which allowed us to engage in fantastic conversations and discussions."

"I feel like I made connections that I may contact in the future."



Quest University Canada student Katie Gerstle surveying intertidal biodiversity at Porteau Cove Provincial Park, summer 2016. Photo: Kyla Hemmel-

**PACIFIC
ESTUARINE
RESEARCH
SOCIETY**

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PERS Student Grants and Awards

PERS offers a variety of Student grants and awards. Supporting student research and encouraging their success has long been a focus of our group, please find below the various ways that PERS supports our student members.

Annual Meeting Awards - Students presenting at the Annual Meeting are eligible to receive awards if they are named best presentation in their category or honorable mention. The number of categories varies based on student participation but the Best presentation in each category receives a cash award of \$50, and a 1 year membership in CERF. Honorable mention winners in each category receive a 1 year membership in CERF.

PERS Annual Meeting Travel Grant - Student presenters at the Annual PERS Meeting are encouraged to apply for travel assistance to defray some of their expenses of attending.

Heinle Award The Heinle Award is up to \$500 in support for the winning student to travel to a subsequent CERF national meeting.

Student Research Fund Grants are for up to \$250.00 awarded at the annual meeting of PERS with a maximum of 3 awarded each year. Note that Research funds are disbursed to the sponsoring institution not to the students directly. Applicants will need to contact the Office of Research (or equivalent) at their institution to approve the application and complete the grant administrator section. Complete application information can be found on the PERS website. Deadline for application is typically three weeks prior to the annual meeting in the spring, with the 2016 deadline extended to May 15, 2016.

**Enjoy the rest of your summer and hope to see you in the field
or at the next PERS meeting in Coos Bay, OR.**

Jude Apple, PERS President

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