Welcome to the Sixth Volume of Depth, the School of Oceanography’s alumni magazine and a product of the dedicated work of our undergraduates. Depth began in 2005 with the inspiration of an undergraduate, Tiffany Straza. Each year since then, the students provide articles that create a window into their experiences at sea, their work in laboratory settings, and their interviews with faculty members. The School is extremely proud of our undergraduates as they develop both as scientists and as advocates for the field of oceanography.

This issue highlights some of the best things about our School. Our students learn by doing. We pride ourselves in being the only academic institution with a research vessel that operates on a global scale and that is used, in part, to support educational activities like those you will read about here. No other oceanography program in the nation offers such a close interaction between research and graduate and undergraduate education.

Those of us who study the oceans are drawn by the excitement of understanding the workings of this still largely unexplored realm, the adventure of conducting research at sea, and the importance of understanding the role of the oceans in the complicated system we call Earth. In Volume 6 of Depth, you will read of student participation in cruises to hydrothermal vents and to the Hawaiian archipelago, undertakings that consist of long hours, team work, new insights, and lots of fun. You will learn of the commitment of our students to engaging the public in the cutting edge research needed to understand our connections to Puget Sound. Most importantly, you will see the dedication to learning and teaching that exemplifies our School.

I am both humbled and excited about my new role in the School. I am surrounded by wonderful colleagues and alumni that work tirelessly to help enrich our School. Susan Hautala joins me as our new Associate Director for Undergraduate Education. Trina Litchendorf (class of 2006) volunteered to mentor this year’s Depth writing team.

As human impacts on the planet accelerate, society will increasingly depend on those that understand the complexity of the earth system to help inform decisions that affect us all. I look forward to working with all of you to help ensure that our students are prepared to assume this critical role.

Ginger Armbrust
Director, School of Oceanography

Your support is appreciated!

With decreased state funding and increased tuition, now more than ever, we could use your help. By educating talented men and women who become leaders and decision-makers in public and private life, by conducting research that brings to light new discoveries and contributes to our understanding of the natural world, by providing outreach opportunities for students of all ages, the School of Oceanography has a far-reaching impact. In particular, you can help support Depth by making a contribution to our Science Education Fund (gift code SCEDUC).

To make a gift online, please go to: www.ocean.washington.edu/about/giving.html

Please contact Sandra Schuman, Philanthropy Officer, College of the Environment, schumsa@uw.edu, (206) 221–6808 for more information.

Stay in touch!
Help the School of Oceanography and the UW to keep our records current by telling us about any updates to your name, email address, mailing address or employment information. This will help ensure that you receive any relevant communications from our School, the University of Washington, and the UW Alumni Association.

www.washington.edu/alumni/
Changes in Latitudes,

After 33 years, Arthur Nowell is looking forward to his first sabbatical. “Last month I had the wonderful sensation of not needing to be anywhere for a meeting, a freedom I have not had for years.” Well-earned relief for a scientist who has dedicated his career to UW Oceanography. Arthur arrived in Washington State on January 1st, 1978, a day he remembers well. The Huskies were in the Rose Bowl and Warren Moon was picking apart Michigan’s secondary, leading the underdog Huskies to a 27–20 victory over the Wolverines. Arthur, without much knowledge of American football, found himself alone shopping for a mattress at a deserted Southcenter Mall, where all the salesmen were glued to the TV. The young Brit was ignored. Many sleepless nights later, Arthur exacted his revenge by becoming Associate Director for Undergraduate Studies in our School, where he helped start the sophomore field course and reinvent the senior thesis in the mold we still use today. Arthur became director in 1986 and held the reins until 1996 when he became the Dean of the College of Ocean and Fishery Sciences, a post he held until the Board of Regents abolished the college in 2010. Currently, Arthur is Senior Advisor to the Provost, pending the start of his first sabbatical sometime in 2012. Arthur received his BA from Trinity College and a PhD at the University of British Columbia. Despite (or perhaps because of) his new found freedom, he remains a vital part of our School’s community.

Changes in Attitudes

Russ McDuff shares a hard-fought and newly-found freedom with Arthur. After receiving his PhD in 1978 from Scripps, Russ bantered about in an MIT postdoc, and then moved to UW in 1981. In 1990 he was named Associate Director for Research and in 2004 he became the Director of the School of Oceanography. Russ has tirelessly advocated for the School and in the early days of his reign he helped establish the undergraduate endowment funds that support so many of our activities. He actively advocated to “move the senior thesis back out into blue water,” a controversial shift that remains an extended experiment today. Russ’ advocacy for student rights and shared governance also led to the establishment of the SOS lounge in the Ocean Teaching Building, and the enhancements of the 1st Friday Departmental Happy Hours. Russ stepped down from the director’s position in early 2011 and he currently is enhancing his skills as a ski instructor, a job that he professes to be interested in once he retires from the School in a few years.

by Rick Keil
Chemical Oceanographer

Thompson Update

In mid January, the R/V Thomas G. Thompson went to dry-dock at the Portland, OR shipyard for its scheduled maintenance period. While there, several regulatory inspections took place, and many repair and maintenance projects were completed. Some jobs were complex and required outside assistance, while others required a certain amount of down time and could not be completed while the ship was in service. The ship has several fuel tanks (280,000 gallons worth) and ballast water tanks (to control stability), which all needed to be inspected. Any tanks that were found to be showing signs of excessive rust were sandblasted and painted. The Engine Department was especially busy, as this was our opportunity to overhaul engines and motors. Work was done to the main mast and other areas that are difficult to access while at sea. Finally, before going back in the water, the ship’s hull received a complete paint job. Upon completion of the shipyard work, all effort was directed towards wrapping up loose ends and cleaning the ship to make it ready for its next scheduled science mission in April, when once again our 300 days-per-year work schedule resumed. Our first project took the Thompson to Alaskan waters. After that, throughout the summer and fall, operations will be off the Washington coast. As the end of the year approaches, we will work our way west to Guam, via Hawaii.

by John Wilson
Captain, R/V Thomas G. Thompson
Networking the Final Frontier

300 MILES OFF THE WASHINGTON COAST, Jason is out for a swim. I check his progress on the navigation monitor. He is approaching “El Guapo,” a hydrothermal vent 1500 meters below sea level. The Remotely Operated Vehicle (ROV) Jason played an integral part during the Enlighten ’10 Expedition.

Dr. Deborah Kelley encouraged my first undergraduate oceanography class to apply for Enlighten ’10. Five months later, I found myself lugging my duffle bag across the gangplank to join Leg 2 of the month-long cruise in August of 2010.

The expedition embarked on the University of Washington’s R/V Thomas G. Thompson. The 274-foot vessel was packed with students, scientists, technicians, crew, artists, and cargo containers full of equipment. The expedition was lead by Co-chief Scientists Dr. John Delany and Dr. Deborah Kelley. Our mission: to map and image cable routes for the cabled observatory component of the National Science Foundation’s Ocean Observatories Initiative, the Regional Scale Nodes (OOI RSN). The University of Washington leads this component of the OOI.

Cabled observatories use electro-optical cables to link scientific instruments on the seafloor to users via the Internet. For the OOI RSN, a shore station in Pacific City, Oregon will supply up to 200 kilowatts of power and up to 240 Gigabits per second of bandwidth. Data will be streamed 24/7, 365 days a year anywhere with Internet access, including offices, lecture halls, classrooms, public libraries, and personal computers. Even an iPhone will be able to stream live video of a hydrothermal vent or monitor data from a seismometer.

High–resolution maps produced from the Enlighten ’10 cruise will be used to lay over 800 kilometers of cable in summer of 2011 and then to place seven primary nodes in 2012. In 2013, the secondary nodes and cables will be installed, scientific instruments will be deployed, and data are scheduled to begin streaming ashore. By 2014, the cabled observatory will add enhanced in-situ remote sensing to an oceanographer’s toolbox.

Initial study sites on the OOI RSN include Hydrate Ridge and Axial Volcano. Leg 1 of Enlighten ’10 surveyed Hydrate Ridge 125 kilometers from Newport, Oregon. The Autonomous Underwater Vehicle (AUV) Sentry produced extremely detailed maps of Hydrate Ridge. These detailed charts show where to set sensor arrays, one of which will quantify methane seep fluxes from methane hydrates to the overlying ocean.

“Being on watch felt like working on a Mars rover mission with more to see.”
– Diane Perry
Final Frontier

Leg 2 explored potential OOI RSN sites at Axial Volcano. The volcano’s caldera contains three hydrothermal vent areas thanks to its location on an active spreading ridge. According to Interactive Oceans, over 60% of the planet’s volcanism occurs on the seafloor; however, direct observations of this underwater activity are extremely rare. Instead of missing the next big one, instruments connected to the OOI RSN in Axial Caldera will be able to record data and collect samples during an underwater eruption. The vision is that eventually underwater robotic vehicles will be garged on the seafloor and will be able to respond quickly to such episodic events. One event that occurs during a major eruption is the release of microorganisms from beneath the seafloor. According to Dr. Delaney’s Technology Entertainment and Design (TED) conference presentation, remote sampling of these microorganisms may lead to new pharmaceuticals.

A very memorable experience during the expedition occurred when weather shut down all scientific operations. As the ship fell down the face of a wave, I practically floated up the ladder to the galley feeling the same weightlessness as on a roller coaster ride. At that moment, I realized cabled observatories will provide data unrestricted by weather conditions. Consequently, scientists will be able to improve predictive models of oceanic processes including ocean acidification, climate change, harmful algal blooms, submarine volcanism, and life in extreme environments.

Pre-cruise, Dr. Delaney remarked, “Oceanography should be as celebrated as the space program.” After spending my first four-hour watch in the Jason Control Van, I had to agree with him. Being on watch felt like working a Mars rover mission, but with more to see. For instance, during one watch I saw dark chasms appear on the ROV’s radar screen. My watch leader, Allison “Lava Yoda” Fundis, told me we were approaching collapsed lava pits. Almost on cue, a collapsed pit opened before us.

Lava pillars stood like ancient undersea ruins, and I bombarded Fundis with questions. Luckily, Allison was the undersea lava morphology expert on the cruise and provided excellent answers. I learned the lava pits were evidence that a huge volume of lava flowed through the area during the last eruption. With that image in mind, the thought of laying cable across an undersea volcano became even more impressive.

Dr. Delaney explained during our interview that he wished to create an educational atmosphere on the Enlighten cruise that communicated, “We are learning as we go and we would like you to learn with us.” Applicably, while I was learning about lava morphology, the expedition leaders were learning which cable routes were too risky for installations that are supposed to last 30 years. I also learned on an exploratory expedition the need to expect the unexpected. When high seas and Microsoft blue-screens-of-death delayed operations, I observed how a chief scientist must improvise. Now I can understand his last “Delafism,” “if oceanography was a form of music it would be jazz.”

Similarly to how Jacques Cousteau’s aqua-lung revolutionized the way marine scientists and ordinary people could experience the undersea environment, undersea cabled observatories will allow anyone with an internet connection to interact with and learn more about the oceans. To borrow a phrase from Captain Jean-Luc Picard, this initiative is “boldly (going) where no one has gone before” (cue trumpets).

by Diane Perry

Diane Perry is a sophomore majoring in oceanography.

→ The crew of the Thompson will embark on the Visions ’11 Expedition August 12–September 1, 2011.
   
   Tune in to www.interactiveoceans.washington.edu/visions11 for daily logs and live video of the mission.
“I spend dawn standing on the deck, watching islands appear out of the darkness, different from those that disappeared the night before. It inspires contemplation on the size of the world and how little I matter within it. I don’t know if I could be more cliché, but the immensity of the ocean is daunting. Right now, I could go on the deck and see water on every horizon – no land in sight. It makes me feel like we’re balanced on a drop of water and can’t see over the edges…”

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— Cruise entry by Sarah Wiesner, December 30, 2010

Growing Glass

My work in the Hawaiian archipelago focused on the groups of phytoplankton known as diatoms and dinoflagellates. Both are microscopic algae that range in size from thousandths of a millimeter, to a couple millimeters. Diatoms are particularly beautiful algae that make shells out of silica, or glass, to help them stay afloat. Their shells, called frustules, grow spines and horns that connect to form long chains. My favorite specimens from the trip were of the genus Chaetoceros and had intricate overlapping spines with beads of glass adorning each connection. Dinoflagellates have two flagella (tails) that they use to swim. I used a fine mesh net to collect samples from 14 different sites. Half of my sample sites were within the eddy we visited just west of the islands so that the students sampling zooplankton (the animals that eat phytoplankton) could use my data to supplement their own. The other seven sites represented a range of conditions that I wanted to look at so I could search for trends between phytoplankton abundance and environmental factors, including salinity, fluorescence and depth of water.

I planned to begin cell counts aboard the Thompson, but I quickly realized that even while wearing a seasickness patch, I cannot look through a microscope on a ship unless I want to spend the next half-hour on the fantail trying to keep my lunch down. Even though this meant more work back home, it allowed me to spend more time outside doing whatever tasks were needed while looking out at the deep blue ocean. This also gave me time to watch sunrise and sunset. On a particularly memorable morning, I got to release one of the storm petrels that had crash-landed on deck. These small, sea-faring birds use the moon to navigate, but, confused by the flood lights on the CTD, they ran into the ship. Thankfully, Rika, the graduate student with us, found boxes for the birds to recover in and we were able to watch them fly away with the dawn. Despite the hours of work, I found ship life incredibly relaxing. Perhaps it was due to the calm seas and beautiful weather, but sitting on the bow of a ship, watching the stars appear, without the distractions of city life, reminded me how immense the universe is and how lucky I am to be part of it.

Back on land, the relaxation didn’t last as I spent hours using a microscope to count and identify many species. Phytoplankton are important because they photosynthesize the way plants do, collecting carbon in their bodies that will eventually sink to the ocean depths and join sediments. Like terrestrial plants, blooms of phytoplankton remove carbon dioxide from the air, which is a natural way of controlling greenhouse gasses. I was able to estimate the biomass of phytoplankton in the water at each of my sample locations. From there I used an equation to estimate the total carbon in the diatoms and dinoflagellates at each site. Studying a process linked to climate change by looking at beautiful cells under microscopes — what could be better?

by Sarah Wiesner

Sarah Wiesner is a graduating senior in biological oceanography.
How Do You Study a Moving Target?

One of the most exciting (or in my case, terrifying) moments happened during the final two days of the cruise. Despite all of our careful planning, we found ourselves frantically chasing a moving eddy in the lee of the islands. Eddies are temporary features caused by winds and currents. They form regularly near Hawaii and may be up to 100 km across. Physical changes eddies cause in the ocean make them visible in satellite data collected by NOAA, NASA, and the US Navy. Seems like it should be pretty simple to look at the data, locate a few sampling stations in the eddy, and take some samples, right? Not exactly, eddies move. Scientists can predict where they think the eddy will be up to a month in advance, but that doesn’t mean the eddy will behave according to predictions. It’s a little like predicting the weather in Seattle.

The eddy we planned to study shifted eastward after the cruise began, and all of the carefully planned locations of our sampling stations went out the window. Lucky for us, the ship’s instruments continuously collect sea surface temperature and Acoustic Doppler Current Profiler (ADCP) data that we could use to figure out what direction the eddy was traveling, and tell us when we were in the right place to collect samples for the biological and chemical oceanographers in the group. The ADCP projects acoustic waves of around 70 kHz into the ocean. The way the waves reflect back off of particles in the water to the ship’s sensors tells us the current’s direction, and even the best depth for finding fish and crustaceans. The ocean current wizards in our group, Matt, Zach, and Charlie, translated this data for the rest of us, and spent all night tracking eddy currents until we found the new location of the eddy center at 4:30 in the morning. The biological samples we collected in the eddy were amazingly diverse, and included tiny cephalopods, pteropods — a type of marine snail with wings, radiolarians, copepods, fish larvae, and lots of shrimp.

by Elizabeth Ewings

Elizabeth Ewings is a graduating senior in biological oceanography.

Words of Wisdom

This past December, in the days before leaving for our week-long cruise around the Hawaiian Islands, I cast my mind back to the spring of 2005, when I was an undergraduate preparing for my own first adventure at sea. I remember wondering what it would be like to leave all sight of land for the first time in my life, wondering what types of marine life we would see. I vaguely remember wondering if a hurricane-force storm was going to sink our ship, taking all hands down with it to the watery depths. (You never know, I told myself.)

Now, five years later, I was about to head to sea again, this time as a teaching assistant for the undergraduate senior thesis class. I presumed that the students in the class would be feeling the same excitement, curiosity, and perhaps even the same morbid trepidation that I had felt then. This time, I decided to take a different tack: what would the students not be anticipating? What should I expect for them, and how should I prepare accordingly?

Seasickness, I thought. Oh, sure, I had overheard some of the students briefly mentioning it, but surely it wouldn’t be so bad, they said.

I packed my suitcase with enough motion-sickness pills to feed a small army.

Throughout the eight days we spent aboard the R/V Thompson, it felt like a series of déjà vu over and over again. Watching the students getting giddy as the boat rocked in the increasingly large waves, I smiled as I remembered my own first experience with sea legs, and then urged them to tie all the equipment down as quickly as possible. When the first sediment core hit the deck, it brought back memories of mud facials on my first coring cruise — and as if on cue, one of the students soon wandered by me bejeweled in diatomaceous ooze. And yes, the seasickness set in. My cache of motion-sickness pills lasted about as long as a bottle of rum in a roomful of pirates. But every student persevered in spite of it, and someone was always on hand to man the CTD or assist in taking net tows whenever help was needed.

And this, ultimately, was my lasting impression of our Hawaiian adventure. Going to sea and carrying out a research project of your own design is no easy task; yet through their hard work and their collaboration, both at sea and afterwards, the students made this cruise a success. And while we all know that the entire endeavor, from research proposal to final manuscript, is a challenging one, I hope that the experience provided a step forward in preparing young scientists for future lives as oceanographers... as long as they remember their seasickness pills.

by Rika Anderson

Rika Anderson is a graduate student in biological oceanography studying viruses and hydrothermal vents.
Following Spices
The Story of SoundCitizen

The history
In the autumn of 2006, during a field research trip for Ocean 442, Oceanography of Puget Sound, Dr. Rick Keil, the professor, and three students, Jaqui Neibauer, Kailey Genthal, and Brittany Forrest were discussing the connection between individuals and Puget Sound. Using that conversation and the support of Dr. Keil’s lab as a foundation, Neibauer and Genthal began testing the West Point sewage outflow for vanilla, thyme, and cinnamon. These spices were chosen because the lab could already test for them and they can be found in the foods people eat, and thus can be traced back to people via the water from the sewage system. This link was evident in the first data set the students analyzed. When they described this connection in their first press release, the undergraduates enjoyed a touch of fame. Members of the Puget Sound community wanted to know if they too could help collect water samples, to see what spices could be found in their part of the Sound. But there weren’t any supplies that could be lent out to the community.

Two years later Neibauer and Genthal had graduated, but Forrest was still working on the as-yet-unnamed Puget Sound spice project. More and more people had been asking to help collect water samples — people from all over Puget Sound, many of whom were not scientists. Meanwhile, Forrest had been testing various bottles and other gear that could be given to the community as a sampling kit. Finally, on one Friday afternoon, Forrest and Dr. Keil put together the first 20 sampling kits, within three days they had all been given away. Two months later they gave out 200 revised kits at a COSEE (Centers for Ocean Sciences Education Excellence) conference, and from there the project became SoundCitizen and grew to include three lab technicians and more than eight undergraduates.

The lab
Even now, SoundCitizen is run primarily by undergraduates, and the hierarchy is based more on experience than anything else. Kelsey Powers has been working for SoundCitizen since 2008 and is set to graduate this year. She thinks SoundCitizen is extremely supportive of undergraduates. “A lot of labs just have undergrads to wash dishes and prepare solutions, but our lab is unique because we’re involved in every step of the process — from receiving a sample to analyzing it.”

Normally it’s extremely expensive to process samples, so undergraduates rarely get to do their own research. But recently the SoundCitizen lab has provided multiple undergraduates with the supplies and lab space to do their own projects. Powers, who collected orca scat for her senior project, says she had the opportunity to do so “because Rick really supports undergrads being involved.” These personal research projects have used samples collected from as close as the Strait of Juan de Fuca and as far away as Nepal and Tanzania.

Forrest, now graduating and working as the lab manager and “undergrad manager,” thinks that it’s a win-win scenario: as much as the undergraduates receive in support, the lab receives in enthusiasm and effort. “They’re here because they enjoy science. I feel like we’re working with an elite group of individuals — they’re very mature and driven and I think they’re going to achieve a lot. It’s very fulfilling working with them. And this organization honestly wouldn’t be alive without them,” says Forrest. The best part about working for SoundCitizen is honestly wouldn’t be alive without them,” says Forrest. The best part about working for SoundCitizen is that everyone, including the undergrads, are “on the same level” and can participate in brainstorming sessions. No one complains about doing the dirty work like washing bottles and you can get help when it’s needed. As Forrest says, “We’re all excited about what we’re doing.”

Another unique aspect to SoundCitizen is its treatment of community members. As Powers puts it, SoundCitizen is “trusting community members to collect reliable samples without contamination.” And from these samples SoundCitizen is collecting good data that they in turn use to educate the community.

By focusing on spics in the water, community members can learn about their personal connection to Puget Sound without feeling guilty about what they do in their daily lives. In addition, she says, “littie kids understand cookies better than they do Clorox bleach,” although both have the same connection to Puget Sound. So why not use the fun example? A lesson doesn’t have to be scary to be understood.

To learn more about SoundCitizen and to request your own sample kit visit: www.soundcitizen.org

by Rachel Faye Lipsy

Rachel Faye Lipsy is a graduating senior in physical oceanography with a minor in Program on the Environment (PoE).
Bob Morris

OCEANOGRAPHY HAS A FREQUENT HABIT of recruiting a variety of scientists from different backgrounds and fields. With its interdisciplinary nature, it seems that every researcher has a unique training, education, experience, and above all, life history. UW Biological Oceanographer Robert Morris is no exception. Though he currently researches ocean microbes, when asked how he got into his line of work, he begins with a pause, and thoughtfully replies “It was sort of a long, nontraditional route.”

Serving as an embassy guard in the Marines, Bob initially began as a George Mason undergrad focusing on Russian studies, planning on becoming a diplomat. It wasn’t until he took a biology class that he immediately knew what he wanted to be — a biologist. Working and then joining the Peace Corps eventually led him to graduate school at Oregon State, working in a microbiology lab. It was there that he came up with the first quantitative estimates for SAR11 bacteria, one of the most abundant microbes in the ocean. Bob’s findings with the lab represent a major discovery in the field of biological oceanography. After getting his PhD at Oregon State, he studied physiology at Cornell, did a post-doc in Santa Barbara, and then came to the UW to divert his focus to oceanography. He now studies heterotrophic bacteria and teaches various aspects of biological oceanography to UW students.

Do you know now what it was about biology that made you want to focus in that field, as opposed to Russian studies?

For me it was the aspects of molecular and microbiology. Studying things such as how cells function was fascinating for me, such as the complexity of the cell and how evolution has come up with these really unique and intricate ways of doing things. And it was everything in biology, not just molecular, but all the way up to living systems like our bodies, and how intricate they can be. But as I took more and more courses I really liked the idea of little molecular machines doing all the work in the cells, and that we can really start to understand how all of those work.

What exactly is your current research interest, given your range of educational interests?

Now I study heterotrophic bacteria, so bacteria that basically assimilate dissolved organic matter in the oceans. They don’t fix CO2. They take up organic matter produced by phytoplankton.

Sounds like a unique research topic. What about that interests you?

Well I mostly study the open ocean. Because the oceans are so big and the oceans are so deep and there are so many bacteria in every milliliter of seawater, they have a really important role in cycling of carbon and other nutrients on the planet. For me the interest really lies in studying seawater that’s really clear out in the open ocean. It’s easier to work with (laughs), and it’s also really important. Basically your conclusions can have really important implications for global processes.

Can you tell me a little bit about SAR11 bacteria? That’s a big discovery that you were a major part of.

I was in Steve Giovannoni’s lab when Mike Rappe cultured the first SAR11 isolate, and then I came up with the first quantitative abundance estimates for SAR11. It was a really exciting time to be in a laboratory, to have these two big discoveries happening simultaneously and to be involved with both of them. If I wasn’t hooked before, I was hooked after that. If you’re ever in a lab where something exciting like that is going on, it’s pretty contagious.

Can you briefly explain the implications of this discovery?

[The 165 ribosomal RNA genes in SAR11 bacterium were first identified], by Steve Giovannoni in the Sargasso Sea once molecular biologists started looking at diversity, by looking at these genes. These genes were identified and, following that, in all the other studies that were conducted, SAR11 genes were identified. So suddenly, here’s this new group of organisms where all we know is that it’s present in seawater from this unique gene that it has. When we start looking at samples all over the ocean, we find that it’s everywhere. And not only that, but it’s one of the most frequently identified genes in seawater, suggesting that it’s very abundant.

About 10 years passed, and there were some questions as to whether or not it was really that abundant, because there are biases with these molecular approaches. So basically the gene was abundant, but is the cell abundant? That’s what we didn’t know. My job as a graduate student was to use an approach that allows us to count SAR11 cells directly in seawater. When I got that to work I, for the first time, had data that showed that SAR11 was in fact about 25–30 percent of the cells globally. That’s in the surface water. In the deep ocean there are about 15–20 percent. So what that means is that in every single milliliter of seawater, there are 500,000 to 1,000,000 SAR11 cells. If you figure out how much carbon is in a cell and extrapolate that to the oceans, because they’re so abundant, that’s an enormous amount of carbon and nutrients. Quantitatively to know that not just the genes, but the cells were abundant was an important finding.

You taught Ocean 430 [Biological Oceanography] for the first time recently. What other teaching experience have you had so far with undergrads?

I taught Ocean 220 [Introduction to Field Oceanography] and Ocean 443 [Design of Oceanographic Field Experiments] and 444 [Advanced Field Oceanography], but those are very different classes because they’re field based, and they’re co-taught. Ocean 430 [Biological Oceanography] was really intimidating for me at first because it was my first relatively large undergraduate lecture course that I was the only instructor for. I had also taught in Bermuda and had some undergraduates, but again it was co-taught and it wasn’t the same. So I was pretty nervous going in, but it turned out to be a really rewarding experience.

What was your overall impression of interacting with undergrads in general?

The students were engaged. I was really impressed with the level of students we have in our oceanography major. They were all really talented students. I was almost pleasantly surprised, because you hear rumors, you know? It’s a select crowd. These are oceanography majors — they picked a hard major. But you hear rumors from other professors and from society in general about “kids these days” all being on their cell phones when you’re lecturing (laughs). But everybody was really involved and I didn’t have any of those problems.

by Greg Ikeda

Greg Ikeda is a junior majoring in oceanography and minoring in quantitative science.

To learn more about the work done in the Morris Lab, and to watch their videos, please visit: morrislab.ocean.washington.edu
The bright spring day in May was perfect for sitting by the Drumheller fountain. Instead, I was attending organic chemistry lab in the basement of Bagley Hall. It was about a hundred degrees and I could see a shimmer of benzene fumes evaporating from the test tubes sitting on the lab bench. I rather liked the smell of benzene, not realizing at the time that it’s carcinogenic, but the combination of heat and vapors made the lab stifling. I began thinking about whether I wanted to spend my working life as a laboratory chemist, and by 2:30 when I left the building I was sure the answer was no. I walked down to the Oceanography Teaching Building and changed my major.

Of course it was not quite as simple as that. I was born and raised in Anchorage, Alaska. Although Anchorage is a large city today, when I was young it had a population of only 50,000, a small community surrounded by miles and miles of wilderness. My father and uncle loved to fish, and I joined them on small boats, catching salmon, halibut, and crab. I spent hours beachcombing, looking under rocks for interesting invertebrates and picking up flotsam. But when I first chose a major I thought I should pick something practical, like chemistry, since oceanography did not seem like something that would lead to a steady job. I was wrong about that.

In 1975 I was awarded a BS degree with a double major in chemistry and chemical oceanography. Two of my professors, Dr. Roy Carpenter and Dr. James Murray, encouraged me to go to graduate school, although Roy was partial to Scripps and Jim to Woods Hole Oceanographic Institution. I applied to both, as well as Oregon State, but chose WHOI, partly because of Jim’s enthusiastic descriptions. Five years later, after conducting research on sediment biogeochemistry with Dr. John Farrington aboard ships off Peru and South Africa, in the north Atlantic and Sargasso Sea and Gulf of Maine, I had earned my PhD. I went on to Scripps for a postdoc with Dr. Peter Williams, studying the sea surface microlayer off California and Mexico, an ideal project because the work could only be done under dead calm conditions that allowed sea surface slicks to form. In all these endeavors my UW double major gave me the background that I needed to succeed. I had lab and field skills and knowledge of the oceans that many of my fellow graduate students, who had been strictly chemistry majors, did not have. The days aboard the small boats of my childhood were also helpful. I rarely got seasick, and I had a reserve of practical fixit skills learned from my father, who was an electrician and plumber as well as a knowledgeable weekend sailor.

“'My father and uncle loved to fish, and I joined them on small boats, catching salmon, halibut, and crab. I spent hours beachcombing, looking under rocks for interesting invertebrates and picking up flotsam.” – Dr. Susan Henrichs

However, Cape Cod and southern California were not my idea of good places to settle, and when there was a job opening at the Institute of Marine Science at the University of Alaska Fairbanks, I decided to return home. Of course Fairbanks was not quite like Anchorage; among other things it is 300 miles from any seawater, and it can be bitterly cold, down to -65° F. On the positive side, it has wide open spaces, crystal blue skies, views of the aura and Denali, and friendly, accepting people, and it has been a great place to raise my four children.

I started at UAF as a faculty member 29 years ago, in January of 1982. Like most new faculty I didn’t have any formal training in teaching or graduate student mentoring, but I did have the examples of many of the UW and Scripps faculty and WHOI scientists who helped to educate me. These stood me in good stead during those early years, although I’m sure the students in my first classes saw some rough edges. I taught mainly at the graduate level, but also taught a large enrollment introductory oceanography class for more than ten years.

IMS had (and still has, within UAF’s School of Fisheries and Ocean Sciences) active research programs around the 6640 miles of Alaska’s coastlines. As a faculty member I worked with graduate students and a research associate, Dr. Susan Sugai, who earned her Master’s from UW. We conducted research in the Bering Sea and Gulf of Alaska, which are some of the most productive waters in the world in terms of fisheries, and some of the most dynamic in terms of winds and waves. During some research cruises, like a memorable one aboard the R/V Wecoma in 1998, there would be weeks of nearly continuous storms, with winds gusting over 70 knots. Many nights it was impossible to stay in a bunk and we would drag our mattresses onto the floor, but still it was difficult to sleep. Eating was also nearly out of the question—even if one was not suffering from mal de mer, sometimes sitting in a chair was not possible. On some trips the freezing spray would coat the decks, making them treacherous, but more importantly increasing the weight of the superstructure. A top-heavy ship in heavy seas is not a good thing. Once, all hands including the science party were sent out to chip ice off the ship to reduce the danger of capsizing.

All this was a great adventure at age 30, but as 50 loomed it was getting a bit less enjoyable. From 1992 to 2003, I had served as the Program Head of the Graduate Program in Marine Sciences and Limnology, a position similar to department chair. I enjoyed working with students, and so when the Dean of the UAF Graduate School and Vice Provost position came open, I applied and (somewhat to my surprise) was selected. Graduate School Dean was a wonderful job; in my case it offered the opportunity to help develop a doctoral program in Indigenous Studies focused on Alaska Native languages and culture. I became involved in many of the tasks of higher administration, including budget development and institutional accreditation. In 2007 the long-term UAF Provost retired. Although when I left the faculty my ambition was only to be Graduate School Dean, the opportunity to influence the course of the entire University was tempting. So, here I am.

The Provost’s job, as my predecessor used to say, is easy except for the parts that involve people. Of course, it’s all about people. A typical day involves at least four or five hours of meetings, plus answering fifty e-mails and reading dozens more. Most years I’m responsible for writing about a hundred administrator, faculty, or staff evaluations, helping to prepare the University’s operating budget, and writing several institutional performance reports. For the past two years, my office has been working on a self-study for institutional re-accreditation, and soon we will begin the accreditation cycle again with a year devoted to strategic planning. Perhaps this doesn’t sound like much fun, but most days it is. And it’s all due to a hot spring day almost 40 years ago.
RECENTLY I FOUND MYSELF LYING ON MY BELLY in the middle of the road. Did I mention it was pouring rain and freezing cold? No, this wasn’t the result of a nervous breakdown or drunken stupor, just a typical day “getting the job done” in the career that I chose. A lot has happened since earning my PhD in Oceanography from UW almost three years ago. I hope this article gives you an idea of the types of work that I do as an environmental consultant with NewFields and how my experiences at UW helped me get to where I am today.

The simplest way to describe the job of a consultant is as a professional problem solver. Clients come to us seeking expert recommendations based upon the investigations we conduct. This isn’t a one-man job. Luckily I work with a team of very capable scientists who are comfortable tackling just about any marine-based investigation that our clients can come up with. One of the biggest differences between academic research and consulting is the much shorter timeframe in which studies need to be designed and conducted. The fast pace keeps things exciting. Favorite aspects of my job are the diversity of projects I participate in and that most involve improving the health of Puget Sound. Recently I have participated in independent studies involving sediment transport from an eroding beach near the mouth of the Columbia River, assessing benthic habitat in Willapa Bay, and identifying contaminant sources to Puget Sound.

So how does my work result in me lying in the middle of the road in the rain? When it’s raining hard in Seattle, chances are you’ll find me tracing contaminant sources to the largest contributor of pollutants to Puget Sound...stormwater. As rainfall drains off roofs and over pavement, it picks up a toxic mix of oil, grease, and heavy metals from cars, pesticides lethal to aquatic life, nutrients that promote algal blooms; and lots of other nasty substances from industrial properties. During large storm events these pollutants are washed into Puget Sound untreated. Goals of these stormwater studies include differentiating residential and industrial “chemical fingerprints” and identifying primary contaminant source locations. It’s not the most glamorous work, but I find it endlessly interesting and it’s actually a lot of fun.

The knowledge I acquired while at the School of Oceanography made me the type of well-rounded environmental scientist that can flourish as a consultant. The job requires you to play many diverse roles. I am involved in virtually every aspect of an investigation; pricing, study design, fieldwork management, data analysis and interpretation, and report writing. Exposure to GIS and methods of spatial data analysis has been invaluable, as nearly all studies I am involved in require spatial interpretation of the data in order to identify patterns. A truly underappreciated skill is the ability to efficiently mobilize people and equipment to conduct fieldwork. Not enough can be said about the importance of concise scientific writing. Your data is only as good as your ability to report it. Beyond simply interpreting and reporting data, my clients also seek specific recommendations on how to move forward. This requires the ability to make firm, defensible decisions that are supported by the science.

Last October six colleagues (four of which are UW Oceanography alumni) and I took a big gamble. The large consulting corporation (45,000 employees) that we worked for was interfering more and more with our ability to work on the types of local projects that we enjoyed and had proven ourselves to be good at. As a result we simultaneously resigned from our jobs in order to venture out on our own. This was quite a liberating experience. We had kicked loose the shackles of the corporate consulting world and were now free to pursue whatever type of work intrigued us. We quickly merged with NewFields, a small group of multidisciplinary specialists providing solutions for a wide variety of environmental problems. Now here we are a few months later operating out of our new office in Edmonds, WA. We’re looking forward to the end of the rainy season and beginning of another busy summer of fieldwork on the Sound.

“When it’s raining hard in Seattle, chances are you’ll find me tracing contaminant sources to the largest contributor of pollutants to Puget Sound...stormwater.” — Dr. Jon Nuwer
Stopping by Vents on a Marine Snowy Evening

Whose vents these are I think I know. The Doppler is all messed up though; They will not see me stopping here To watch the chimneys slowly grow.

My little robot must think it queer To stop without a cursor near Between the nodes and survey lines The deepest dive of the year.

He gives his tether lines a shake To ask if there is some mistake. The only other sound's the beep Of radios and computer mistakes.

The vents are lovely, dark, and deep, But I have promises to keep, And miles to go before I sleep, Literally miles to go before I sleep.

- Adaptation of Robert Frost’s “Stopping by Woods on a Snowy Evening” by Diane Perry