You can have your greens and bacon (flavor), too
Tara Kulash | The Oregonian/OregonLive By Tara Kulash | The Oregonian/OregonLive
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The tug-of-war between vegans and bacon lovers may be coming to a draw.

Oregon State University researchers have patented a dulse seaweed strain that, when fried or smoked, tastes similar to the popular, salty pork product. And while dulse is already on the market as a cooking ingredient, this particular strain grows faster and researchers are experimenting with broadening its use in dishes.

Dulse, a red algae that grows along the Pacific and Atlantic coasts, is full of minerals, vitamins and antioxidants. In dry weight it packs 16 percent protein.

Chris Langdon, a professor in OSU’s fisheries and wildlife department, bred a fast-growing strain about 15 years ago – for sea snails.

He said the idea was to create a super-food for abalone, a popular dish in Asia. The dulse would absorb the carbon dioxide and ammonia produced by abalone and turn them into protein and nutrients. In turn, the abalone eats the dulse. This technology is also used in Hawaii.

Langdon said he stopped the project in the late ’90s but continued to grow the dulse without abalone.

Chuck Toombs, an instructor in OSU’s College of Business, stopped by Langdon’s office in the Hatfield Marine Science Center a year ago looking for projects for his business students.

He saw an opportunity to expand on the seaweed’s potential and took it to OSU’s Food Innovation Center.

Michael Morrissey, the center’s director, said this strain is promising because of how quickly it grows. Eventually, it could make the product more affordable. Right now it can sell for upward of $60 a pound.

The Oregon Department of Agriculture must have seen the strain’s potential, too, because it approved an OSU grant for research. It also designated dulse as a specialty crop – a first for seaweed.

The research team brought on Jason Ball, a Chicago-native chef who previously researched seaweed dishes in Copenhagen.

He said he’s worked with dulse before, but this project allowed him to get as creative as he wanted.

“I just kind of went crazy actually.”

Ball said he brainstormed about 50 ideas with others and experimented with making instant ramen, a salt-substitute in sourdough, and even beer.

After panels taste-tested all the products and the team considered factors such as shelf life, he said the team narrowed down its first commercial product to a salad dressing that can be sold in grocery stores. The group will likely pursue a rice cracker after that, followed by peanut popcorn brittle that incorporates the bacon flavor.

This summer the team hopes to look into the strain’s raw use in restaurants.

Ball said out of all the dulse he’s worked with, Langdon’s strain is the best quality. The controlled environment where it grows provides a consistent batch and he’s excited for its commercial use.

“From a chef’s perspective, it’s exactly what you want.”
Transitions

**Dr. Lavern J. Weber**, co-Founder and first Superintendent of our Marine Experiment Station, passed away on May 5, 2014.

Dr. Weber was the first resident Director of the Hatfield Marine Science Center, serving in that capacity from 1977 until his retirement in 2002. Under his guidance both COMES (established in 1989) and the Center developed and expanded, forming an ever stronger collaborative research base as federal and state agencies joined OSU at the Newport location.

If you’d like to make a donation to the COMES Founders Scholarships in memory of him, you can do so at marineresearch.oregonstate.edu

**Stella Coakley**, Associate Dean for the College of Agricultural Sciences, has officially retired but we’ll still see her on occasion. As Emeritus Professor, she’ll take on special projects, including work on faculty and unit leader development/mentoring and assuming an active role with the ER Jackman Friends and Alumni Board. Stella, who has supported COMES, will be sorely missed, but her background and experience will prove invaluable in working with the college’s unit leaders, in helping them achieve greater success for themselves and their units.

**Dan Edge**, formerly head of OSU’s Department of Fisheries & Wildlife, has replaced her as Associate Dean. Dan has also served as chairman of the Oregon Fish & Wildlife Commission and as president of OSU’s Faculty Senate, and is well-respected in the professional community.

(Tory Hittner did a great profile of Dan last year — read it on page 3)

**Janet Webster**, HMSC’s Librarian, retired on January 1 after successfully overseeing the completion of a user-friendly remodel of HMSC’s Guin Library. Janet’s support to COMES has been invaluable, particularly her leadership with open access publications and OSU’s Scholars Archives. And her contributions to HMSC have eased major transitions for hMSC, as she’s stepped in and served as both acting and interim director of the center on several occasions.

She initiated HMSC’s Tech Talks series, which offer an expert understanding of new trends and technologies, such as 3-D printers and updated social media outlets for scientists and led Guin’s transition to on-line journals. Her reconfiguration of the Library provided an additional class/conference room and a smaller group gathering room. Her rearrangement of the stacks has also given faculty, staff and students a far more congenial meeting, reading, or studying environment. As HMSC grows into the Marine Studies Initiative, we expect to see her back here on an irregular basis, certainly serving in more than role.

**Guin Library Update**

**Mary Markland**, formerly a librarian at the University of North Dakota Health Sciences Library, has been appointed Head Librarian at HMSC’s Guin Library. Markland earned a BS in Biology with a French minor from Iowa State University, Ames IA, and an MA in Library and Information Studies from the University of Wisconsin-Madison. She is the third Head Librarian in HMSC’s 50-year history, succeeding Janet Webster, who retired after 25 years in the position, and Marilyn Potts Guin, Librarian from 1976 until her death in 1989, for whom the Guin Library is named.

*For more about the Library, http://guin.library.oregonstate.edu*

**College of Agricultural Sciences Updates**

**Sam Angima** replaces Bill Braunworth and Mike Borman, who consecutively served as program leader for OSU’s Agricultural Sciences and Natural Resources Extension Program. Angima will assume a new position of assistant dean for outreach and engagement that will bridge OSU’s College of Agricultural Sciences and the Division of Outreach and Engagement.

**Jerri Bartholomew**, director J.L. Fryer Salmon Disease Laboratory at OSU, is the new head of Microbiology. Bartholomew replaces Theo Dryer who retired in 2014.

AMBC Manager **Bob Moch** announced his retirement effective May 1. His successor, **Debra Crawford**, formerly with the Port of Portland, became HMSC Business Manager effective April 27, 2015.
On the Edge of greatness: impacting lives on campus

Oregon State fisheries and wildlife department head Dan Edge has an enviable collection of ties—an assortment that appears to be just as colorful and creative as the man himself.

Yet perhaps even more impressive than Edge’s actual tie collection is the amount and quality of relationships he has amassed during his time at Oregon State University. Edge serves not only as a wildlife and ecology professor and department head, but also as the Faculty Senate president.

“I’m a wildlife ecologist,” Edge said. “I joke that 12 years ago, I went from being an ecologist to a psychologist. I mostly fix problems now.”

Colleagues and students stressed the good-natured personality and knack for making personal connections that make Edge such a vital part of the university.

“He’s just very generous and very engaging,” said Nancy Allen, fisheries and wildlife academic adviser. “He’ll take time out of a busy day to just chat with someone who walks through the door.”

Edge has proven to make an impression on students as much as his co-workers.

Andrew Futerman, a senior studying fisheries and wildlife, said Edge is the main reason he decided to attend Oregon State. Futerman was on leave from a tour in Afghanistan and visiting campus when he was pulled aside and told that the department head of his intended major wanted to speak with him. Futerman was floored that someone in the department knew he was visiting campus and walked to Edge’s office.

The two spoke for some time before Edge looked at his watch, packed up his things and took Futerman out to the Bombs Away Cafe. “He bought a glass of wine and I bought a beer and he told me not even why he wanted me to come to this school, but what the university had to offer me and why … I would really fit in here,” Futerman said. “It almost felt like I was being recruited to come here and it was very personal.”

Futerman’s experience is not an anomaly in his department. Futerman said Edge has invested similar amounts of personal time in many of his peers. “I still don’t know how (Edge) knew I was on campus that day or that I was a veteran and looking at the school,” Futerman said. “But he was a big, big reason why I decided to come here.”

Edge’s openness and dedication to his colleagues and students make his department a fun and effective place to work, several employees said.

“He comes from this perspective where we’re like family here,” said academic adviser Liz Kelly. “We’re here to support you … and we’re all really excited about it.” That sense of family is fostered even further with department parties, which Edge and his wife host at their home biannually.

But work, of course, serves as the priority for Edge and he tackles everything he does with careful consideration and effort. As the newly elected president of the Faculty Senate, Edge hopes to continue promoting beneficial open lines of communication among the faculty, administration and students. Edge said his position serves mainly as a liaison to help facilitate the shared governance of university leadership.

With OSU’s new board of trustees earning full legal power this coming July, Edge said his primary goal for the year will be developing a good, working relationship between the board and the Faculty Senate. So far, the transition seems promising.

“I’m very pleased with how the board looks,” Edge said. “They’re very bright people and very interested in what happens at Oregon State. I’m optimistic the … advantages will outweigh the challenges.”

In addition to establishing a relationship with the board, Edge hopes to further promote faculty and student welfare. According to Edge, an internal report is being conducted to address several concerns faculty have expressed regarding compensation, fairness and trust.

“It might simply be a conversation with the president and provosts saying we’ve got the resources to fix it; you guys need to buck up,” Edge said.

Edge’s involvement at OSU is widespread. He’s been an advocate for faculty at the OSU-Cascades campus, extension centers and even has strong ties to OSU’s online presence. For more than 20 years, Edge has worked at the forefront of distant education, helping to build the Oregon State Ecampus. According to Edge, the OSU Ecampus department of fisheries and wildlife is currently the only such online field available in the nation.

It appears his impact can even go into cyberspace.
2-Plus Pounds of Tuna

Americans consume 15.0 pounds (6.8 kg) of seafood per person in 2011 with canned tuna being the second most consumed seafood (about 2.25 pounds per person) in the U.S. after shrimp. Canned tuna is commonly produced from pre-cooked tuna meat manually separated from the skin and bones after cooking. There is a potential for the pre-cooked meat to be contaminated with *Staphylococcus aureus* during manual handling, which might lead to formation of heat-stable enterotoxins in the tuna meat before canned products are commercially sterilized.

Professor Yi-Cheng Su of the Seafood Research and Education Center investigated growth of enterotoxin-producing *Staphylococcus aureus* and time-temperature combinations needed for enterotoxin production in pre-cooked tuna meat. The study reveals that both albacore and skipjack tuna meat can support growth of enterotoxin-producing *S. aureus*. However, it required at least 7 hours of incubation at 37°C or 10 hours of incubation at 27°C to allow the counts of *S. aureus* to increase by greater than 3 log CFU/g in tuna meat. No enterotoxin was detected in samples incubated at 37°C for 12 h or at 27°C for 16 h. Frozen pre-cooked tuna meat should be used within 6-8 h of thawing for producing canned tuna to avoid product spoilage and potential enterotoxin production by *S. aureus* in contaminated pre-cooked tuna meat.

Professor Su, who is head of the Seafood Microbiology & Safety Lab, is the recipient of the 2014 Chinese American Food Society Distinguished Service Award. For more about seafood safety, visit the Seafood Lab’s website: http://osuseafoodlab.oregonstate.edu

Recent Defenses

Sheanna Steingass, MS (Markus Horning) March 2014
Foraging behavior of the Pacific harbor seal (*Phoca vitulina richardsi*) in the Pacific northwest and potential impacts of coastal hypoxia on foraging efficiency.

Alana Alexander, PhD (Scott Baker) September 2014
The influence of social structure and molecular evolution on genetic diversity in the sperm whale.

Sophie Pierszalowski, MSc (Scott Baker) September 2014
The influence of local fidelity and recruitment on population dynamics and specialized foraging of humpback whales in Glacier Bay and Icy Strait, Alaska.

Renee Bellinger, PhD (Michael Banks) December 2014
Genomic studies for Chinook salmon migration: from stock-specific differences in ocean distribution to characterization of transcriptome profiles to gain insights into mechanisms of magnetic and olfactory cue perception.

Renee Albertson, PhD (Scott Baker) December 2014
The worldwide phylogeography and local population structure of the rough-toothed dolphin (*Steno bredanensis*).

Selene Fregosi, MSc (Markus Horning) May 2015

Erin Fedewa, MSc (Jessica Miller) May 2015
Pre- and Post-settlement Processes of Northern Rock sole (*Lepidopsetta polyxystra*) in Relation to Interannual Variability in Temperature and Productivity in the Gulf of Alaska

LaTreese Denson, MSc (David Sampson) May 2015
Data Needs for Spatially Explicit Stock Assessments: A Simulation Study Using Stock Synthesis

Ryan Flaherty, MS (Gil Sylvia) June 2015
Tags vs. Genetics: a comparison of tools used to describe Chinook salmon distributions in the California Current
Pacific Focus on Fisheries Dynamics

In July David Sampson made a trip to South Korea to give the keynote address to the annual meeting of the Korean Federation of Fisheries Science and Technology Societies held in Busan. David spoke on “Drivers of fishery dynamics: Examples from the US West Coast” to highlight factors other than fish biology, stock assessment and economics that can have a major impact on fisheries. These other factors include the ocean environment, technological developments in fishing and fish processing, and changes in national policies and legislation.

After the conference David was hosted by Professor Byungsoo Park for a seminar and visit at Prof. Park’s university, Gyeongsang National University, in Tongyeong. Prof. Park was a visiting scientist at OSU during 2005-2006, while on sabbatical from Gyeongsang National University.

David also visited Seoul where his former student Yong-Woo Lee took him on a two-day tour of the city. Yong-Woo completed his MS in 1997 and his PhD in 2003, both under David’s supervision. His MS thesis was entitled “Using Oregon Trawl Logbooks to Study Spatial and Temporal Characteristics of Commercial Groundfish Species Associations”. His doctoral thesis was entitled “Oceanographic Effects on the Dynamics of Food Habits and Growth Conditions of Some Groundfish Species of the Pacific Northwest.” Yong-Woo did a post-doc in Seattle at the Alaska Fisheries Science Center and followed that with a faculty position in Arkansas. He later returned to the PNW for a while with the Washington Dept. Fish and Wildlife, and then moved to Texas where his wife, who is a pediatrician, did her residency. They are now back in the PNW, living in the Olympia area, and Yong-Woo is working for the Northwest Fisheries Science Center.

Hatfield Marine Science Center 50th Anniversary

Join us on August 7 as we honor our past and celebrate our future at the OSU Hatfield Marine Science Center in Newport, OR. A list of events can be found on the HMSC website, along with a number of historical documents and photos from the past. http://hmsc.oregonstate.edu/main/50th-anniversary-hmsc

The Marine Mammal Institute Recently Welcomed

Ari Friedlaender, formerly at Duke, a cetacean ecologist with a strong tagging program.
Daniel Palacios, formerly with the NOAA Environmental Lab in Monterey, an ecological modeler who will be mining MMI tagging data to characterize cetacean habitats and developing new projects.
Leigh Torres, from New Zealand, a spatial ecologist with a behavior emphasis and Sea Grant out-reach responsibilities.
A new study by MMI’s Dr. Markus Horning found the first indirect evidence that high levels of predation previously observed in the endangered population of Alaskan Steller sea lions may be due to sleeper sharks. For more information, read the excellent article Autopsies from space: who killed the sea lions? at https://theconversation.com/autopsies-from-space-who-killed-the-sea-lions-34106

“Although group size varies, the behaviour of the whales does not,” says Professor Scott Baker of the Marine Mammal Institute, at Oregon State University. A founding member of the South Pacific Whale Research Consortium, Scott has studied humpbacks for more than 30 years and has helped to chart typical aggressive behaviours of males in competitive groups – some of which can result in serious injury or death.” For more on Scott’s work, visit his website, http://mmi.oregonstate.edu/ccgl

Sheanna Steingass, PhD student in the Pinniped Ecology Applied Research Laboratory, is continuing her research on Pacific harbor seals in Oregon. As part of her research project on the foraging ecology of harbor seals, she will be attaching up to 13 Wildlife Computers Spot5 © satellite transmitters onto adult male seals in Alsea and Netarts Bays, Oregon in April. Of the 11 seals tagged in September 2014, 7 of these satellite tags are still transmitting. The tags primarily provide information on the locations of animals through time, but they also provide data regarding water temperature, and whether the animals are in water or hauled out on land. She will use this data to create predictive habitat models for harbor seals, as well as their utilization of Marine Protected Areas and future wave energy development sites.

Shea was also recently awarded a 3-year ARCS (Achievement Rewards for College Scientists) Scholar Award from the Portland, OR Chapter of ARCS. The ARCS Scholar Award is a competitive scholarship that supports tuition and stipend for graduate students. Applicants are selected based on academic credentials, experience, and potential to complete a degree and pursue a successful career in scientific research.

http://mmi.oregonstate.edu/sheanna-steingass

Longest mammal migration raises questions about distinct species
NEWPORT, Ore. – A team of scientists from the United States and Russia has documented the longest migration of a mammal ever recorded – a round-trip trek of nearly 14,000 miles by a whale identified as a critically endangered species that raises questions about its status.

The researchers used satellite-monitored tags to track three western North Pacific gray whales from their primary feeding ground off Russia’s Sakhalin Island across the Pacific Ocean and down the West Coast of the United States to Baja, Mexico. One of the tagged whales, dubbed Varvara (which is Russian for Barbara), visited the three major breeding areas for eastern gray whales, which are found off North America and are not endangered.

http://oregonstate.edu/ua/ncs/archives/2015/apr/longest-mammal-migration-raises-questions-about-distinct-species
This past summer, the OSU Seafood Lab supported two undergraduate students who were participating in the College of Agricultural Science’s new Branch Experiment Station Experiential Learning Program. Daria Van De Grift, from Astoria, had just completed her freshman year at OSU in the department of Food Science and Technology. Jae Heilig, from Portland, had completed his sophomore year at OSU in Chemical Engineering.

Both interns were kept especially busy this summer with Listeria testing in ready-to-eat (RTE) individually quick frozen (IQF) pink shrimp. Our laboratory group was conducting these tests for a local seafood processing company, which was initiating their own production of RTE shrimp.

The company had been shipping their frozen raw shrimp out (primarily to Iceland) to be further processed, but decided – rather than letting someone else capture the value from further processing – they should attempt to handle that processing themselves, and keep those jobs local.

The production of RTE shrimp, however, requires special processing precautions. It’s not something that you can just jump into doing because of the potential hazard of post-cook contamination with Listeria, a serious pathogen. Workers at the plant have to go through special training and wear special clothing to keep from inadvertently contaminating the product while it is being frozen and packaged. Their attire is similar to what a person would wear working in a high tech electronic manufacturing space or “clean room”. Our lab was serving as a 3rd party verifier for the processor. The purpose of our testing was to help this processor build-up confidence in its own evaluation processes.

Aside from routine testing, the interns also aided graduate students Dustin Keys and Silvana Harikedua with their projects. Mr. Dustin Keys was finishing-up a project evaluating the quality of flounder after storage in an ice slurry containing nano-sized ice crystals. Ms. Silvana Harikedua, a doctoral student from Indonesia and a Fullbright Scholar herself, worked with the interns on a project to determine whether marinade injection could be used to improve the texture of whitefish fillets and on a project to evaluate a fish quality meter developed by Seafood Analytics in Alaska.

Mr. Keys also received several recognitions this summer, including a Feeding Tomorrow Scholarship from the National Institute of Food Technologists (IFT) and a scholarship from the local Oregon Section of IFT. He also received the Marvin Byer Scholarship Award from the Research Associates of Military Food and Packaging Division.

Aside from supervising research in the laboratory, Dr. DeWitt was kept busy organizing a Seafood and Aquaculture Technology workshop, which was held in Astoria the first week of October. This workshop was the second of three workshops being presented as a result of collaboration between the University of Delaware, OSU and LSU.

In addition, Dr. DeWitt was asked by the Joint Institute of Food Safety and FDA to help present the principles of Seafood HACCP at a Good Aquaculture Practices workshop in Indonesia in September. This was a great opportunity for Dr. DeWitt to see aquaculture production and processing practices first-hand in that country.

For more, visit the Seafood Lab’s website: http://osuseafoodlab.oregonstate.edu

And More About Seafood...

The Seafood Lab now hosts the Seafood Network Information Center (SeafoodNIC) at seafood.oregonstate.edu. The website provides easy access to a wide range of seafood-related resources for processors, researchers, food educators as well as consumers - topics range from seafood safety to purchasing and preparation, species information, and health facts.
Our First MSI Addition

In support of OSU’s Marine Studies Initiative, a new tenure-track faculty position in Marine and Coastal Economics was recently created. This position will be academically housed in the Applied Economics Department on the main OSU campus and will be jointly administered by Applied Economics and the Coastal Oregon Marine Experiment Station. Duties are split 50% teaching, 40% research, and 10% service.

Teaching will support graduate and undergraduate programs such as the Applied Economics program, Marine Resources Management, Water Resources Graduate Program, and Environmental Sciences. Research and outreach will include the economics of ecosystem services with a focus on marine and coastal ecosystems. It will also address the economic and management dimensions that integrate with biophysical, ecological and marine system science research and outreach to address critical societal issues.

We recently completed the interview and hiring process, and will soon welcome Steven Dundas as our newest faculty member. Currently a Jenkins Fellow at North Carolina State University, Departments of Economics, Agricultural and Resource Economics and Center for Environmental and Resource Economic Policy, Steven will complete his doctoral work in May (PhD. in Economics). His dissertation is entitled: Public Policy and Private Behavioral Responses to Climate Change.

He’s scheduled to arrive in Oregon in late summer. After he gets settled in, he’ll spend time with us out here on the coast, where he’ll have the opportunity to explore our communities, meet our stakeholders, and learn about our industries and the challenges they face.

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Behind the Scenes...
Dave Jacobson, Key Partner

Since graduating in 1985 with a Bachelor of Science in Zoology from the University of Nevada, Reno, I have had the honor of working in a variety of scientific fields. I started with a position at the Wake Forest School of Medicine in Winston-Salem, NC, looking at the effect that different ligands have on the up and down regulation of polymorphonuclear neutrophil receptors. In 1991 I joined a research group at the Mayo Clinic’s Department of Biochemistry and Molecular Biology in Rochester, MN. This research examined patterns of spontaneous germ-line mutations within the factor IX gene that is linked to Hemophilia B. This was my first introduction to the uses of Molecular Biology and opened my eyes to the infinite questions that could now be asked with molecular tools.

In 1993 I moved to the University of Washington’s Department of Molecular Biotechnology. There, my research involved cloning of T-cell receptor chain gene constructs which I used to help develop a transgenic mouse for modeling of collagen induced arthritis. I joined OSU in 1996 and have been involved with two different projects. The first was with Dr. Chris Langdon and the Molluscan Broodstock Program. I managed the program for five years. When Dr. Michael Banks joined the OSU ranks at HMSC, I saw my chance to be involved with another use of molecular tools. Since joining Dr. Banks in 2001, I have worked closely with him to help build the Fisheries Genetics Lab into a top-tiered research group.

I call Newport my home, but originally hale from North Dakota and have lived in 8 different states. When my wife Kym and I moved here in 1996 our son was 3 years old. He is now a senior in the Business Leadership program at the University of Puget Sound, where he also swims for the Loggers. Outside of science I enjoy hiking, backpacking, skiing, long walks on the beach with our Chocolate Lab, traveling, tasting new foods and dabling in wine making. I have volunteered in many areas of the community, most notably as an Oregon Swimming Official and artist hospitality organizer for the Oregon Coast Jazz Party.
**Community, Connections: the Bridge to the Future**

**Merrick Burden**, a former student of Gil Sylvia, received his MS degree from OSU’s AREC (now, Applied Economics) Department in 2004. His thesis was entitled, “Oregon Coast Cold Storage: Simulation Modeling and Optimal Temperature Management for Effective Planning”. We asked a few questions, and here are his responses:

**Did you know what you wanted to do when you started out at OSU?**
I first decided to attend graduate school after working as a junior analyst in Anchorage prior to attending OSU. While there I found myself working on a variety of resource and environmental issues, including fisheries. Several very exciting things were happening in North Pacific fisheries during that time, including the passage of the American Fisheries Act and a controversial Steller Sea Lion Biological Opinion, both of which had large impacts on fisheries of the North Pacific. Being around those issues convinced me that I wanted to work in fisheries policy. My goal going into OSU was to eventually find my way to a position with NOAA or one of the Fishery Management Councils. Attending OSU paid off!

**What are you doing now?**
I’m the Executive Director of the Marine Conservation Alliance and the President of the North Pacific Fisheries Research Foundation. The MCA is an organization that works on conservation matters on behalf of the North Pacific fishing industry. We work on things like ecosystem-based fishery management, deep sea coral conservation, fish habitat, Magnuson-Stevens Act reauthorization, and we work to develop original science on pressing matters. An example is an evaluation of Pacific halibut recruitment indices which happens to be a project we are partnering with COMES on at the moment. The lens that we approach these matters through is in trying to find that perfect balance between conservation and utilization so that the fishing industry can be healthy now and into the future.

**What do you like most about what you do now?**
It’s hard to identify one thing that I like most about what I do now. That being said, one thing that comes to mind right away is the appreciation that the fishing industry on this side of the U.S. has for thoughtful, science-based policies that help ensure sustainability for current and future generations. That means that the work we do at MCA is appreciated, even when it means having to swallow a bitter pill in order to maintain sustainability objectives.

**How did your graduate studies at OSU help you in your career?**
My studies at OSU were very quantitative in nature but I also had the flexibility to study across disciplines. My first job out of graduate school was as a federal fisheries analysis for NMFS and the mix of modeling capability, an understanding of law, and a dose of science and economic coursework turned out to be an ideal skill-set for what was needed at that office at that time. The math and scientific coursework gave me a technical foundation, while the legal and economic coursework helped me to apply it.

**Was there anything about your work at COMES in particular that has helped you?**
Perhaps the single most important aspect of my graduate studies at COMES was in engaging with stakeholders and developing a thesis which was used and appreciated by several different coastal Oregon interest groups. The connections I made through applied research at COMES set in motion a career that has been more than I ever envisioned when I first began graduate school over 14 years ago.

**Is there anything more you would like to share, or any recommendations for current students?**
When you’re a student at COMES you have a window of opportunity to make connections in the fishing community, with researchers, and with other stakeholders that you may not have later on. Take advantage of that opportunity. Many of the connections I made at COMES have turned into friendships and professional relationships that continue to help in my career today.
New projects in Michael Banks’ Marine Fisheries Genetics and Conservation lab include:

- Genetic pedigree studies in restoration of spring Chinook salmon from both wild and hatchery origin to above high-head dams in the Willamette basin. The construction of Dams in many rivers of the southern region of Chinook’s natural range have been one of the primary reason’s for the decline in Chinook abundance throughout this region, because dams block access to up-river spawning habitat. These projects researches alternative strategies or capture, transport and outplanting adult Chinook in habitat above reservoirs as a means of making this habitat available to Chinook to help restore their abundance.

- Population genetic characterization of Chinook and steelhead life history diversity in the Siletz river system. As for many rivers, increasing needs for freshwater has drawn attention to the feasibility of damming the Valsetz valley. Our project is to research and quantify the full extent of life history diversity expressed among Chinook and steelhead of the Siletz as a means of assessing the likely impact of such an action.

- Genetic response to temperature stress associated with climate change and three-spined stickleback that have foun-dered from marine populations into freshwater habitat of Oregon’s central valley in the last 30-40 years. Because our region is experiencing unprecedented increasing temperatures, it is important to determine how fishery population are likely to respond and assess whether any are reaching limits for survival. While stickleback are not part of any viable fishery, a number of features such a short lifecycle and a complete annotated genome may studies of this species an ideal model to assess likely genetic impacts for fishery subjects.

Renee Bellinger successfully defended in December: “Genomic studies for Chinook salmon migration: from stock-specific differences in ocean distribution to characterization of transcriptome profiles to gain insights into mechanisms of magnetic and olfactory cue perception.” She has since taken on a post doc position in bioinformatics and climate change at the University of Hawaii in Hilo.

Current tudents include Nicholas Sard, Chante Davis, and William Hemstrom. Nicholas, working on his PhD, is doing the above high-head dam restoration project. Chante, also working on her PhD, is handling the Siletz project. Will, working toward his MS, is handling the steelhead aspect of the Siletz project and the stickleback project.

Michael and Chante recently visited Hampton University and the University of Maryland Eastern Shore where they both lectured with the goal to inspire application to our summer Research Experience for Undergraduates (REU) program here at Hatfield.

The Marine Genomics Program has enjoyed increasing linkage with the Center for Genome Research and Bio-computing (CGRB), led largely by Kathleen O’Malley serving on several committees for CGRB. Our increasing use of this connection and bioinformatics has resulted in our recent purchase of a 64 processor computer unit for a cluster housed at CGRB as well as 12 terabytes of file server space. We need this data storage for large volumes of data generated by ProjectCROOS, Renee’s, William’s and other forthcoming genomic projects.

For more about the work of these researchers, check out the websites below:

http://nicksard.wix.com/nicksard
http://melissaleaevans.wix.com/melissalevans
http://marinegenomics.oregonstate.edu/
Feeding Fish (food they want to eat)

Feeding fish isn’t easy – especially when you’re trying to increase the world’s food supply through marine aquaculture and learn that mortality rates of up to 90% in the larval stage are not uncommon. And if the larvae do survive, they may have physical deformities that may be tied to nutritional imbalances, or they may grow slowly if not provided the proper nutrients.

Researchers have learned that the small pelletized food that works well in fresh-water aquaculture isn’t suitable for marine larvae, which are much smaller than the fresh-water larvae. As a result, Dr. Chris Langdon and Ph.D. candidate Matt Hawkyard have been working with researchers from The Norwegian Institute of Food, Fisheries and Aquaculture Research (NORFIMA), NOAA’s Alaska Fisheries Science Center, and the National Institute for Nutrition and Seafood Research (NIFES) to solve this problem.

The pelleted food currently in use is less expensive than other food sources and is much easier to work with. However, marine fish larvae will seldom eat pelletized food. And it’s also been challenging to develop particles that are small enough for the far smaller marine larvae, yet able to retain their water-soluble nutrients once the pellets are added to the water.

When marine larval fish begin feeding in the wild, they are dependent on small planktonic invertebrates (often referred to as “live prey”) for food. In captivity, the two most common types of live prey used for feeding marine fish larvae are rotifers and brine shrimp, which are more efficient and/or cheaper to use. As neither of these live prey species are their natural food items, they may not be nutritionally optimal for feeding marine larval fish, thus slowing or stunting their growth. Producing live prey is an expensive process; the longer the larval fish are dependent on it, the higher the overall costs of raising the fish.

This research has been aimed at improving the nutritional quality of both rotifers and brine shrimp by enhancing the concentrations of key nutrients in each of these live prey species. Specifically, Matt and his fellow researchers have focused on water-soluble nutrients such as vitamins and amino acids because these nutrients are lost from food items when placed in a water-based environment.

If this project is successful, our ability to grow marine fish will be greatly enhanced. The research will also pave the way towards identifying key nutrient deficiencies and providing a means for supplementing these nutrients in larval fish diets. In turn, these nutritional improvements will lead to higher growth rates and lower mortality rates in captured marine fish species, resulting in a higher cost savings for aquaculturists, which may ultimately remove some of the financial barriers faced by this industry. Ultimately, this would result in a greater quantity of marine fish, and also a more reliable food supply for humans.

Pop-Up Dinners and other Events

Want to try a dulse dish along with several other courses that include Oregon agriculture? The Food Innovation Center was scheduled to host a pop-up dinner this month, featuring a dulse dish and several other courses that include Oregon agriculture. For more information, and a listing of other sponsored events, check out the FIC’s website: http://fic.oregonstate.edu/

More Seafood Lab Info

Continuing their leadership tradition, Christina DeWitt and Michael Morrissey took on the role of “trainer” at the Fall 2014 West Coast Regional Aquaculture and Fisheries Technologies workshop which was held in Astoria.

Year 2014 was a productive year with various research projects and activities. Dr. Park published his third edition of the textbook, Surimi and Surimi Seafood. This continues to serve the global surimi and surimi seafood industry as a processing and product guide. His three books are the only books written in English since 1992 covering this research area.

In this third edition, in addition to various subjects covering science and technology, historical reviews of the industry and technology, research and development, nutrition and health benefits of surimi seafood were covered. Dr. Park is most proud that 13 of the 63 contributing co-authors are his former students and staff. This book has served as a textbook for his 22-year long OSU Surimi School (Astoria, OR) along with other global Surimi School programs in France, Spain, Thailand, Japan, and China.

Matt Fowler, who finished his MS in September, researched the effect of salmon plasma as an enzyme inhibitor and gel enhancer for surimi and salmon fillet. Two manuscripts have been submitted to major reference journals. Matt also won graduate student’s paper competition with the second and third prize at Pacific Fisheries Technologists (PFT) and Institute of Food Technologists (IFT), respectively. Two other Ph.D. students, Yuka Kobayashi and Jinhwan Lee, are currently working on surimi/fish protein isolate technology and trimethylamine n-oxide demethylase, respectively. There were four visiting students from Huazhong Agriculture University in China (Tao Yin), Kangwon National University in S Korea (MG Lee, Jihoon Moon) and Tokyo University of Marine Science in Japan (Taka Oshima). These students successfully conducted thermal studies of surimi. Two intern students also worked in Dr. Park’s lab: Kaitlin Junes, who is a senior at OSU Nutrition Dept, spent 3 mo this summer assisting with various projects. During her time, she found her interest in fish protein technology for a possible graduate study; Katie Burgher, who is a freshman at the Clatsop Community College, is the newest edition to our team as an intern student.

The IFT conference has been our annual gathering for Dr. Park’s former students, staff, and sponsors. IFT 2014 (New Orleans, La) in June showcased 10 papers presented by members of our research group. In addition, Yuka and Matt were invited as finalists for the graduate student’s competition. His group also participated in the PFT conference (Monterey, Ca) and presented four papers. Dr. Park has been nominated as the next PFT president. His OSU team will host the 66th PFT Conference in Astoria on March 1-4, 2015.

For more, visit the Seafood Lab’s website:  http://osuseafoodlab.oregonstate.edu

Congratulations!

Each year recipients of the Mamie Markham Awards participate in an HMSC Symposium and present a poster or an Ignite presentation showing the scope of their research project. Two of our students earned top praise from their peers, so congratulations go to:

Evan Durland  (Major Advisor: Chris Langdon) for the Best Ignite Presentation award
Tyler Jackson  (Major Advisor: Kathleen O’Malley) for the Best Research Poster award
**Collaborating with Other Coasts**

Dr. Jessica Miller and five OSU graduate students, including four COMES students, attended NOAA’s Educational Partnership Program 7th Biennial Education and Science Forum at the University of Maryland Eastern Shore from October 26 to 29, 2014.

The 7th Biennial Forum was hosted by the NOAA Living Marine Resources Cooperative Science Center (LMRCSC), which is one of four Cooperative Science Centers that support NOAA’s mission by educating graduate and undergraduate students in Atmospheric, Remote Sensing, Marine Science, and Coastal Ocean Sciences.

The NOAA LMRCSC partner institutions are UMES (lead institution), Delaware State University, Hampton University, Oregon State University, Savannah State University, University of Maryland Center for Environmental Science-Institute of Marine and Environmental Technology, and University of Miami-Rosenstiel School of Marine and Atmospheric Science. Jessica is the Project Director for OSU within the LMRCSC.

The 7th Biennial Forum was attended by nearly 300 people and provided an opportunity to showcase results of collaborative research, to discuss new engagement opportunities, and to promote career opportunities for Science, Technology, Engineering, and Mathematics (STEM) graduates with academic, government, and public/private sectors.

Three OSU PhD students, Smit Vasquez-Cabellero (advisor G. Sylvia), Marisa Litz (advisor J. Miller) and Chanté Davis (advisor M. Banks), and two MS students, including LaTreese Denson (advisor D. Sampson) and Matt Ramirez (advisor Selina Heppell, FW) presented oral or poster presentations on their research. Congratulations to Matt, who won the Best Graduate Student Oral Presentation in Healthy Oceans!

Smit and Marisa provided presentations of their research at a well-attended poster session. Smit’s poster was titled “Modeling spatial-temporal fishing effort of the West Coast Salmon Fishery” and Marisa’s presentation was on the “Effect of dietary fatty acids on juvenile Chinook salmon (Oncorhynchus tshawytscha) growth, lipid composition, and swimming performance”.

LaTreese delivered a talk on her nearly completed MS research on “The effects of spatial assumptions and data availability on stock assessment results in the presence of a changing environment: A simulation study”. Chanté presented a talk on the early stages of her dissertation research, which was titled “Development of novel microsatellite markers putatively linked to reproductive hormones for the differentiation of closely related runs of Chinook salmon (Oncorhynchus tshawytscha) in Siletz River, OR.

Links to both the Marine Fisheries Ecology and the LMRCSC websites can be found at:
http://marineresearch.oregonstate.edu/research

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A post-doctoral position is available in the laboratory of Kathleen O’Malley at Oregon State University. The primary aim of this position will be to develop and apply genetic pedigree methods to examine 1) the effects of hatchery propagation on the total lifetime fitness of Chinook salmon in the wild and 2) the evolutionary response of reduced hatchery influence on recently reintroduced wild populations.

The postdoc will hold a leadership role among a larger research team studying founder effects of recently reintroduced populations of Chinook salmon and will be expected to provide general support and collaboration towards scholarly advancement in the Marine Genomics Program located at the Hatfield Marine Science Center in Newport, Oregon.

The position requires a Ph.D. degree in genetics, ecology or evolution with an emphasis in statistics. Familiarity with genetic pedigree methods is required as well as a record of publication and evidence of ability to work both independently and cooperatively. The position closes 8/4/2015; http://oregonstate.edu/jobs/

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Smit was interviewed about his dissertation research during the poster session!

Chanté (left) and LaTreese (right) talk with an undergraduate from Hampton University in Virginia about his senior thesis.

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LaTreese Denson, an MS student at OSU, presented a talk on her nearly completed MS research on the effects of spatial assumptions and data availability on stock assessment results in the presence of a changing environment: A simulation study. Chanté Davis, a PhD student at OSU, presented a talk on the early stages of her dissertation research, which was titled Development of novel microsatellite markers putatively linked to reproductive hormones for the differentiation of closely related runs of Chinook salmon (Oncorhynchus tshawytscha) in Siletz River, OR.
As an undergraduate at Florida State University, I majored in Biological Sciences. In my third year, I was awarded the Mote Endowment in Fisheries Ecology Grant which enabled me to pursue my strong interest in fisheries research and study recreationally important species including common snook. Upon graduation, I headed north to pursue a Masters in Science degree from the University of Guelph in Ontario, Canada.

My appreciation for the utility and potential of genetics to inform fisheries management was first initiated during my master's degree. There, I was able to identify regions of the genome that influence the spawn timing and body weight of rainbow trout, an important aquaculture species. The research goal was to develop genetic markers that could be used to inform hatchery breeding practices and produce large rainbow trout that spawn year round.

To further advance my skills and knowledge in fisheries genetics, I travelled south to work as a research assistant at Texas A&M University where I studied the population structure of red drum, a popular game fish in the Gulf of Mexico.

After a year, I relocated to the Pacific Northwest to pursue my long time goal of a Ph.D. and enrolled in the Department of Fisheries and Wildlife at Oregon State University. My primary research aim was to identify the genetic and environmental factors that influence migration or run time in Chinook salmon.

Run time (i.e. fall or spring) is an important trait used by fisheries biologists to manage Chinook salmon populations along the west coast of North America. Therefore, understanding the environmental and genetic factors adult salmon use to home to their natal rivers is vital to ensuring sustainable management of these populations and enabling predictions as to how different migratory species might respond to climate variability.

Considering the practical findings from my Ph.D. research and the complexity of this topic, I decided to expand my research efforts to study the genetics of run time in five species of Pacific salmon as a post-doc at NOAA's Northwest Fisheries Science Center in Seattle.

In 2009, I returned to Oregon State University as Assistant Faculty in the Coastal Oregon Marine Experiment Station and the Department of Fisheries and Wildlife. Broadly, my fisheries genetics laboratory conducts research to understand, utilize, and sustain marine resources and ecosystems. Some areas of interest include: population connectivity of Dungeness crab, differences in reproductive success between hatchery and wild salmon, reintroduction of endangered spring Chinook salmon, adaptation of Arctic char to a changing polar climate, and genetic basis of run time.

I believe my interest in marine and freshwater fisheries was instilled in me at a very young age when I enjoyed summers at the Jersey shore fishing with my grandfather. His passion for fishing likely incited my own passion and appreciation of the sea. As a young researcher, I was inspired by Dr. Steven Berkeley who worked collaboratively with commercial fishermen and integrated the fields of marine ecology, conservation biology, and fisheries science to improve fisheries management.

When I am not working, I can usually be found outdoors doing something active. I enjoy whitewater kayaking, running, backpacking, snowboarding, bow hunting, and fishing. I also truly value our Newport community and greatly appreciate time spent with family, friends, and colleagues.
About Kathleen’s research:

*Population connectivity in the marine environment*

Connectivity broadly refers to the extent to which populations in different parts of a species’ range are linked by the exchange of larvae, recruits, juveniles or adults. Although connectivity is important to developing effective management and conservation strategies, it is often poorly understood in most marine species. This is true for Dungeness crab, Oregon’s most valuable single-species fishery.

We are currently using genetic markers to measure population connectivity and examine how inter-annual variation in oceanographic conditions (i.e. timing of spring transition) influences patterns of spatial and temporal genetic structure in Dungeness crab. Knowing whether Dungeness crabs off the west coast represent a single panmictic population or subdivided populations is an important factor to consider when developing long term management strategies.

*Genetic basis of migration timing*

The seasonal timing of life history events (i.e. migration and breeding) is often under strong natural selection, requiring animals to integrate and respond to multiple environmental cues. Photoperiod or day length is a predictable environmental cue that animals can use to respond to seasonally varying conditions. The internal circadian clock, present in most all organisms, senses changes in day length and mediates a number of photoperiodic responses such as flowering time in plants and hormone secretion in mammals.

Pacific salmon show considerable diversity in their temporal patterns of migration and breeding within and among species throughout their geographic range. Photoperiod is regarded as a primary environmental cue influencing migration to sea and return to freshwater for breeding. We are using a comparative approach to study circadian clock gene variation in temporally divergent migratory runs of salmon from New Zealand, Ireland, Japan, Norway, and North America. Identifying migration timing genes will not only facilitate delineation of locally adapted populations for management purposes, but it will also enable predictions as to how different migratory species might respond to climate variability.

*Reintroduction of captive-reared and wild fish*

Alteration of the physical landscape through hydropower dam construction has adversely affected populations of Pacific salmon throughout the Northwestern United States. Dams block access to historical spawning habitat and disrupt natural river flows. To mitigate for this habitat loss, hatcheries have been constructed in rivers systems throughout the Pacific Northwest. More recently, reintroduction programs have been initiated to re-establish natural spawning populations in rivers above dam operations.

We are using genetic parentage analysis to evaluate the contribution of reintroduced fish to the productivity of endangered salmon populations and to examine the efficacy of different reintroduction strategies. We are currently assessing three different reintroduction programs located on the South Fork McKenzie, South Santiam, and North Santiam Rivers. The first program involves a combination of unmarked (natural-origin, NOR) and marked (hatchery-origin, HOR) spring Chinook salmon released above Cougar Dam. In contrast, the South Santiam and North Santiam programs involve only unmarked (NOR), and only marked (HOR) spring Chinook salmon, respectively. This presents an opportunity to compare three alternate reintroduction strategies and ultimately determine the efficacy of releasing Chinook salmon above dams in the Upper Willamette River Basin.

*Mate choice and reproductive success in natural populations*

Mate choice is an important mechanism influencing offspring survival. For example, in adult salmon, nonrandom mating based on the Major Histocompatibility Complex (MHC), the central component of the vertebrate immune system, may function to increase immunocompetence of offspring.

We are using multi-generational genetic pedigrees of naturally spawning salmon to estimate mate pair reproductive success (RS) based on the number of returning adult offspring and test for evidence of MHC-mediated mate choice. Using this approach, we can determine whether MHC diversity is correlated to increased mate pair RS and whether mate choice strategy differs among hatchery-reared and wild-born salmon. Findings from this research might be able to be used to inform hatchery breeding practices.

*Kathleen’s website is at: marinegenomics.oregonstate.edu*
**Next Step: Marine Studies Initiative**

Thanks to the support from our Coastal legislators, our donors, and our stakeholders, OSU’s Marine Studies Initiative should be open to its first students well before 2020. The Oregon Legislature’s approval of the $24.8 million dollar bond, along with a $25 million match, will fund the new MSI building on the Hatfield Marine Science Center campus.

“This new building is essential to the university’s goals of expanding education and research on marine-related issues,” said Bob Cowen, director of the Hatfield Marine Science Center. “There are so many critical issues facing coastal communities today – from economic stress tied to variable fish stocks to concerns over tsunamis, ocean acidification, rising sea levels, erosion and others.”

For more, read the full article at:
Or visit the MSI website at: http://marinestudies.oregonstate.edu/

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**“He was a bold man that first eat an oyster,”**

Jonathan Swift is reputed to have said. Bold, or maybe just hungry. Whichever it was, the reward must have been worth the risk, because humans have been prying open oyster shells and slurping down the salty-sweet meat for thousands of years.

The Pacific Coast’s cold ocean waters and extensive intertidal zones make for prime oyster-growing country. Oysters are not only good for you (high in protein, low in fat, and packed with minerals), they’re good for the economy. Oysters grown in Oregon, Washington, and Alaska have a dockside value of about $70 million a year.

And oysters are good for the environment, too. ...

For more, see “Build a Better Oyster”, from Oregon’s Agricultural Progress:
http://oregonprogress.oregonstate.edu/summer-2015/build-better-oyster

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**Ensuring Safety in a Fast-Paced Fishery**

**OSU’s Seafood Lab ensures freshness in Northwest albacore**

When albacore tuna are schooling in the blue waters off the Oregon coast, fishermen don’t get much rest. A dozen trolling lines unspool off the stern of a boat and trail their bright-orange lures. A crewman leans over and hauls in a line, hand over hand. In a sudden eruption of spray, a silvery torpedo-shaped fish bursts through the waves, its slender pectoral fins rising like wings. ...

For more, see the latest issue of Oregon’s Agricultural Progress:

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**Coastal Oregon Marine Experiment Station**

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**Collaborate • Innovate • Communicate**