

AGRICOLA

FOR ALUMNI AND FRIENDS OF DALHOUSIE'S FACULTY OF AGRICULTURE

FALL 2021

Life under water

Maggie Macleod (MSc Agriculture student) closely observes striped bass larvae, as part of the striped bass broodstock development program at the Faculty of Agriculture.

In memory

The Agricultural Campus and the Alumni Association acknowledge the passing of the following alumni. We extend our deepest sympathy to family, friends and classmates.

J. Gordon Crowe	1946
Robert Stirling	1947
Donald Barteaux	1948
Frederick Walsh	1950
William Durant	1951
William Abraham	1952
Freeman Eaton	1954
Ronald Colpitts	1954
David Ogilvie	1955
Robert Balcom	1958
Sherman Williams	1959
Gary Pretty	1961
Wilfred Deveau	1965
Donald Cameron	1966
Clair Gartley	1975
Edward Hartigan	1975
Weston Rayner	1989

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Alisha Johnson

Editor, AGRICOLA

Alumni Relations, Dalhousie Agricultural Campus

Message from the editor

This is the first time we've taken AGRICOLA "under water" and were we ever missing out! Dalhousie's Faculty of Agriculture is the only institution, east of Montreal, with an undergraduate degree in aquaculture. There's incredible work taking place, on campus, with our researchers and students. Not to mention the stories our alumni can tell, working in the aquaculture industry, across the country and beyond. We could easily focus on aquaculture for multiple issues.

It was exciting pulling together this content and I hope you enjoy reading about the aquaculture industry in Nova Scotia and beyond!

Campus has come to life again, after a very quiet 2020-2021 academic year, due to the pandemic. Staff and faculty have been migrating back and students returned, in September, to in-person classes, residence life, clubs and athletics and other activities.

We are thrilled to be easing back into our regular alumni events and activities again this fall, following Public Health guidelines. Keep an eye on social media and your e-mail inbox as we start to plan in-person events, where possible.

Stay in touch and we hope to see you soon!

A handwritten signature in blue ink that reads "alisha johnson".

Alisha Johnson

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Dr. David Gray

Dean, Faculty of Agriculture
Principal, Dalhousie Agricultural Campus

Message from the dean

You may know me as Dean Gray, Dr. Gray or just David but anyone who follows me on social media also knows me by the name of @limpetman.

Limpets are a group of aquatic snails that have a conical shell shape with a strong, muscular foot and their teeth are made of the strongest material on the face of the planet! They are part of my research as a marine biologist — hence my name limpetman.

As a marine biologist, it was such a pleasure to become dean of the Faculty of Agriculture and principal of the Dalhousie Agricultural Campus that is home to the only undergraduate aquaculture program in Atlantic Canada! With an on-campus farm, our students and researchers are learning about nutrition, machinery, and feed both on land and in the water!

It's the best of both worlds for me — farming the land and the sea while helping to meet the UN Sustainable Development goals like Life Below Water, Zero Hunger, Sustainable Cities and Communities and Responsible Consumption and Production.

Our aquaculture program is growing and so too is our research, so much so, we decided to dedicate an entire issue of our alumni magazine to this topic.

There is a resurgence of jobs in rural, coastal communities as regenerative ocean farming becomes increasingly important. We are continually looking at how we can evolve our programs to meet the changing needs of sea farmers while providing hands-on experience to our students.

Our pre-vet program remains one of our most popular and is now providing expertise for aquatic veterinarians. An aquatic veterinarian is a Doctor of Veterinary Medicine that specializes in the healthcare and management of marine animals and invertebrates. They are qualified to treat a wide variety of underwater life, including fish, sea turtles, marine animals, and other wildlife.

Dr. Terra MacDonald, Class of '16 is the sole veterinarian for the entire West coast operation of Mowi Canada West and is featured in this issue.

Did you know shellfish are known as ecosystem engineers? Dr. Sarah Stewart-Clark focuses on shellfish production in Atlantic Canada and is leading our students in this area.

We also have some of the most talented faculty leading cutting-edge research on sustainability. Dr. Stefanie Colombo investigates innovative ways to improve nutrition in aquaculture and contribute toward improved, healthier, environmentally sustainable, and economically viable farmed seafood.

We are fortunate to live and work in one of the most beautiful provinces surrounded by Canada's ocean playground. And the health of this playground is a top priority. Dr. Fraser Clark is part of an investigative team of researchers working to understand the connection between ocean health, marine animal health, and human health.

Our students are learning, hands-on, from some of the best in the industry and are being actively recruited by companies across the country.

I couldn't be prouder of the work we are doing teaching, learning, and innovating as we farm the sea in a responsible and sustainable way.

Dean David Gray | @limpetman





Sustainability of aquaculture in Nova Scotia

It is feeding time at Sustainable Fish Farming Canada in Burlington, NS, and there is something unique on the menu for the Atlantic salmon that are raised here: black soldier fly larvae.

That may sound unappetizing, but there are a few things you should know about the larvae. They are a nutrient-rich alternate source of protein. They are produced locally by Oberland Agriscience and nurtured using organic byproducts, such as spent grains from craft breweries. They are also helping Sustainable Fish Farming Canada live up to its name by reducing the company's reliance on fish meal produced from anchovies and other wild fish. It is a practice that is increasingly unsustainable; the Food and Agriculture Organization of the United Nations reported that aquaculture production accounted for more than 50 per cent of total fish production in four of the top 10 countries for largest total farmed and wild production in 2018. And there is every reason to believe that share will continue to grow.

For that reason, Sustainable Fish Farming Canada is working toward 100 per cent sustainability in all its operations. The company is reconstituting its wastewater into useable, clean seawater for its circulation system, meaning there is no discharge into the environment. It is collaborating with Dalhousie University and the Nova Scotia Community College on projects to transform fish manure and uneaten feed into fertilizer products. And it is conducting tests of alternate protein ingredients such as the fly larvae, locally sourced fermented algae from Smallfood, and fish that are helping to reduce methane levels in flooded California rice fields.

"Our goal is to develop a sound diet based on sustainably produced ingredients that do not come directly from the ocean and achieve a growth rate the same as, or better than, using conventional feed," says David Roberts, Sustainable Fish Farming Canada's Project Development Director. "We are about a third of the way through our alternative feed study and we already have encouraging results that indicate that we will be able to produce a premium product in a recirculation system with alternative proteins.

The desire to innovate and adopt more sustainable business practices is one that has been embraced throughout Atlantic Canada's aquaculture industry. The region's farmers are demonstrating to the world that it is possible to move to a closed-loop, or biocircular, framework and improve cost efficiency, reduce carbon footprints, and produce seafood that maintains or enhances the quality standards we have established.

"Atlantic Canada is a leader in technology, and in research and innovation," says Stefanie Colombo, assistant professor and Canada Research Chair, Aquaculture Nutrition, at the Department of Animal Science and Aquaculture at Dalhousie.



Maggie Macleod (MSc Agriculture student) inspects the body condition of striped bass larvae, as part of the striped bass broodstock development program at the Faculty of Agriculture.

"You can see that when it comes to salmon. Although Canada is behind Norway, Scotland, and Chile for production numbers, I would argue that Nova Scotia is ahead of those countries in use of sustainability-related technologies because we are a hub for innovation and we are early adopters. There are many examples of companies that are developing new ways to enhance the welfare and sustainability of our stocks."

One example that immediately comes to mind is ReelData, a Halifax-based company that has developed a fully automated artificial intelligence feeding system that delivers real-time insights on fish tank population behaviour, appetite, and food waste. "Having access to reliable biomass information is really important in calculating feed so that you don't overfeed, which results in waste and thus becomes an environmental issue," Colombo says. "It also eliminates the stress of farmers removing fish from the tanks to weigh them, so technology like this is really beneficial for both the fish and the farmers."

Nova Scotia is also setting standards in the realm of alternate protein solutions, as exemplified by Oberland Agrisciences larvae and by Dartmouth-based Mara Renewables, which is using waste carbon from spent brewery grains and other sources to produce microalgae that are rich in DHA. This is a special omega-3 that is not only an essential element of fish diets but also contributes to human brain health.

"The idea of using waste to make protein is one area in particular where the world is looking to Atlantic Canada," Colombo says. "These alternate proteins are not only enabling our region to become more self-sustaining, which is important for our future food security, but also, and probably more important, they provide us with an exportable product. That creates significant economic advantages and benefits, and that's an incentive for us to remain leaders in this space."

Many of these industry innovations have been made possible in part by the Faculty of Agriculture at Dalhousie, both through the training it provides to students and through collaborations with faculty. For example, Colombo is working with Sustainable Fish Farming Canada in the development of its fish diet, and she has worked with Oberland and Mara Renewables to refine their alternate proteins. In each instance, she brought student trainees on board to apply their learning in tackling real-world challenges. "There is a clear need for training in this industry," Colombo explains. "Other universities have aquaculture programs, but Dalhousie is unique in the sense that we offer a full undergraduate degree. That demonstrates our commitment to the industry, and we are continually looking at how we can evolve our program to meet their changing needs or work with them to achieve more sustainability in their operations."



Above: Anshita Madaan (BSc research assistant) feeds striped bass larvae to wean them onto their new formulated diet as they grow into their next developmental stage as juveniles.

Below right: Dr. Stefanie Colombo administers test feed to Atlantic salmon as part of an ongoing experiment at the Faculty of Agriculture.



“Having access to reliable biomass information is really important in calculating feed so that you don’t overfeed, which results in waste and thus becomes an environmental issue,” Colombo says. “It also eliminates the stress of farmers removing fish from the tanks to weigh them, so technology like this is really beneficial for both the fish and the farmers.”





Shanwei Qiu (left, aquaculture technician), Anshita Madaan, and Juan Manriquez-Hernandez measure rainbow trout using an electronic PIT (passive integrated transponder) tag scanner to identify the fish number, and measure and record fish weight and length, as part of an experiment testing seaweed extracts in diets for farmed trout.

Colombo is also sharing her extensive aquaculture nutritional and developmental expertise with the industry as a scientific advisor to the Aquaculture Association of Nova Scotia. Formed in 1977, this member-driven association supports Nova Scotia's sea farmers in developing sustainable, profitable operations through advocacy, public engagement, and research and development. "We represent approximately 96 per cent of the total industry in three sectors: finfish, shellfish and sea plants," says executive director Tom Smith.

Shellfish health is a major priority for the association. It has produced a post-harvesting handling guide to help local oyster farmers manage *Vibrio*—bacteria that can cause serious illness among humans. It is also conducting biweekly lab assessments of *Vibrio* prevalence so that farmers know when to pause harvesting due to warm water temperatures that help the bacteria proliferate. The association is also assisting the Verschuren Centre in Cape Breton in its efforts to address *Haplosporidium nelsoni* (MSX), a parasite that wiped out the Island's oyster industry in 2004. "This project is in its third year and the hope is that it will lead to harvesting and management practices that will enable oysters to survive in those lakes and thus help rebuild the industry," Smith says.

Smith adds that the association is also helping shellfish farmers diversify their revenue streams, an effort that has become a priority in recent months due to COVID-19-related closures of restaurants. For example, the association is collaborating with three Cape Breton farms and the Atlantic Canada Opportunities Agency to explore opportunities for growing seaweed, specifically sugar kelp, on shellfish lines. The kelp is used to manufacture a range of commercial products, including cosmetics and fertilizers. The association is also interested in extending Best Aquaculture Practices (BAP) Certification to the province's shellfish farmers.

"All of our finfish farms in Nova Scotia are BAP certified," Smith explains. "It is an independent certification program that is recognized worldwide, and we believe that it will help open new markets and retail opportunities for our shellfish farmers because it carries that assurance that their product is the best on the market."

For the most part, these efforts to increase sustainability has been industry driven, but Smith also credits the provincial government for creating a regulatory framework that provides added incentive. "Every aquaculture farmer has to have a farm management plan in place, and they have to have a surety bond in the event of any mishaps that require cleanup or remediation," Smith says. "That provides a sustainability footprint and the assurance that all farms are living up to a certain standard. I think the regulations governing our operations are the most robust, transparent, and innovative anywhere. You can see that in the fact that many jurisdictions are looking to us for direction



Artemia (also known as brine shrimp) are grown in the lab to feed young striped bass larvae as they transition from using nutrients from their yolk to eating live food. The artemia are rich in nutrients like amino acids and omega-3s to support the growing larvae early in life.

on ensuring the development of their industry is progressive and sustainable."

Having garnered international attention for innovation and regulations, the question is how our industry will maintain or build on those standards going forward. Smith says a substantial number of new aquaculture farming license applications have been submitted to government, which will likely lead to further growth, new approaches, and groundbreaking technologies. Roberts is hopeful that the industry will help the province move toward cleaner, greener energy sources. His company is doing its part by selling solid waste from its reconstituted wastewater to an anaerobic digestion company that produces methane-derived electricity for Nova Scotia's grid. And Colombo says the Faculty of Agriculture will look for new ways to support industry innovation and efforts to ensure our food production is sustainable in the face of pressures such as pandemics and climate change.

"Although we are seeing a trend toward more land-based aquaculture, I don't think that's going to be the only answer for us, particularly given that 60 per cent of our earth is water," Colombo says. "I believe our aquaculture farmers are going to be looking more at how we can better manage the resources that we use so we can sustain ourselves and ensure that, 100 years from now, we are still growing fish in a way that doesn't completely exhaust our aquatic resources."



Common equipment frequently used in the aquaculture lab, Haley Institute.



Sustainable shellfish

Dr. Sarah Stewart-Clark

There are few farms that likely could sustain themselves if 30 to 50 per cent of all the seeds they planted failed to grow into marketable product. But those are the failure rates that many shellfish farmers are experiencing across the Maritime Provinces as they continue to rely on larval shellfish produced by wild oysters for their seeds.

“Seed was always plentiful in the wild, so you could set out your ropes and collect a lot of larvae looking for somewhere to settle each year, which means the industry never invested in developing hatcheries,” explains Sarah Stewart-Clark, associate professor, shellfish aquaculture, with the Department of Animal Science and Aquaculture at Dalhousie. “But climate change has had an impact on that activity, changing the location of larvae or killing them in heavy rainstorms. The seed is very variable, which means a significant percentage do not have the optimal genetics to make it through the production cycle. As a result, farmers are starting to invest in hatcheries because the traditional source of seed is unstable.”

However, the move to hatcheries requires reliable seed that can grow into reliable broodstock — the mature shellfish that create the larvae. This is where Stewart-Clark’s expertise comes into play. She is combing through billions of genetic sequences to identify the traits that will enable farmers throughout the

region to develop oysters that have the metabolic and respiratory efficiency to thrive on the bare minimum of resources and direct any excess energy to withstanding the impacts of climate change and other threats.

“In all other crops, we’ve found the genotypes that do well on farms, and that’s all we’re growing,” she says. “Through my work, I’m identifying the characteristics that will enable oysters and mussels to grow quickly and well so that they all reach maturity without any wasted resources.”

Success will not only ensure the sustainability of the Maritime Province’s shellfish farms but also significantly enhance the quality and quantity of each farm’s yield. But identifying the traits that enable shellfish to thrive requires considerable testing. Using the Aquatron Laboratory at Dalhousie’s main campus, Stewart-Clark is exposing mussels and oysters to salinity, temperature, food availability and ocean acidification-related stressors to see which genes are more active. The insights she gathers will provide farmers with tools for assessing and monitoring the health of their oysters.

“Shellfish do not exhibit signs of stress, so a population that looks perfectly healthy one day could be dead the next day,” Stewart-Clark says. “Now, it will be possible for farmers to determine whether their oysters are experiencing stress and then intervene or make more informed farming decisions. For example, if your oysters are experiencing stress due to high temperatures or low oxygen, you can delay any actions that might increase that stress, such as moving them.”

Although shellfish farming is behind other industries in terms of selective breeding, it does have an advantage in that it can draw on lessons learned in developing reliable genotypes, specifically finfish. Stewart-Clark says that when salmon were first selectively bred, the focus was on fast growth, resulting in



The Faculty of Agriculture's Dr. Sarah Stewart-Clark takes a blood sample from a live oyster through a tiny hole, drilled into the shell. Through this method, the blood can be tested for stress while the grower gets their oyster returned, alive.

fish that are unable to cope with low oxygen stress. “Because we were aware of that challenge, we were able to breed for a suite of traits—fast growth, disease resistance, resilience—to ensure our stock can withstand a variety of conditions. And now we have the markers for them.”

Stewart-Clark has already put those markers to the test. Through a collaboration with Dr. Denise Methe at DFO Gulf, Master of Science Student Stephanie Hall, and industry partner Maison Beausoleil, a New Brunswick oyster farm, her team screened broodstock for metabolic and respiratory efficiency-related genes. They identified a pool of oysters with these markers and took them, along with some slower-growing oysters, back to the lab to conduct genetic sequencing and breeding tests. They also conducted genetic sequencing of the fast-growing oysters' offspring and determined that they had the same markers.

“Our industry partner grew spat produced by broodstock with our target genetic traits, and the growth rate was significantly faster than that of the wild seed harvested on their farm and the seed we produced from oysters that did not have our target traits,” Stewart-Clark says. “Our partner estimated that using this broodstock would enable him to get oysters to the market one to two years earlier than using wild seed. This is a huge advantage for them.”

As her research continues, Stewart-Clark is filling in more gaps in our knowledge about shellfish and identifying new genes that play a prominent role in how they respond to stress. All these insights serve one purpose: to provide the industry with the best seed possible. “My role is to ensure that the industry remains sustainable by giving our farmers access to the research and development expertise they need to continue producing a world-renowned product,” she says.



Saving Nova Scotia's wild Atlantic salmon

Seeing the next generation of young ones enter the world after you have helped to raise them is always a profound experience, even when it is wild Atlantic salmon returning to the West River Sheet Harbour.

"That was one of the most exciting days ever," says Audrie-Jo McConkey (Class of '03), a senior instructor with the Department of Animal Science and Aquaculture at Dalhousie. "Just to see them back in their home environment and watch them splash about was a very powerful moment."

It was a moment born of necessity. Over the years, the number of adult salmon returning from the ocean to West River to spawn had been dwindling. Low pH due to acid rain has been a major factor, compounded by negative changes in river flow and spawning habitat and mergansers preying on smolts in the estuary.

The pH levels were restored by adding vast quantities of dolomitic limestone and the salmon's environment was enhanced through the creation of deeper pools. Although these improvements increased smolt production, the number of returning maturing adults remained disconcertingly low.

"The Nova Scotia Department of Fisheries and Aquaculture proposed trapping some salmon smolts, rearing them to adults, and then releasing them back in the river to spawn," says Dr. Jim Duston, professor of finfish aquaculture with the Department of Animal Science and Aquaculture.

Having secured the necessary licenses and support, Duston and McConkey proceeded to rear two sets of smolts, one caught in 2017 and the second in 2018. It was an undertaking that posed considerable challenges. The smolts had to endure the stress of being transported to the campus by truck and then acclimating to fibreglass tanks. It also took great patience to convince the smolts to adapt to commercial food pellets.

"Initially we used freeze-dried krill dipped in cod liver oil, following advice from Beth Lenentine at Department of Fisheries and Oceans Coldbrook, and then we gradually weaned them onto a commercial pelleted diet" says McConkey, who handled most of the feeding and husbandry.

"That was one of the most exciting days ever," says Audrie-Jo McConkey, a senior instructor with the Department of Animal Science and Aquaculture at Dalhousie. "Just to see them back in their home environment and watch them splash about was a very powerful moment."



Dr. Jim Duston and Audrie-Jo McConkey releasing Atlantic salmon into West River after being on-reared the Faculty of Agriculture.

McConkey took care to ensure the tank provided a suitable rearing environment for the smolts. The water velocity was set at approximately one-and-a-half body lengths per second—which juvenile salmon prefer—and the fish's endocrine systems were synchronized through a natural daylength cycle. Saprolegnia, a white fungus that is ubiquitous in fresh water sources, also posed problems when the fish were stressed, initially post-capture and later as they completed sexual maturation. A one-hour saltwater bath treatment proved effective.

“Perhaps our greatest asset was our water quality,” Duston says. “We are sitting on a huge aquifer, which gives us an almost limitless supply of 10-degree groundwater, with ideal pH levels, alkalinity and hardness. I think having that ideal water chemistry was a factor in our ability to rear these fish.”

It typically takes two years for West River smolts to reach sexual maturity, but some take an extra year. As a result, McConkey says they are still rearing some of the fish from the 2018 cohort, which will mature in fall 2021.

In fall 2020, Dr. Eddie Halfyard, a research scientist with the Nova Scotia Salmon Association, led a preliminary survey near the release location. Although the wild and captive salmon could not be separated, the number of redds—gravel nests where salmon lay their eggs—observed near the release site far exceeded observations in other stretches of the West River. This suggests that the released salmon are spawning near the release site, and that the Faculty of Agriculture fish rearing project was a success.

“What we saw could be the result of several factors such as lime dosing and restoration of the riverbanks,” McConkey says. “For those reasons, it may not be necessary to undertake an initiative like this again. But if we see the numbers begin to dwindle, we are ready to apply our skills and demonstrate how aquaculture can help ensure the sustainability of our wild stocks.”



Faculty of Agriculture Aquaculture Society member, Paige Villeneuve and Audrie-Jo McConkey returning mature Atlantic salmon to West River. Salmon were on-reared at the Faculty of Agriculture campus from smolt to a sexually mature stage.



Audrie-Jo McConkey, Fisheries Enhancement Manager with the Nova Scotia Department of Agriculture and Fisheries, Darryl Murrant and Dr. Eddie Halfyard, Nova Scotia Salmon Association.

Changing focus - from land to sea

Ian Sewell (Class of '16 & '18)

A love of animals and travel drew Ian Sewell (Class of '16 and '18) to the Dalhousie Agricultural Campus from the island of Jamaica with an eye on vet school, but an introductory aquaculture course saw him ultimately change his focus from the land to the sea.

"I originally came to Canada with an end-goal of completing a veterinary degree," explained Ian. "My plan was to complete the pre-vet program and further transition into vet school. However, I quickly realized I enjoyed the aquaculture field and studying the dynamics of saltwater and freshwater organism health, anatomy, and ecology from taking Introduction to Aquaculture as an elective," he added.

The course was enjoyable and informative enough to pique Ian's interest as he continued to take additional courses until he realized he wanted to change his major entirely!

Ian is now venturing into biological consulting, having accepted a position with Stantec Inc., as an Intermediate Aquatic Biologist, this past August.

"Aquaculture and veterinary medicine are very similar. That's what I love about it," explained Ian. "I like the ideology of it. Being able to sustainably produce food for a growing world population without significantly impacting wildlife or wild stock. The idea and concept behind it is very rewarding."

"It has been very rewarding following Ian's career advancement following his MSc degree," said Associate Professor, Shellfish Aquaculture, at the Faculty of Agriculture, Dr. Sarah Stewart-Clark. "Knowing Ian, I am not surprised by his success. During his BSc and MSc programs, Ian demonstrated excellent critical thinking skills and had the personal drive and work ethic to conduct innovative research. When you're so passionate about your work, success often follows. Ian is a great example of that."

Ian spent much of his younger years volunteering with the Jamaica Society for the Prevention of Cruelty to Animals veterinary hospital where he developed his love for animals and interest in science along with animal health and care.

"My younger years were filled with traveling throughout the summers to and from the United States to visit family in



areas such as Miami, New York, and New Jersey," he said. "This continuous exposure opened my mind to the concept of studying abroad for furthering my post-secondary education."

Ian attended the College of Agriculture Science and Education (CASE) where he completed his Associate of Science degree in Veterinary Sciences in 2013. Upon completion, he applied to several schools throughout North America and the Caribbean to complete his veterinary studies. He received three offers — one of which was Dalhousie University.

"I chose Canada because I felt adventurous and thought to myself this is the only place I haven't traveled to, why not try somewhere new while continuing my educational goals."

Ian completed his master's degree under the supervision of Dr. Sarah Stewart-Clark and immediately accepted a position with Cermaq Canada located in Tofino, British Columbia as a saltwater technician on one of their many Aquaculture farm sites in June 2018. He progressed to site assistant manager working to produce harvestable-sized salmon for consumption from smolt stage when they first enter seawater within three years.

It was a bit of a culture shock coming from a little island in the Caribbean to Canada, but Ian enjoyed the small class sizes, the culture, and the people.

"Studying at the Dalhousie Agricultural Campus was enjoyable because of the smaller class sizes allowing for an individualistic and more targeted approach. The concepts taught were a lot easier to grasp and digest mainly because they were being taught by very passionate lecturers and lab assistants like Dr. Sarah Stewart-Clark and Scott Jeffrey."



The perfect fit

Dr. Terra MacDonald (Class of '16)

Agriculture today involves farming both the land and the sea and as such, aquatic veterinarians are in high demand.

An aquatic veterinarian is a Doctor of Veterinary Medicine that specializes in the healthcare and management of marine animals and invertebrates. They are qualified to treat a wide variety of underwater life, including fish, sea turtles, marine animals, and other wildlife.

Just ask Dr. Terra MacDonald, Class of '16 who is the sole veterinarian for the entire West coast operation of Mowi Canada West.

"It's my dream job, truly," said Terra. "And I owe my whole career path to my early days at NSAC."

Terra is a third-generation alumnus born and raised in Truro so there was no question as to where she would attend school.

"I'd wanted to be a vet since I was young," explained Terra. "And the AC was an obvious choice to start my pre-vet journey. During my first year I was introduced to Dr. Derek Anderson who brought me on as a summer student, working with a few of his master's students in the aquaculture wing."

Terra was instantly in love with fish — especially the trout and salmon. It was her first introduction to aquaculture and she immediately thought it was a good opportunity to raise sustainable protein in a way that supports fisheries and takes pressure off wild stocks.

"I almost changed my mind about becoming a vet because I wanted to stick with fish, but Dr. Anderson said, 'You can be a fish vet' and I thought it was the perfect fit," she added.

Terra attended the Atlantic Veterinary College in 2013 after completing her third year at NSAC and continued to be fully focused on aquaculture as a career path.

"While concurrently completing her Bachelor of Science in Agriculture and her Doctor of Veterinary Medicine degrees, Terra and I worked up a fourth-year project feeding Camelina products to salmonids," explained Dr. Derek Anderson. "I was extremely impressed with Terra's desire to fully investigate aquaculture. She has become a great addition to the fish veterinary field, and I am glad to have had an opportunity to introduce such a capable person to such an important aspect of veterinary medicine."



Terra took aquatic animal electives, had summer positions focused on aquaculture and in her fourth year attended aquaculture-focused electives in Norway and British Columbia. After graduating from AVC, Terra went to a small animal general practice in Alberta for 18 months before accepting a position with Cermaq Canada in September 2018 in British Columbia and for the past two years has been with Mowi Canada West.

"My day-to-day work revolves around maintaining the health and welfare of all fish produced by the company from egg to harvest," she explained. "I am often out in the field visiting farms or hatcheries — these visits would involve the necropsy of any fish that have died, sampling for diagnostics if needed, as well as examining live fish for health and welfare. I talk with the site staff about feeding, biosecurity, fish behaviour and training on tasks like mortality classification and sea lice counting, which is required by our regulatory body."

When Terra isn't in the field, she spends time doing data analysis, mortality trends, sea lice data, feed rates, regulatory reporting, reviewing diagnostic results, and developing and coordinating treatment plans. She is also involved in the food safety side such as ensuring all the appropriate drug withdrawal times have been observed.

"One of the most interesting parts of my job is that I actually have control over a small fleet of treatment vessels, including two well-boats and one mechanical delouser. Never as a vet did I imagine that a huge part of my job would be directing the use of a massive ship!"

She added, "It's a new challenge every single day and I know better than to ever settle into a routine, but I love that I'm always being pushed to learn more."



The east coast's first aquaculture veterinarian

Dr. Steve Backman (Class of '82)

What happens when a woman from a New Brunswick dairy farm marries a man from a fishing family, on the South Shore of Nova Scotia? Their son becomes the east coast's first aquaculture veterinarian, obviously.

"Growing up I was highly influenced by both sides of our family, so looking back it seems completely logical that I would end up combining both family traditions and follow a path in aquaculture," reflects Dr. Steve Backman.

A young, future Dr. Backman, decided in middle school that he wanted to be a veterinarian, in fact. "Like all aspiring veterinarians, I had a love of animals and a strong appreciation for the role of veterinarians in farming," said Steve.

He adds he also had a strong passion for the sea, fueled by French explorer, Jacques Cousteau, and his famous quote — "We must plant the sea and herd its animals using the sea as farmers instead of hunters."

"I was singularly focused on becoming the James Harriet (British veterinarian surgeon and author) of the aquatic realm," Steve adds.

With that goal in mind, Steve attended NSAC and Ontario Veterinary College where he was mentored and became employed as a graduate student. It was there that Steve's career aspirations started coming to life.

"I became involved in a program that converted tobacco farms to land-based aquaculture operations. Under this program we introduced ambulatory and diagnostic veterinary services to this very new industry. Our diagnostic lab also received case submissions from across the country and there began to be a strong nucleus of veterinarians in aquaculture practice forming."

Steve's biggest career break came when he received a phone call from a nutrition company, offering him a position on Canada's east coast to provide service to the burgeoning salmon aquaculture industry. "This was my absolute goal coming to fruition and I would be that aquatic James Harriett," he says.





Steve became the first specially trained aquaculture veterinarian, in private practice, working on Canada's east coast. His coverage area included all of Atlantic Canada and Northeastern USA, down to Massachusetts. Simultaneously the Atlantic Veterinary College completed construction and had introduced aquatic studies as part of their core training. With their heavy focus on aquatic medicine, they became an important resource and support for the aquaculture industry.

"I had the pleasure of being a mentor to a number of students, who have since built amazing careers of their own right within the aquaculture industry," Steve adds. "I had always found that while I was supposed to be the experienced trainer, I had most certainly learned more from them than they did from me."

With the rapid growth of the aquaculture industry and more and more specialized veterinarians there became a need for a medium to exchange information and collaboration. Steve was honoured to be the charter president of the Canadian Association of Aquatic Veterinarians and founding secretary for the Eastern Association of Aquaculture Veterinarians.

Over time, Steve's career path moved away from fish health services and more in the direction of health product development and fish health research. Today, Steve is product manager (recirculating aquaculture systems) and health feed veterinarian for Skretting North America — an international feed company.

"In my current role, I am much more focused on innovation and nutrition rather than diagnostic services," Steve adds. "I coordinate product development and offerings to farmer clients, while working with our research teams to help translate the new knowledge gained to practical feed solutions."

And when Steve is not travelling for Skretting, he's operating his own business — Magellan Aqua Farms, a shellfish and seaweed farm in the Bay of Fundy. At Magellan Aqua Farms, Steve works alongside his family, including his wife, Ann.

"We started Magellan Aqua Farms in 2003 raising scallops and urchins as part of an integrated approach to farming," Steve says. "A few years later we expanded to also growing seaweeds with Chopin Coastal Health Solutions, working to make the blue revolution greener, hence our motto — Turquoise Revolution."

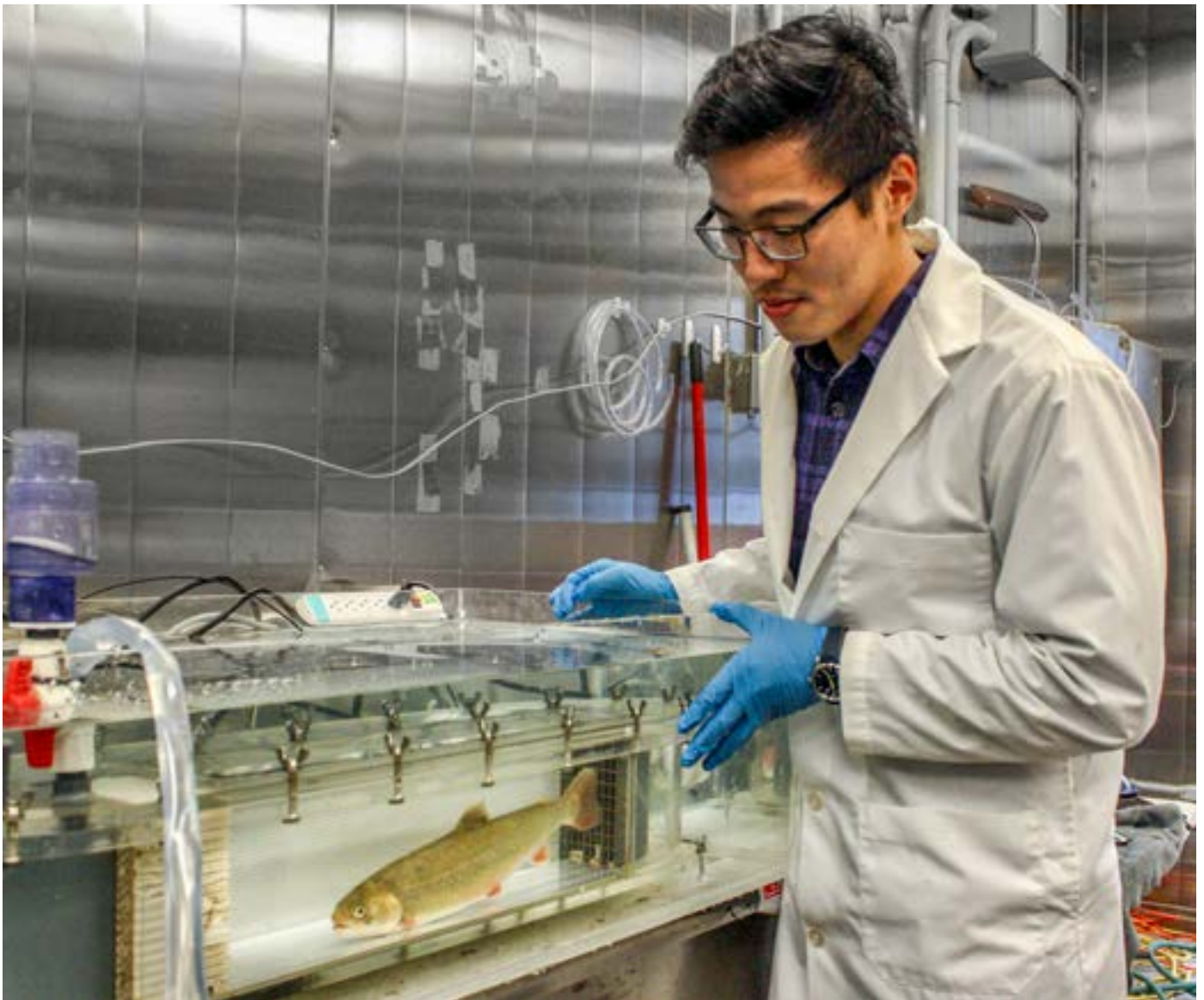
Between company, Magellan Aqua Farms and his role with Skretting, he is truly doing what he loves.

"My work is helping to build knowledge and helping to feed our future in an innovative and sustainable way. Aquaculture is a rapidly growing and evolving industry." For Steve, becoming the aquatic James Harriet has been hard work, but most importantly, so rewarding.

An early scientist

Yangfan Zhang (Class of '14)

As a young boy, growing up in a coastal city of southeast China (Fuzhou), Yangfan Zhang was never surprised when fish was served for his meals, every day. Until it wasn't.



"Suddenly fresh-caught fish would disappear from my dinner plate for a few months at a time," says Yangfan of his childhood. That's when Yangfan realized the pattern — fisheries stopped for a few months during the spawning season of the wild stocks. His interest was peaked.

"It occurred to me we are still hunting fish when we domesticate and farm all the other terrestrial livestock. Why couldn't we domesticate and farm fish?"

It was this early interest in aquaculture and the nautical lifestyle that led Yangfan to the east coast of Canada.

"When I discovered an aquaculture program offered by (the former) NSAC, I signed up without hesitation."

Yangfan's interest in aquaculture only expanded with curiosity as he spent the next four years on the Agricultural Campus working towards his undergraduate degree in aquaculture.

"My professors and instructors sparked my interest in understanding how aquatic animals interact with their environment. The aquaculture program at the Faculty of Agriculture is so unique it also taught me about aquatic ecology," he adds. "I actually felt like a scientist before I even began graduate school."

Even though he felt like a scientist, Yangfan headed to the west coast of Canada to further his education. As a researcher in the Department of Zoology and Faculty of Land and Food System, at the University of British Columbia, he earned his M.Sc. and Ph.D.

"I am passionate about my research in comparative physiology," says Yangfan. "It is such a broad yet focused discipline that studies the mechanisms of how animals live in their environment. I am excited about discovering how the principles of physiology are at work in the broader biological disciplines: ecology, aquaculture, virology, toxicology and bi-robotics. The knowledge generated from the broader context inspires me to advance the basic science of physiology."

Conducting cutting-edge research is not the only thing Yangfan is passionate about. He also enjoys touching the lives of students (whom he mentors) in a deep and meaningful way.

"When I started graduate school, I loved to discover the unknowns and figure out the mechanisms. As I started to mentor students, I found myself also enjoying seeing the eureka moment in their eyes. When my students tell me they get a nice job or get into a graduate school they dreamed of, I feel really happy for them."

Most likely a very similar feeling to what Yangfan's former instructors think of his success. He acknowledges many of the

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mentors he had while at AC and the impacts they made. "It is a little, to no, surprise that I research fish physiology," reflects Yangfan. "Dr. Jim Duston taught all the physiology courses; he was witty, and the courses were hard but fascinating!"

Yangfan's mentors would, without a doubt, be proud of his latest endeavour — as of September, Yangfan became a post-doctoral researcher at Harvard University. There, he is supported by a two-year fellowship from the Natural Sciences and Engineering Research Council of Canada.

"I now have access to all the talents and equipment needed to shed the light into the black box of the energetics of free-swimming fish. It is a gap of knowledge needed to be fulfilled when we want to improve the health and welfare of farmed fish as well as better study ecological performance and evolutionary trajectories of the wild fish species."

Yangfan believes that great capability comes with greater responsibility. And he doesn't mean as an individual.

"For the first time in natural history, a rapid pace of environmental change is driven by one species — Homosapiens, not even dinosaurs left such a gigantic environmental footprint as we do," Yangfan says. "If humans have such a capacity to change planet Earth, we are also capable of taking care of the Earth. As an individual of the Homosapiens species, when I look back one day, I want to be able to say that I did my absolute best to contribute to the conservation of Mother Nature."



Looking ahead to sustain the lobster industry for rural communities

Dr. Fraser Clark

Over the past 30 years, lobster stocks south of Boston have been decimated by a virulent disease that causes holes in their shells.

"It basically looks like their shell has rusted out," explains Fraser Clark, a molecular immunologist and research professor with the Department of Animal Science and Aquaculture, Faculty of Agriculture at Dalhousie. "In some cases, the disease renders the lobster unmarketable because the holes are unappealing to consumers, but in more extreme cases, it results in the death of the lobster when they molt. As a result, there are very few lobster fishers south of Boston now and the concern is it could spread to the Maritime Provinces."

That is an eventuality Clark is hoping to prevent. In partnership with colleagues at UPEI, he is researching the cause of lobster shell disease to better understand the driving forces behind it. The current theory among researchers is that certain types of bacteria are to blame for the erosion, but Clark hypothesizes that stressors such as climate change, pollution and impoundment could be compromising lobster immune systems, thus enabling bacteria to proliferate and cause shell deterioration.

"One of the principal concepts in immunology is that you have to isolate the pathogen you think is causing disease and demonstrate how it is doing that," he says. "But researchers haven't been able to reproduce the disease in the lab and that suggests the lobster with signs of disease are distressed. Our goal is to explore both theories and deliver data and findings that enable timely interventions that either address stressors or particular bacterial pathogens."

Researchers at UPEI will be looking for signs of the disease in the Maritime Provinces' wild populations while Clark is supervising an analysis of impounded lobster from the region and Maine being conducted by PhD student Nicolas Conceicao. Conceicao is taking swabs from the lesions and healthy areas of their shell to see if there are any differences in bacteria between the two. He will also be taking samples from lobsters



with different grades of the disease and assessing their health based on gene expression. The research is funded through the One Ocean Health project, an Ocean Frontier Institute initiative dedicated to understanding the connection between ocean health, marine animal health and human health.

"Lobsters are usually solitary, so when they are impounded, they become stressed and that is when there is disease," he observes. "That said, there was a higher prevalence of shell disease among lobster south of Boston where there were higher temperatures, so the disease could be the result of climate change or multiple stressors."

Given that the waters of the Gulf of Maine are warming faster than 99 per cent of all marine water on earth, the need for actionable insights and early interventions is vital. Clark believes the data that he and his colleagues are collecting will enable a range of solutions, from the development of climate change models to assess hot spots to the identification of lobster populations that are more resilient to the disease.

"We are fortunate in that there is nothing to suggest that the disease is of immediate concern here, which gives us the time and opportunity to take steps to prevent it from becoming a major issue," he says. "For that reason, I'm optimistic about outcomes. When you consider that lobster is the economic backbone of many rural communities here, we need to do all we can to ensure we always have delicious lobster to keep people employed."

Barley Party 2021

Students and faculty alike often have a difficult time explaining what is so special about the Faculty of Agriculture and the Dalhousie Agricultural Campus. If there was an event that could sum up this feeling — it would be Barley Party 2021.

After more than 14 months of virtual working and learning, much thought and effort was put into designing a safe, socially-distant Barley Party in Chapman House parking lot on the Dalhousie Agricultural Campus on Thursday, April 8.

"I think this event shows why this campus is special," said Farm Manager, Jean Lynds (Class of '90). "We have people who care."

And care they did. Facilities Management, Farm staff, Security, residence students, administration and many more pulled out all the stops to make the day special for those students able to attend in person. Even the weather cooperated.

"Barley Party is always such a feel-good, celebratory occasion, but even more so this year," said Faculty of Agriculture Alumni Association Chair, Colette Wyllie (Class of '10). "It may have been highly adapted, but the fact we were able to come together on campus for the first time in over a year was truly special," she added. "The Class of 2021 has had a challenging year, so it was a delight to honor them in this way."

Chalk drawings on the parking lot, a message of congratulations on residence windows, Barley Party window decals and branded chocolate went a long way to make students feel special as they remained in their cars until their name was called. Students received their rings from Dean Gray and campus mascot Rocky the Ram. Class valedictorian Leah Hocquard and her roommate Matt Quinlan arrived via tractor to the special ceremony.

"One of the only things that would get a farmer out of the field on a sunny day in April... receiving their Barley ring," said Leah!

Since its launch in 2010, the Barley ring has become a highly recognized symbol of the Faculty of Agriculture. Now with more than 1300 rings worn by alumni around the world, the Barley ring is a proud symbol of the Faculty of Agriculture and the Dalhousie Agricultural Campus.

"Receiving their Barley ring is definitely one of the most anticipated events for graduating students," says Alisha Johnson, Alumni Relations. "It's a tradition like no other and witnessing campus come together to make this modified event just as special, for the Class of '21, was truly heart warming."

In addition to honoring graduating students who had purchased a ring, the Alumni Association also made an honorary ring presentation. Honorary rings are awarded to individuals who do not meet the criteria to be eligible for a Barley ring but who are extremely deserving of the honour.



Convocation

Convocation took place for Dalhousie University students, in June, with 154 graduates from the Faculty of Agriculture crossing a virtual stage for the second year in a row.

"Our students have spent the past two years in very strange and trying circumstances and have persevered and succeeded," said Dean David Gray. "This speaks volumes to their resiliency and is a testament to their future success. We are so proud of all of them."

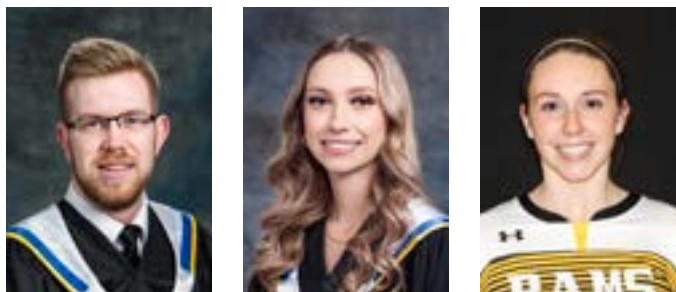
All graduates will be invited back to campus to cross the stage and be duly recognized when conditions permit.

Each spring the graduating class elects two individuals to represent the entire class within the Agricultural Campus Alumni Association. The Class of 2021 elected Robert Larsen as Life President and Hannah Squires-Bavis as Life Secretary.

Life President

Robert is from Prince Edward Island and with his degree in Agricultural Business, plans to continue to work with his parents, Lorne and Brenda, and younger brother Justin, a second year Plant Science Diploma student at the AC, on their beef feedlot. He also operates a custom Agri-services business, Norring Road Custom, owned by his family.

"During our time at the AC, we have all had the chance to network with professors and experts in the industry and have developed strong relationships with peers who will be at



Class president, Robert Larsen, Class secretary, Hannah Squires-Bavis and Valedictorian, Leah Hocquard.

the forefront of the agriculture industry in the years ahead," said Robert. "In this way, we will all be connected to the AC community for the rest of our lives."

Life Secretary

Hannah is from Newfoundland and completed her BSc (honours) in Bio Veterinary science with a certificate in genetics and molecular biology.

She chose the AC as she hopes to go to vet school, and work in an animal-related field

"The best thing about the Faculty of Ag is the tight-knit classes, your professors know you by name and remember you."

During the virtual celebrations, valedictorian, Leah Hocquard, addressed the class via video, while Agriculture Alumni Association Chair Colette Wyllie (Class of '10) welcomed the Class of 2021 to the alumni family.

Agri-Golf Classic

The 2021 Agri-Golf Classic proved to be a great opportunity for new and returning participants to re-connect and enjoy a day of fun, in support of student athletes. After being cancelled in 2020, due to the pandemic and Public Health restrictions, the August 2021 event was held at Abercrombie Country Club, New Glasgow, NS.

Members of the Class of '10 reunited to form a team and share many laughs.



Team from L-R: Luke McLellan, Donald Buchanan, Dan Muir and Colette Wyllie.



Drs. Gray receive Honourary Barley rings

“The 2021 honorary ring recipients are ambassadors and supporters of the Faculty of Agriculture and have made outstanding contributions to the AC community both internally and externally,” said Alumni Association Chair, Colette Wyllie. “They have had a profound impact on our campus, our students, and our alumni.”

In eight short years, Drs. David and Janine Gray have immersed themselves in campus culture. Their dedication and commitment to what is special about being an Aggie remains at the forefront of every endeavor.

David and Janine arrived on campus with their family in 2013, when the merger with Dalhousie was in its infancy. David, the first dean of the Faculty of Agriculture and principal of the Agricultural Campus is now in his second term and Janine is a senior instructor in the Department of Animal Science and Aquaculture.

David is well-spoken and passionate and uses those qualities to inspire those around him. Endlessly optimistic, he always sees the good in agriculture and in the Agricultural Campus and believes the future of both is very bright. After two major fires on campus within three years, David made sure to always see and communicate the positive outcomes. He does not shy away from

tough questions and does not believe in asking his staff to do anything that he is not prepared to do himself. He's even been seen milking cows on Christmas day in the RAC.

As an administrator, David has far surpassed the level of involvement of any dean or president in recent memory. From Orientation through to Convocation, he is exceptionally present in the lives of students. He is approachable and down-to-earth and knows an astounding number of students by name. He makes time for student events, participates in student fundraisers, and engages with students on social media. He is a staunch supporter of the Dalhousie Agricultural Students' Association and holds regular breakfast meetings with the executive to hear updates and concerns — something that was not commonplace before his time.

"David is incredibly supportive of all alumni," explained Alumni Relations Manager, Alisha Johnson. "He understands and respects the history of our campus and has taken great care not to ostracize NSAC alumni in the years following the merger. He manages to do this while also creating excitement around the future of the Agricultural Campus and how it will fit within the Dalhousie community," she added.

David stays in regular touch with alumni by hosting annual Dean's Receptions all over the region, joining meetings of the Alumni Association, speaking at class reunions when invited, through the *AGRICOLA* and social media, and by never missing a Homecoming or Blue & Gold Awards Dinner.

"Janine and I love the AC and everything about it...but when people ask me what my favourite thing is, I always reply, 'the people,'" explained David. "This is truly a special place, it's probably no secret that over the last few years I have been approached and invited to apply for positions at other institutions, but I have not even considered it. This is our home, our family."

Dr. Janine Gray is one of the most well-loved instructors on campus. Her course load is astounding — she teaches a combination of lectures and labs for nine different courses over the academic year — and the amount of support she provides to her students is extraordinary. She knows all her students by name and keeps their interests and needs top of mind in all her lectures and labs. Like David, she is very involved in student life and attends student functions and fundraisers whenever her schedule allows.

Janine has strived to bring new opportunities to students in animal-related programs at the Faculty of Agriculture since 2013. With her support, the Bioveterinary Science program was established and accepted its first intake of students in 2016. The program addresses a gap that previously existed between pre-veterinary studies and the Animal Science program.

Janine is also responsible for the establishment of the African Wildlife Ecology course, offered for the first time in the spring of 2016. African Wildlife Ecology is a three-week intensive credit course taking place in the Eastern Cape of South Africa, developed in partnership with the Wildlife & Reserve



Management Research Group at Rhodes University. Janine has traveled to South Africa with three different groups of students. African Wildlife Ecology incorporates field research, lectures and practice in conservation and veterinary care and is truly a once-in-a-lifetime opportunity for students — and it wouldn't be possible without Janine.

"I am exceedingly proud to be part of my students' success," said Janine. "When I was at school my Biology teacher was a great inspiration to me, and probably the main reason I went into science. I have hoped to inspire the same love of biology or science in my students and show them it can be fun as well."

On top of full-time teaching responsibilities, Janine also spends much of her time supporting recruitment and community education initiatives. Somehow, she finds time to develop activities and lead sessions with youth who are visiting our campus, either as part of a school program or with a community group. She has been instrumental in developing a relationship with local Girl Guides units, who now come to campus on a regular basis to complete badge requirements. She never says no when asked for help, unless it directly conflicts with her teaching schedule — and even then, she often tries to find a work-around. She puts in evenings and weekends to get it all done. Hers is often the last vehicle in the Haley parking lot at the end of the day.

Individually, David and Janine are integral parts of the campus community. Together, they are a force to be reckoned with.

"Receiving the honorary Barley ring is the top honour/award that I have ever received...Janine and I will wear them with pride," said David.

Nova Scotia Institute of Agrologists recognizes Agricultural Campus alumni

This past April, at their annual meeting, the Nova Scotia Institute of Agrologist recognized three Agricultural Campus alumni for their outstanding contribution to agriculture in Nova Scotia.

Elizabeth (Liz) Crouse (Class of '77) — Distinguished Life Member

Originally from New Perth, PEI, Liz grew up on a beef and potato farm. Her post secondary education started at NSAC, before attending the Macdonald Campus of McGill University in Montreal to complete her Bachelor of Agriculture degree in 1979. Following university, Liz began a distinguished 41-year career with the Nova Scotia Department of Agriculture, where she started as the regional 4-H representative for Hants and Kings counties from '79 – '86. Liz then moved into the role of manager of 4-H and Rural Organizations, which she held for 20 years, before becoming the director of the Natural Products Marketing Council in 2006. Liz devoted her entire career to the advancement and success of the agriculture industry in Nova Scotia. Liz is much-admired for her honesty, work ethic, ability, knowledge, and determination. As a dedicated and professional extension educator, Liz mentored many future agriculture leaders and made a significant impact on Nova Scotia agriculture throughout her career. Liz is now enjoying retirement but will miss the agriculture community and watching young people grow from being fresh-faced 4-H members to industry leaders, which she said was one of the most rewarding parts of her job.



Misty Croney (Class of '00) — Distinguished Agrologist

Misty was recognized for her vast contribution to the agriculture industry through her agrology work with LP Consulting. Since joining LP Consulting in 2008, Misty has become a partner and the vice president, alongside president, CEO, and Founder, Lise LeBlanc. Always learning and applying her knowledge, Misty's ever-evolving crop management plans help farmers achieve higher yields and long-term profitability. Among many things, Misty is skilled at analyzing data from research, waste to resource programs, and crop management plans to benefit farmers, industry, and the environment. When not busy planning, executing, and analysing research projects, Misty is contributing to the many facets of agriculture, as an active member of the Soil Conservation Council of Canada, a champion for women in agriculture, the lead for the Bonnefield Agrologist program, and a mentor for Professional Agrologist from across Canada. With more than 600 clients in Atlantic Canada as testament to her quality of work and long-standing dedication, Misty's contribution to agriculture and the environment will only continue to grow.





The award for Outstanding Young Agrologist was presented, posthumously, to Angela Gourd (Class of '08 & '13). Angela was born and raised in Auburn, PEI, where her passion for agriculture came to be on her family's small farm. After completing her undergraduate degree at the NSAC, Angela stayed at the school to complete her graduate studies. Starting in 2015, Angela worked as a plant protection coordinator for the Nova Scotia Department of Agriculture. In her short time with the department, she made many pest management related contributions, most notably the Nova Scotia Weed tours she hosted in 2016 and 2017, which has since become the Maritime Weed Tour. Her efforts also helped lay the groundwork for the

establishment of the Atlantic Weed Science Network. Both initiatives foster collaboration and sharing and will continue to have lasting positive impacts for the weed science and extension communities in the Atlantic Region. In recognition, she was nominated and awarded, posthumously, the Canadian Weed Science Society Excellence in Weed Extension Award in November 2020. Angela was a lifelong student of agriculture and her willingness to share knowledge was universal. She was a passionate beekeeper and loved experimenting within her impressively sized gardens each year. Her contagious smile, unwavering upbeat personality, and dedication to this industry will be missed by those who had the pleasure of knowing Angela.



“My motivation for this is justice,” Teresa says. “I was fortunate to be born in Canada, to be well fed as a child, to be educated here and have a job. The women I meet there are the same as me, but they have not had the same advantages. It’s important for me to share what I can.”

Dalhousie University's Aurum Awards

The Aurum Awards celebrate outstanding Dalhousie alumni who are helping to build a better world. Alumni are recognized for their innovation, community engagement, leadership, and social, cultural, and economic contributions.

The Faculty of Agriculture's Teresa Mellish (Class of '66) was named a 2021 Aurum Award recipient in June.

Harvesting hope in Kenya

When a hurricane decimated banana crops in Dominica in 1979, Teresa Mellish raised funds to help. Realizing she could do much more, she has helped raise millions to address food security in Kenya as co-founder and treasurer of Farmers Helping Farmers.

Like many farmers across Prince Edward Island, Teresa has planted her share of seeds over the years. But one that she helped plant in 1980 has had a significant impact among farm families in East Africa.

That seed, Farmers Helping Farmers, is a non-profit initiative that has conducted hundreds of development projects in Kenya to address food security, health and education challenges. Teresa not only co-founded it but has also helped fund it in her role as treasurer and coordinator.

"My motivation for this is justice," Teresa says. "I was fortunate to be born in Canada, to be well fed as a child, to be educated here and have a job. The women I meet there are the same as me, but they have not had the same advantages. It's important for me to share what I can."

That desire to share first took hold in the early 1970s when Teresa and her husband, Ken Mellish, who is also an alumnus, volunteered with Cuso International, a Canadian charity dedicated to ending world poverty. But it was at the 1979 provincial International Family Farm Consultation, which Teresa helped organize, that the idea for Farmers Helping Farmers took root. During the event, a hurricane tore through Dominica, decimating the banana crop of one of the attendees. In addition to raising funds to help reestablish that crop, Teresa and other PEI farmers discussed the possibility of visiting developing countries to see farming conditions first-hand and explore other ways to make a difference.

"We submitted a proposal to the Canadian International Development Agency (CIDA) for funding and we chose Kenya and Tanzania because we really connected with their delegates at the event," Teresa says. "Twenty-two of us travelled to East Africa for

four weeks in 1980 and then we brought a group of farmers from there to PEI. That's how we got started."

To date, Farmers Helping Farmers has funded projects valued at more than \$10 million through contributions from PEI farmers and CIDA. These projects include helping Kenyans grow more and better food, building school cookhouses to address hunger, installing rainwater storage tanks to improve access to water, and delivering programs in cooperation with the Atlantic Veterinary College to enhance dairy production. Funding has also provided communities with access to school lunch programs, mosquito bed nets, cookstoves, seeds, and airtight bags for safely storing maize and beans. Through these efforts, Farmers Helping Farmers has touched the lives of more than 100,000 Kenyans.

Teresa says the overarching goal of the Farmers Helping Farmers initiative is to help communities develop the knowledge and resources to address economic, nutrition, and education challenges through strategic partnerships with families, women's groups and schools. "We work with each community for five years because we do not want to create any kind of dependence," Teresa explains. "At the end of those five years, families have a better diet, better income and they are better educated."

In addition to working with Farmers Helping Farmers, Teresa donates to her local food bank and, with her husband, owns and operates New Perth Farms, which breeds Dutch warmblood horses. She is honoured to be recognized with an Aurum Award for her involvement with Farmers Helping Farmers and hopes it continues to bear fruit for years to come.

"We are just starting to do a strategic plan to guide us for the next 10 years," she says. "I would like to see us go on pretty much as we are now. The fact that I get to work directly with people there continues to motivate me as does the support we have here in PEI. We are a small organization, but very effective."

Cooke Aquaculture scholarship advances Dalhousie students' education

You may not immediately think about farmed food production when looking out at the ocean, but at sea sites dotted along the coastline of Atlantic Canada, salmon farmers are growing a sustainable source of protein to help feed a growing global population. According to Food and Agriculture Organization of the United Nations, aquaculture will need to supply 2/3 of the world's seafood requirements by 2030.

As the demand for healthy salmon grows, so too does the need for people with the education and expertise to support the industry, and the Faculty of Agriculture's Aquaculture program plays an important role.

For Cooke Aquaculture, a family-owned, New Brunswick-based food production company, having an aquaculture program located within Dalhousie's Faculty of Agriculture has enabled a symbiotic relationship between Cooke's research teams on R&D projects, and the students who are poised to help the industry continue to sustainably grow and meet global demand.

Since 2016, the Cooke Aquaculture Scholarship has been providing support to undergraduate aquaculture students who will become the next generation of aquaculture industry expertise. Each year, a student with a passion for aquaculture has received \$2,000 to support their academic journey. Given the success of the program and the high calibre of students that the scholarship has been able to support already, Cooke Aquaculture recently renewed the scholarship for the next five years.

"The aquaculture industry creates rewarding careers, grows the economy, helps protect fish stocks in the ocean from overfishing, and provides locally raised food for the finest retailers and food service professionals," says Joel Richardson, Cooke's Vice President of Public Relations.

Salmon farming is an essential economic and social driver for Atlantic Canada, bringing prosperity and over 8,000 year-round, full-time jobs to many rural, coastal communities across the region.

"As a local company we are proud to invest in supporting students who are pursuing aquaculture studies, and we ultimately aim to be an employer of choice for graduates. Cooke is hiring in every Atlantic province. We have lots of full-time positions available with good pay, health benefits, a retirement savings plan and a real opportunity to grow," says Richardson.

"It's remarkable to see how post-secondary institutions like Dalhousie are recruiting and training aquaculture students," says Richardson. The program, which averages approximately

25 full-time students a year, places importance on engaging students in the research of their professors and other faculty in the program's labs and aquatic-rearing facilities. This hands-on approach to learning is a valuable asset in the job market. "In our experience, graduates from aquaculture programs, such as those offered at Dalhousie, are bringing practical and applicable skills to their work from day one, and this approach is what's helping to advance our entire industry."

Cooke was started in 1985 by Glenn Cooke, his father Gifford, and his brother Michael with a single marine site. Cooke has since grown into a global seafood leader with salmon farming operations in Atlantic Canada, the United States, Chile, and Scotland; seabass and seabream farming operations in Spain; seafood and wild fishery divisions in North and South America; and one of the largest premium shrimp farms in Latin America. Cooke now has a global workforce of 10,000 employees in 10 countries — mainly located in rural areas. Cooke Aquaculture and all other divisions within the Cooke family of companies have mandated sustainability, environmental and biodiversity policies within their operating and reporting practices.

The company has been named as one of the Top 25 Seafood Suppliers in North America for Sustainability & Conservation and has been recognized for 16 consecutive years as one of Canada's Best Managed Companies. Winners are amongst the best-in-class of Canadian owned and managed companies demonstrating strategy, capability, and commitment to achieve sustainable growth. In 2021, Cooke Aquaculture was named as one of Atlantic Canada's Top Employers.

Aquaculture is among the fastest growing food sectors in the world with many opportunities for new graduates looking to build their career in a modern field that relies on the latest science and technological innovations. In aquaculture today, more than half of those working in the industry globally are under the age of 40.

Cooke's workforce includes a number of people who have been part of the Faculty of Agriculture's Aquaculture program, both program graduates and those who took aquaculture courses as their minor or elective, in roles with its remote feeding operations, and as aquaculture technicians. "As a vertically integrated, science-based marine farming company, it's very important to our company to have academic programs available for people who want to live near, and work on the water," adds Richardson.



Whit Strickland Scholarship

This scholarship was established in honour of Thomas 'Whit' Strickland, a Nova Scotia aquaculture producer, who would often tour Faculty of Agriculture students through his production facility.

Thomas Whitman 'Whit' Strickland, was a leading contributor of the Nova Scotia aquaculture industry and the key innovator and developer of his salmon hatchery in Little Harbour since he started the business in the early 1980s. Whit was passionate about living off the land and enjoyed the outdoors. He especially enjoyed spending time with his five beautiful granddaughters.

Whit passed away very suddenly in October 2017, and to keep his memory alive, Whit's extended family and friends have raised funds to offer a scholarship supporting a student in the Aquaculture program, at the Faculty of Agriculture.

In the spirit of Whit's kindness, generosity and love for his granddaughters, the scholarship is awarded with preference to a student who identifies as female and is in their second year of the Bachelor of Science (Agr) in Aquaculture.

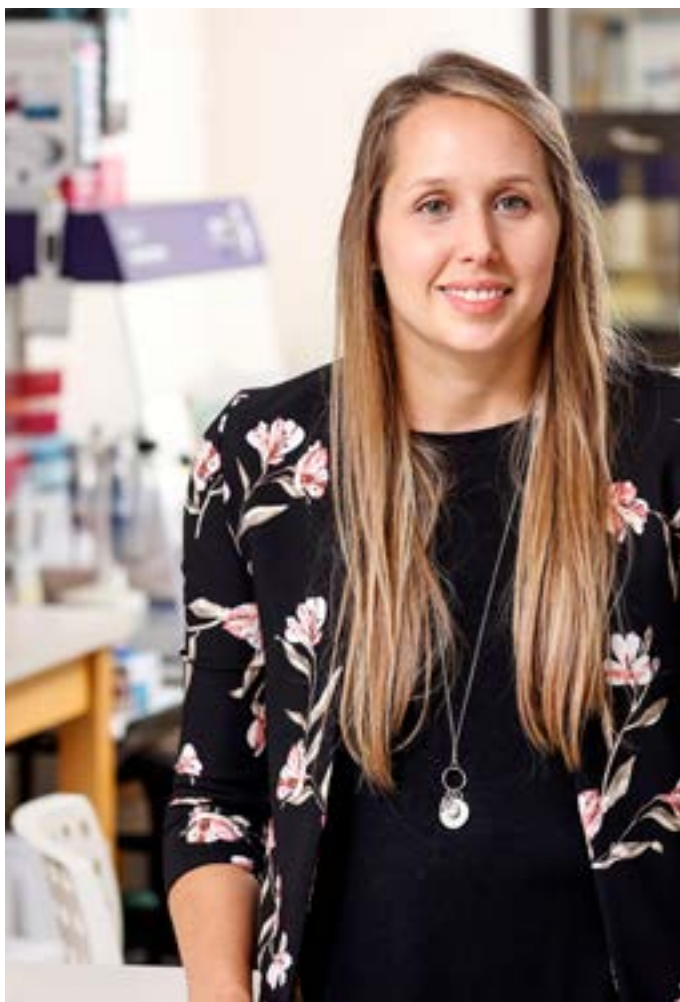
"Thank you for creating and allowing me to receive the Whit Strickland Aquaculture Scholarship. This scholarship allows me to focus on school and activities such as volunteering at the aquaculture center on campus instead of focusing on finances,"



wrote 2019 recipient, **Karlie Lewis (centre)**, from Alberton, PE, pictured here with Whit's daughter, Kelly Jones, and son-in-law, David Jones at the annual Faculty of Agriculture Scholarship Banquet in 2019.

Stephanie Hall

Raised in Dartmouth, Nova Scotia, Stephanie Hall had little knowledge of agriculture or aquaculture. Yet, growing up she loved the ocean, nature, and animals. Stephanie went fishing with her father whenever there was an opportunity. Whether they were at the ocean or lake – she would always take time to scan the shoreline, looking for creatures.



Eventually, Stephanie submerged herself in the world of agriculture, attending the Faculty of Agriculture. This further expanded her curiosity and she quickly became passionate about having a connection and understanding of how food is produced.

Toward the end of her undergrad studies, Stephanie discovered the aquaculture program, at the Faculty of Agriculture, which combined her passion for the ocean and agriculture. Currently, Stephanie is a PhD student, through Dalhousie's Biology Department (Agriculture stream), focusing on the blue mussel aquaculture industry in PEI.

"The mussel aquaculture industry is being challenged by climate change induced stress, resulting from high temperatures, anoxic events, salinity changes, acidification, changes to food availability, heavy fouling from invasive tunicates, etc," says Stephanie. "One of the major challenges to the mussel aquaculture industry is the lack of visual stress behavior exhibited by mussels. Often the only sign of stress observed is mortality, which represents a loss for the industry. My research focuses on discovering markers that can be used to detect stress and determine causative reasons of underperforming mussel populations before it leads to mortality."

What's a typical day like?

A typical day in my PhD depends on the day and stage of my project. When I first started my PhD, I spent a lot of time running stress trials in the lab on mussels. During these trials, I collected information on gene expression patterns of mussels during various stressors. After this, I analysed this gene expression information using bioinformatics to discover markers that were associated with the stress. Markers were then tested for efficacy using genomic technologies (RT-qPCR) in the lab. Currently, I'm in the later stages of my PhD and that means my typical day is spent writing my results and finishing up some final genomic analysis in the lab.

The Agricultural Campus is a pretty special and unique place, as we hear over and over. What's your favourite characteristic of the Agricultural Campus?

My favorite part of the Agricultural Campus was the amount of opportunity there was to get hands-on experience. The Agricultural Campus is unique in that it has relatively small class sizes, making it easier and less intimidating to get to know peers and professors. This also means that labs are more likely to have a hands-on component. In my undergrad, several labs had weekly trips to the on-campus farm, field trips, or labs that I got to work with animals (ie. finfish, shellfish, cows, sheep, etc). For students, gaining these types of experiences is so important for figuring out their career path, and gives an opportunity to develop skills that transitions them into a career in their desired field.

What needs improving?

I think the Agricultural Campus has made significant improvement over the years to expand their campus and be innovative. However, I think continuing to develop their genomic program and technologies available on campus would help to improve and keep the campus competitive with other academic institutions. The field of genomics is currently exploding within most areas of science. Genomic technologies have many applications within the agriculture/aquaculture sector that are key tools for sustainability and growth of the industry.

Atlantic Canada is a place on its own. What do you think are some competitive advantages farmers have here, compared to central or western Canada?

There are various challenges to farming in Atlantic Canada. The one I deal with annually, that is relatively new (last decade), is climate change. The climate is unforgiving at times with frost and hurricanes. These weather events are difficult to navigate but as they become more prevalent, we ensure the support networks continue to advance for our producers. This takes on many forms whether its extension support, risk management programs, insurance-based programs to help manage the risk and research and development to manage in these challenging times.

However, the opportunities are endless. We have amazing innovators in our provinces. Automation in our sectors is lending itself to tremendous improvements as we struggle with labour shortages and the need for new ways of doing business. Climate change has also presented opportunities to grow and process new crops that were previously not sustainable in our regions. For example, we have emerged world leaders in cold climate wine production.

What do you think has been the most significant change since you first started on campus, as a student?

I think some of the renovations on campus such as the library, specifically the new Student Learning Commons has been a huge change. In my undergrad, I spent a lot of time at the library studying, so its wonderful to see it renovated. There has also been changes in degrees including the Bioveterinary Science degree which has generated some new courses that benefits students wanting careers in animal sciences.

Working in agriculture/aquaculture, what are you most proud of?

My MSc and PhD research has been focused on the shellfish aquaculture industry. Being a part of research and innovation in this industry has been very rewarding and something I'm very passionate about. In my current PhD, I'm very proud to be working on research that aids in finding solutions for challenges associated with climate change stress in the mussel aquaculture industry.

Why is agriculture/aquaculture so important?

Life as we are accustomed to would not exist without agriculture. The agriculture industry provides food, and raw materials for many important commodities ranging from fabric that makes clothing, to lumber that builds homes. Global human populations continue to rise, and we need agriculture to feed the world. Aquaculture has an important role in providing a source of food for our growing population and can take pressure off wild fishery stocks.

What are some of the challenges facing the industry today? How can we address these?

I think ensuring sustainable practices and overcoming climate change are two of the main challenges for the agriculture/aquaculture industry in the foreseeable future. The agriculture/aquaculture industry must continue to innovate and implement changes to their industries to mitigate their ecological impacts, while continuing to feed the world. At the same time, climate change will have consequences to these industries. I believe research and innovation is key to overcoming these challenges.

What advice would you give to a young person, considering a future in agriculture?

I think it is very important for anyone considering a career in agriculture/aquaculture to keep an open-mind and actively pursue knowledge of different agriculture/aquaculture sectors, techniques, challenges, and innovations around the world. The agriculture/aquaculture sector needs to continue to evolve to meet the demands of a growing world, while mitigating its ecological impacts, and overcoming challenges associated with climate change. I think by being open-minded and having a well-rounded knowledge of the industry, it sets up the future of the agriculture/aquaculture industry to make the changes needed to become more sustainable and overcome challenges.

Cooke



Jami Whynot *Class of '16*
Remote Feeding Technician,
Cooke Aquaculture

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