SPMC Welcomes New Director

The lights are on in the corner office! Dr. Erika McPhee-Shaw, Shannon Point’s new director, splashed down in Anacortes early this summer. Dr. McPhee-Shaw migrated north from California’s Moss Landing Marine Laboratories, where she was a professor of Physical Oceanography, to take the helm at Shannon Point. She brings much-needed expertise in coastal ocean processes to the SPMC science mix. She’s honed her director skills through management training as a Leopold Leadership Fellow, and gained experience leading strategic planning and developing transparent and democratic decision-making processes through chairing the board of directors of the Central and Northern California Ocean Observing System, one of the 11 components of the national Integrated Ocean Observing Systems network. A café table for informal chats, a Sally Ride poster on the wall, a shock of curly red hair – all testify to the energy she brings to the lab.

Dr. McPhee-Shaw was lured to SPMC by the impressive mix of people there as well as on main campus. She is excited to be part of this top-notch university with its vigorous undergraduate mission and has already been stimulated by the enthusiasm of the students in our summer programs. She and her family (husband Bill Shaw and children Henry, age 10, and Ginny, age 8) are settling into Anacortes, transitioning to new schools and beginning to explore the ocean and forest surroundings.

Aside from the major challenge of directing the multi-faceted SPMC programs and facilities, Dr. McPhee-Shaw has some new ideas for the upcoming year. She’s working on enhanced partnerships with the Anacortes schools, in a model that could extend to other school districts in the future. She’s initiated discussions with WWU’s Extended Education Programs, looking for opportunities to develop programs with them. She also plans to talk up the great research being done at SPMC, getting out to the regional marine community to ‘represent’. This includes building strong connections to regional monitoring networks and the Washington Ocean Acidification Center.

As she settles into her position, Dr. McPhee-Shaw looks forward to meeting SPMC’s larger community of alumni and supporters. She can be reached at Erika.McPhee-Shaw@wwu.edu. Please join us in welcoming her on board!

One thing you might not expect about Erika!

You can sometimes catch her on late-night TV – she spent a week in Scotland with Philippe Cousteau, filming a Discovery Channel show on the plausibility of the Loch Ness monster.

Source: http://www.aboutscotland.co.uk
Oyster larvae that fail to survive, corrosive waters that upwell off the Washington coast, local food webs that appear to be changing—these are some of the phenomena attributed to ocean acidification in the Pacific Northwest. Trying to make sense of these linked chemical and biological changes, researchers Dr. Brady Olson (SPMC Marine Scientist) and Dr. Brooke Love (WWU Assistant Professor of Environmental Sciences) are heading up an array of research initiatives at SPMC, exploring the consequences of acidification (lowered seawater pH) that result when atmospheric CO$_2$ enters our coastal waters.

Much of Olson and Love’s research takes place in an experimental ocean acidification facility, built as part of two research grants from the National Science Foundation totaling $1.1 million. A walk-in environmental chamber allows regulation of temperature and light, while CO$_2$ levels can be manipulated within individual compartments in the chamber. The set-up allows controlled, replicated experiments with different marine organisms at targeted levels of dissolved CO$_2$, including those forecast for the future.

Olson’s plankton ecology expertise and his success in obtaining substantial National Science Foundation funding have brought new collaborators and scientific energy to SPMC. Two grants, one from the NSF and another from the Washington Ocean Acidification Center, involve zooplankton ecologist Dr. Julie Keister from the University of Washington. These studies target krill and copepods, two groups of crustacean zooplankton that are key players in planktonic food webs. Undergraduate and graduate students are heavily involved in this research, which has also brought post-doctoral associate Katharina Schoo to SPMC (see profile, pg. 6). The team is investigating both direct and indirect effects of elevated CO$_2$ on zooplankton physiology and reproduction. For instance, the food quality of zooplankton prey might change, including the carbon, nitrogen, lipids and size of the cells. This in turn could affect the growth and reproduction of the zooplankton (an indirect effect). In addition, development of zooplankton larvae could be compromised or delayed in waters containing excess CO$_2$ (a direct effect).

Another collaboration, funded by the Washington Department of Natural Resources, teams marine chemist Love with Dr. Jennifer Reusink and Ph.D. student Emily Grayson, both of the University of Washington. The group is studying oysters just after settlement onto the bottom. Young oysters are particularly vulnerable to elevated CO$_2$, which promotes dissolution of their growing shells. Love and colleagues hope to find a means of oyster ‘rescue’, a slow-release mechanism that can improve chemical conditions in the vicinity of young settlers. The DNR is also supporting a WWU graduate student, working with Love to develop a low-cost CO$_2$ sensor. They aim to design sensors that are cheap enough to deploy in large numbers, the better to characterize our highly variable local waters.

SPMC is excited to be hosting these multi-faceted investigations. We all look forward to the collaborations, learning opportunities, and scientific contributions that are sure to continue as this research unfolds.

The breadth and significance of ocean acidification research at SPMC has attracted the attention of private donors, leading to creation of the Ocean Acidification Research Endowment Fund. This fund, established by WWU alumnus, Dr. Greg Rau, supports marine research and education focused on the study of ocean acidification. Those interested in supporting ocean acidification research at SPMC are encouraged to make a contribution this fall by visiting [http://www.wwu.edu/give](http://www.wwu.edu/give) and designating the Ocean Acidification Fund for the gift. Contributions made before 2015 may be eligible for a 1:1 match.
Funding Highlight: SPMC Imaging Center

Thanks to support from the NSF Biological Field Stations and Marine Laboratories (FSML) program, SPMC will soon have a new state-of-the-art Imaging Center. As the number of resident and visiting SPMC researchers has grown, so too has the breadth and complexity of our research activities. In the past two years, seagrass ecology, invertebrate larval behavior, ocean acidification and molecular ecology have all emerged as new research themes. A common feature of these and most other research areas at SPMC is the need to display, capture and analyze high-quality digital images and video. To fill that need, we are acquiring three new research-quality microscopes (epifluorescence, DIC-capable compound and stereo), associated cameras (monochrome, color and high-speed video), imaging software and supporting computer equipment. The Imaging Center will increase the capability of resident scientists to pursue new research directions, support the needs of visiting researchers, and provide opportunities for training and research by the host of student researchers working here.

Deep-sea Research Featured

SPMC marine scientist Dr. Shawn Arellano’s research into deep-sea larval dispersal recently found the spotlight. Her recent publication in Proceedings of the Royal Society B (see listing, last page) was highlighted this spring on Science magazine’s “Science Shots” web site (http://tinyurl.com/l3dfu4k). The study by Arellano and colleagues found that larval mussels and snails from deep-sea methane seeps migrate to surface waters, where they may live for more than a year. Long journeys on fast-moving surface currents could explain how a single species inhabits deep-sea communities on both sides of the Atlantic.

Sea Star Wasting Disease Hits Close to Home

The humble surroundings of SPMC’s boat shed were home to a winter quarter research effort on the devastating “sea star wasting syndrome”. WWU Biology professor Ben Miner (pictured below), assisted by MIMSUP student Robert Beck, quarantined sick and healthy sea stars in a system of tanks to determine whether the disease could be transmitted by contact with sick sea stars. Dr. Miner received funding from NSF, WA SeaGrant, and Western Washington University to study the disease. Funding from WWU and NSF (with Cornell University co-PI Dr. Ian Hewson) supported the laboratory experiments as well as subtidal surveys at SPMC. WA SeaGrant funding (with co-PI Melissa Miner), supported the training of citizen scientists to help monitor WA populations for the disease. Dr. Miner and many other researchers and citizen scientists have documented mass mortality in numerous populations of sea stars along the U.S. West Coast—this event is one of worst disease-related mortality events ever recorded in the ocean. First noticed in summer 2013 on the outer coast of WA, the Anacortes area and San Juan archipelago seemed largely immune until last summer; at this point, most of the sea stars in the inland waters of WA have died. For more information about the disease, visit www.seastarwasting.org.
A sense of place imbues a variety of recent outreach activities involving SPMC Marine Scientist Dr. Jude Apple. With Judy Lemus (University of Hawaii) and Steven Semken (Arizona State University), Jude served as co-editor of an issue of *Journal of Geoscience Education* dedicated to teaching science within the context of culture and place. See http://nagt-jge.org/toc/jgee/62/1 for an editorial article by these co-editors describing the philosophy behind this approach to engaging students of different cultures in place-based science learning.

Working with Dr. Megan Bang (learning scientist and indigenous scholar, University of Washington College of Education), Fern Renville (Red Eagle Soaring Native Youth Theater), and Dr. Jan Newton (University of Washington), Apple has participated in various efforts to engage Native youth in the Seattle area in ocean science learning, including helping facilitate intertidal explorations as part of a recent summer camp at Daybreak Star Cultural Center and including young actors from Red Eagle Soaring on oceanographic cruises. Closer to home, this past summer Dr. Apple worked with Dr. Eric Grossman (USGS/WWU) and camp facilitator Nathanael Davis to involve Native American high school students from Northwest Indian College (NWIC) summer science camp in an all-day field investigation of the organisms and geology of the Nooksack River delta at the north end of Bellingham Bay. A continuation of Jude’s involvement with COSEE (Centers for Ocean Sciences Education Excellence) Pacific Partnerships seeks to develop a place-based STEM curriculum based in ocean and climate science at the Quinault School in Taholah, Washington.

Closer to home, SPMC students of all stripes continue to shine in outreach activities led by Denise Crowe. The MIMSUP Outreach Program continued their long-standing tradition of weekly visits to 2nd and 4th grade classrooms in Anacortes school. The ever-popular MOSIS traveling touch tank gave graduate and Marine Scholar’s Program undergrads, guided by Denise, a chance to share charismatic megafauna with audiences of hundreds at events around the region. Recent MOSIS outings included Back 2 Bellingham alumni and family weekend on WWU’s main campus, KidsR Best Fest at Storvick Park in Anacortes, Grandparents U on main campus, and Fidalgo Bay Day at the Samish Indian Nation Fidalgo Bay Resort. (see photo at left). Denise and SPMC graduate students also participated in Down to the Sea, a Cultural and Natural History of Fidalgo Bay. This program, funded as part of the Trail Tales Project through the Department of Ecology, guides Anacortes 8th-graders through a multi week exploration of the urban watershed and marine environment through class and field instruction. Denise also oversaw the launch of a new pilot program in which REU students, guided by SPMC graduate students, shared marine science concepts with Anacortes folks at nearby Washington Park.

Sharing the wonder of the marine world:
“Wherever we went this year, we brought the students and research of SPMC to the people. We fielded questions about seastars, HABs, and Ocean Acidification in local waters. Our live organisms inspired wonder and care. Our students engaged with the public in thoughtful exploration of ideas and a tangible demonstration of the importance of higher education and science.” Denise Crowe, SPMC Marine Science Public Education Specialist
Several talented artists have spent time at SPMC during the past year. Here are their reflections on how art and science together can deepen our understanding of the natural world beyond the power of either field alone.

**Elizabeth Cooney**, WWU graduate student, Marine and Estuarine Science Program:

Art has been a part of Liz's path into science since childhood. She is incorporating the use of artwork as outreach into her graduate studies at SPMC.

“I drew ‘Fly with a broken wing’ when I was 17. The pinned fly I used as my model was old and missing one leg from each pair. I was able to reconstruct the missing legs based on each leg’s respective partner, but I chose to draw the crumpled left wing as it was. My decision to keep a major imperfection in this otherwise idealized drawing exemplifies a quality I like to retain in my artwork. While I appreciate that scientific illustrations usually depict perfect specimens because they are intended to function as references, the reality is that imperfection is an instrumental quality of nature. Mutations, scars, and anomalies are what drive the ongoing stories of individual organisms, populations, and landscapes. Being able to deliver that feeling in my illustrations is more real and important in my mind than simply creating an anatomically accurate image.”

**Quinton Maldonado**, WWU undergraduate (Studio Art) and SPMC summer art intern:

Quinton joined the SPMC group for 10 weeks last summer, and brought his large format photography to an interpretation of our spaces. His images were part of a solo show on main campus this fall.

“When I was selected for the Science and Arts residency at Shannon Point Marine Center, I began to think of the categorization of space and how art and science approach the subject of space in unique but similar ways. Space, and the way that we use space, has been organized into a hierarchy to reflect our feelings of the importance of the world around us. As geomorphic agents, people have a new responsibility to consider not just the immediate world around us, but also all aspects of it big and small. Working alongside scientists who were studying everything from the phytoplankton to oceanic hypoxia helped me realize the level of complexity but intricacy that exists in the world, and my work attempts to show that interconnected world in a visual and emotional way that data and analysis often cannot.”

Later this fall SPMC will take delivery of the long-awaited R.V. *Magister*, an aluminum vessel especially designed for research in our local waters. Built by Bean Custom Marine Fabrication in Clarkston, Washington, *Magister* has overall hull dimensions of 35’ length and 10’6” width. She will be powered by twin 200 HP Mercury outboards, for swift travel to local environments. Particularly exciting is the interior space, designed with laboratory benches, power supply, a sink, fridge and freezer to allow analytical work and sample processing in the field. An A-frame on the bow will support CTD casts and other sampling operations. Funding for *Magister* was from the National Science Foundation, with support for the marine electronics from the Borman Family Foundation. Shawn Hinz, an alumnus of WWU’s Marine and Estuarine Science graduate program and managing partner of the consulting firm Gravity Environmental, donated a hydraulic winch and labor toward setting up the vessel’s hydraulics.

*A gleaming R.V. Magister takes shape in the Bean fabrication plant in eastern Washington.*
Dr. Katherina Schoo is the new Postdoctoral Research Associate in the Ocean Acidification Lab at Shannon Point, working with Brady Olson and Brooke Love. Originally from land-locked Luxembourg, Katherina studied Marine Sciences in Edinburgh, Scotland, and Auckland, New Zealand, before gaining her PhD at the Alfred-Wegener-Institute for Polar and Marine Research and the University of Kiel in Germany. Her main research interests are ecological stoichiometry and planktonic food web interactions. She has investigated food quality effects of ocean acidification as part of the BIOACID Project in Germany and the role of nutrients on fatty acid and stable isotope profiles in South Africa.

Kat Schoo, SPMC post-doc Loves: Travel and food (ideally at the same time!) Mad skills: Speaks 5 languages, played basketball at university Fun fact: Is the oldest but shortest (at 1.87m=6’1.5”) of her siblings!

Mike Adamczyk, Junior (Biology), first came to SPMC his freshman year as part of our 2012 Marine Science Scholars (MSS) program. In winter 2014, a small group of MSS students including Mike began working with Dr. Sylvia Yang at Shannon Point on various eelgrass ecology projects. Mike got the opportunity to continue his work this summer with Sylvia and Dr. David Shull (WWU Environmental Sciences) as part of “Team Eelgrass”, working with WWU grad student Melissa Ciesielski, WWU undergrad Tyler Tran, and REU students Socheata Lim and Lowell Iporac, exploring the effects of sulfides on various life stages of the native Puget Sound Eelgrass Zostera marina. Upon reflection, Mike reported “The amount of time that can go into one experiment that may or may not even yield usable data is what surprised me the most about research, but I still think it’s worth it because what you can learn in the process of doing research can be just as valuable as the data.” When he’s not learning about eelgrass and the scientific process, Mike enjoys throwing a frisbee around, playing on WWU’s ultimate club team and disc golfing. He plans to present the results of his research at Scholars Week on main campus next spring quarter.

Tyler Spilane
Funding from the Steve Sulkin Education and Research Endowment supported M.S. candidate Tyler Spilane as he worked this past summer in the laboratory of Dr. Suzanne Strom. Tyler is studying the glass shells (frustules) of diatoms and whether these provide mechanical protection from predatory protists called dinoflagellates. Tyler spent the summer developing methods, learning to culture diatoms, and isolating the dinoflagellates he needs for his grazing experiments, which are underway this fall.

The Sulkin Endowment honors former director Dr. Steve Sulkin and supports graduate student research at SPMC. Contributions to the endowment can be made online at www.wwu.edu/give (indicate that the gift should be designated for the Steve Sulkin Fund).

Congratulations, Graduate Students and Alums!

Elizabeth Harvey (MESP 2007) completed her Ph.D. at the University of Rhode Island and is now a postdoctoral fellow at Woods Hole Oceanographic Institute.

Amelia Kolb (MESP 2012) recently started as Oceanographer for King County, WA.

Melissa Ciesielski (MESP current) received a Padilla Bay Graduate Research Award for eelgrass-related research with Dr. Shull.

Funding from the Steve Sulkin Education and Research Endowment supported M.S. candidate Tyler Spilane as he worked this past summer in the laboratory of Dr. Suzanne Strom. Tyler is studying the glass shells (frustules) of diatoms and whether these provide mechanical protection from predatory protists called dinoflagellates. Tyler spent the summer developing methods, learning to culture diatoms, and isolating the dinoflagellates he needs for his grazing experiments, which are underway this fall.

The Sulkin Endowment honors former director Dr. Steve Sulkin and supports graduate student research at SPMC. Contributions to the endowment can be made online at www.wwu.edu/give (indicate that the gift should be designated for the Steve Sulkin Fund).

Melissa Ciesielski (left) and some other members of Team Eelgrass, including (L to R) Tyler Tran, Mike Adamczyk, Socheata Lim, Lowell Iporac
Congratulations, Undergraduates and Alums!

Timothy Anderson & Daniel Woodrich (MSSP entering 2012) received 2014 NOAA Hollings Scholars awards.

Josh Morel (MIMSUP 2014) received the PERS 2014 First Place Undergraduate Poster Award for “Consequences of salinity on growth and chemical defense of eelgrass (Zostera marina)”

Umi Hoshijima (REU 2012) has started a Ph.D. program at the University of California in Santa Barbara. Umi was awarded a National Science Foundation Research Fellowship for work with Dr. Gretchen Hofmann on ocean acidification effects on fish egg and larvae development.

Torian Jones (MIMSUP 2014) was runner up for the best student poster for her work entitled “Does ocean acidification affect Metacarcinus magister embryonic development?” at the 2014 PERS conference.

Tyler Carrier (REU 2013) received an NSF travel award to present his work on “Responses of Dendraster excentricus larvae when exposed to Pleurobrachia bachei” at the 2014 North American Echinoderm Conference.

Andrew Muchinski (WWU class of 2014) received a Scholar’s Week 2014 Poster Award for “Effects of nutrient loading and herbivory on secondary compound production in eelgrass Zostera marina.” Andrew is currently a graduate student at Virginia Tech.

---

**Marine and Estuarine Science Program Master’s Theses**


Yolimar Rivera (2014) How do compounds released by the green tide alga Ulvaria obscura affect development of invertebrate larvae? (Environmental Sciences).


---

**2014 Grants to SPMC Scientists**

**Jude Apple:** Washington State Ocean Acidification Center: Linkages between ocean carbonate chemistry and plankton community dynamics. $30,000

**Jude Apple:** NOAA Environmental Literacy Grant: Advancing Climate Literacy through Investment in In-service and Pre-service Science Educators (ACLIPSE). $193,817

**Brian Bingham:** Whatcom County Marine Resources Committee: Boulevard Park biological survey project, Phase II. $4,795

**Brian Bingham and Shawn Arellano:** NSF Biological Field Stations and Marine Labs: An Imaging Center to support research across multiple scales at the Shannon Point Marine Center. $176,589.

**Denise Crowe:** Friends of Skagit Beaches: Trail Tales: Fidalgo Bay Public Education Project. $19,000

**Brady Olson and Brooke Love** (Env Sci): Washington State Ocean Acidification Center: Effects of ocean acidification on zooplankton of Washington State. $28,139.

**Brady Olson and Brad Warren** (Director of Global Ocean Health): Threshold Foundation: Partnering with Amrita University (India) to transfer knowledge and build capacity to combat ocean acidification in a region dependent on fisheries. $20,000.

**Suzanne Strom:** NSF Biological Oceanography: Environmental stress and ROS based signaling among planktonic protists. $599,638.

**Suzanne Strom:** North Pacific Research Board: Measuring the pulse of the Gulf of Alaska: Oceanographic observations along the Seward Line. $229,595.

**Kathy Van Alstyne:** Western Washington University Research and Sponsored Programs: Development of Condensed Tannin Methods for Eelgrasses. $998

**Sylvia Yang and David Shull** (Env Sci): Washington Sea Grant: Effects of porewater sulfide on eelgrass health, distribution and population growth in Puget Sound. $92,253.
Publications


