



SUMMER 2022

THE COLD HARVESTER

NEWFOUNDLAND AQUACULTURE



***Aquaculture 101
Launched
Member Updates***

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New Process

You demand the best...

we assembled the best technical team in the industry!

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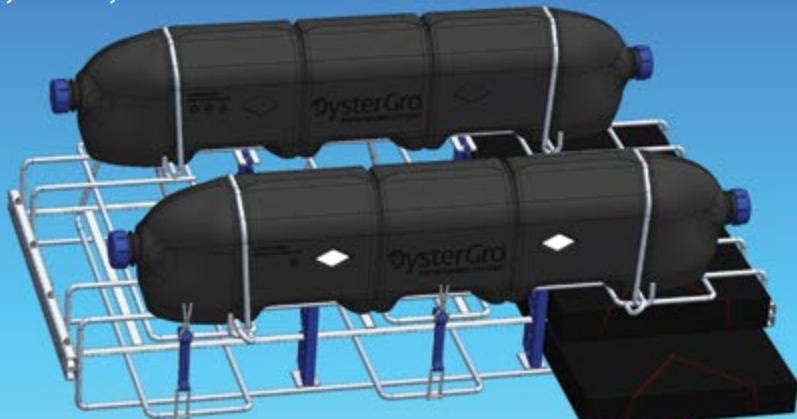


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The Newfoundland and Labrador Aquaculture Industry Association (NAIA) is a member-based organization that represents the interests of seafood farmers and their suppliers in Newfoundland and Labrador. We are passionate advocates on behalf of our members to facilitate and promote the responsible development of the aquaculture industry.

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Message from President and Chair of the Board

Sheldon George

Hello to our NAIA members, I hope you are all doing well. Welcome to the first edition of the Cold Harvest since my return to the president's role on the NAIA board, and I have to say it is an exciting time to be in this position. The last few months have been busy for us with career fairs, hosting a supplier group with Innovation Norway and most importantly getting ready and stocking a new year class of fish.

I would like to take this opportunity to send a big thank you to the town of Grand Falls-Windsor for hosting the first of our career fairs, one with high school students from Exploits Valley High; and also thank you to Bay d'Espoir Academy for our second fair. Our industry here in NL has an aging workforce, and we need to attract more youth to work on our farms, sail our vessels, repair our equipment, run our processing facilities and so on. There is a large variety of advanced skills needed to keep our industry thriving, and our youth plays an important part in keeping our farms operating.

Along with the youth, a key part to the farms succeeding is having great suppliers. In mid-June Innovation Norway had a group of suppliers who are interested in working with our farmers tour the area. It was a great week for the finfish industry to educate them about our needs here in Newfoundland, but also to show how we have overcome areas where we never had suppliers before, and we had to either make do with what we had or modify technology to make it work. These suppliers have great products to offer and hopefully we get to see some of them working here in the future, and of course at the Aquaculture Canada WAS North America 2022 Conference in August, just a short time away.

While the tours were taking place, our finfish industry was in the middle of stocking their 2022 year class smolts. I always find this time exciting as it marks new beginnings, and farm

staff get to start off a crop of fish with another production of experience under their belts. Newfoundland has one of the most difficult environments in which to grow fish, however we have been successful by learning from each crop, learning how to handle what we cannot control and putting measures in place to mitigate against these risks. It is with each new crop that we get to show how we have improved and better prepared our companies for the unexpected. The knowledge and experience of the local people here in Newfoundland, and their determination to make things work gets renewed each spring as smolt get transferred from hatcheries to sea sites.

I would like to take this opportunity to wish all farmers good luck in their new year class of crops. This past year has been an exciting one, especially for Grieg Seafood NL for the first transfer of smolt to sea cages, what a great milestone.

As well, hats off to the shellfish farmers who are still pushing away at the mussels and oysters. Hopefully this year we get a break from the environment as we try to break the hurdle of some governmental challenges that we are working on right now to help the industry grow.

This will all be achieved as all our Newfoundland producers work together to help each other out, and I expect we can feed off of each other as we finally get to meet up in person again after a couple years of virtual meetings.

Good luck everyone on the 2022 crops, and all ages of fish in the water, safe travels and looking forward to seeing you all in St. John's at the conference.

I will end by saying what I tell our NAIA Executive Director Jamie Baker all the time: "Look after your fish and staff, and your fish and staff will always look after you."

See you in mid-August!



Message from Executive Director

Jamie Baker

As I write this column we are in the final stages of organizing the Aquaculture Canada / WAS North America 2022 Conference and Trade Show – the largest aquaculture show in Canadian history, which will be held right here in St. John's Aug 15-18.

The excitement right now amongst the folks involved is nearing fever pitch. That's understandable given that this will be the first face-to-face gathering in the sector since the initial pandemic lockdowns in late 2019-early 2020. The trade show has been sold out for months. Conference presentations and social events promise to be exceptional. People are coming from around the world. Planning and logistics are ramping up.

After three years of preparation, everyone is excited about opening the doors and making this event truly outstanding.

My own excitement is comparable, but for a somewhat different reason: As a proud Newfoundlander, I am, more than anything, anxious to show the world just how special this place is on every level.

I am excited to show people how aquaculture is such a critical component of food security for our province, country and world, all while being the lowest carbon emitter of any major protein producer. We are only going to become more important as populations grow and seek sustenance from environmentally responsible sources.

I am excited to tell people that 2021 production in the NL sector in both shellfish and finfish is back to pre-pandemic levels and up 85-95 per cent in volume and value over the Covid-impacted returns from a tough 2020.

I am excited to show the world the vast expertise and experience we can boast in our aquaculture sector, and the potential we have for growth and partnerships in both shellfish and finfish. The incredible mix of generational backgrounds in marine fields, combined with traditional Indigenous knowledge, and advancing technology on all fronts in NL is unlike anywhere

in the world.

I am excited to show people our trademark resiliency in producing food in one of the most challenging but also most rewarding marine environments on the planet.

I am excited to show them all the young people who are having such a positive impact on aquaculture in the province, bringing both their passion for farming while living and raising their families in our amazing coastal NL communities.

I am excited to show them the impacts NAIA has had over the years and will have in the future as we sustainably and responsibly work towards developing this sector to the benefit of all.

But most of all I am excited to show the aquaculture world what a significant player this province can be in the years ahead both locally/provincially and nationally. Our potential is off the charts.

Nobody has any illusions about it being easy. As with any type of farming, sometimes things will simply not go our way. As I said, the environment we live and work in is one of the most challenging in the world in which to produce seafood. Regulatory challenges abound on an almost daily basis. Recruitment and retention of workers will be important, just as it is for a great many industries.

But the greater the challenge, the greater the reward.

If nothing else, once the conference is over, I am excited to have people leave here knowing that Newfoundland and Labrador has the tools, the people, and the determination to achieve ocean farming success.

PREMIERS' SUPPORT

It was just a small note in an omnibus press release issued on June 29, 2022, but it was a note that carries with it significant impact and importance – particularly given the events that have been unfolding in BC.

Continued next page

EXECUTIVE DIRECTOR MESSAGE Continued

The Council of Atlantic Premiers – representing the provinces of Newfoundland and Labrador (Andrew Furey), Prince Edward Island (Dennis King), Nova Scotia (Tim Houston), and New Brunswick (Blaine Higgs) – had just finished meeting in Pictou, NS. They had been talking about working together to, “better manage health care, address the impact of inflation on the region’s economy and identify opportunities to enhance energy security and self-sufficiency to meet the region’s long-term needs.”

Aquaculture was a specific part of their discussion and was clearly highlighted in the media release, as follows: “Premiers noted the role aquaculture plays in Atlantic Canada, and across Canada, in creating sustainable economic opportunities for many rural, coastal, and Indigenous communities. The ongoing

changes to the federal approach to aquaculture in British Columbia were also discussed. While the federal government has responsibility in managing Canada’s fisheries, the aquaculture sector is well managed under provincial regulation in this region. Premiers are wholeheartedly committed to maintaining the existing system for licensing and overseeing aquaculture operations in Atlantic Canada.”

We can certainly debate for and against how federal or provincial policy has impacted different parts of our sector to be sure. What cannot be debated is the importance the sector plays in Atlantic Canada, and the importance of growing the sector.

It will be most interesting to see how this discussion unfolds in the weeks, months and years ahead.



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Daniel J. Mahoney photo



NAIA Launches Aquaculture 101 Platform for Public Education and Outreach

In May, as part of an aquaculture career fair and industry networking event in Grand Falls – Windsor, NAIA held a soft launch for our new public education and outreach platform called Aquaculture101. As the Aquaculture101 platform was envisioned as a way to engage young people and educate the general public on aquaculture in Newfoundland and Labrador, the career fair was a fitting venue for the launch.

“Over 100 high school students from Exploits Valley High attended the career fair and the virtual reality farm tours offered through Aquaculture101 were in high demand during the event,” said Darrell Green, NAIA’s Research and Development Coordinator. “Aquaculture101 is expected to work towards meeting key priorities in NAIA’s long-term vision with respect to community outreach and public education – priorities that are aimed at increasing public awareness of aquaculture and the attraction of skilled workers in the future.

“It’s exciting and game-changing.”

The Aquaculture 101 platform combines virtual reality farm tours with video-based learning modules, career profiles and other teacher resources.

The 360 VR farm tours give the public a chance to visit mussel farming and salmon farming operations in virtual reality and offers a look at each stage in the process, from the salmon hatchery and mussel seed collection locations, through the growout stages, through to the processing operations and finally, to the plates at family


tables.

The video-based learning modules cover topics such as the history of aquaculture, the science of aquaculture and aquaculture technology and are well suited for use in schools. Resource materials tailor-made for each learning module offer teachers pre-discussion and post-video discussion questions, links to online content and module-specific quiz questions.

Students, or members of the public, who go through all five video modules can take the test to receive a certificate via email.



The Aquaculture101 platform also offers career profiles and videos in which some of our aquaculture professionals such as Site Managers, Veterinarians and Quality Assurance Staff tell you all about their jobs. This is another piece meant to drive interest

Continued next page



www.Aquaculture101.com

Discover Aquaculture



The Aquaculture 101 website is an educational resource for teachers and students in Newfoundland and Labrador.


Aquaculture101 includes:

- Video-Based Learning Modules**
Learning objectives including The History of Aquaculture, The Science of Aquaculture, Aquaculture Technology, and more.
- Virtual Reality Farm Tours**
A truly immersive experience! Meet the farm employees who offer curated tours of mussel and salmon farms.
- Career Profiles**
Aquaculture professionals such as Site Managers, Veterinarian and Quality Assurance Staff tell you all about their jobs.
- Teacher Resources**
Resource materials tailor-made for each learning video offer teachers pre-discussion questions and post-video discussion points, links to online content and module-specific quiz questions.

Visit www.aquaculture101.com or for more information call: 709-754-2854

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in aquaculture as a career option.

“The Aquaculture101 platform is a great resource for teachers and students and for anyone who is interested in learning more about the aquaculture industry in Newfoundland and Labrador,” Green added. “The 360-degree virtual reality farm tours, in particular, are terrific tools for industries, like aquaculture, which operate in rural and remote areas, most of which are inaccessible to the general public. These videos offer a truly immersive experience for people who want see life on the farm while using technology in a fun and engaging way. Making use of this technology will take advantage of the tremendous growth and development that is happening in the fields of VR and AR.”

This past spring NAIA staff started sharing the Aquaculture101 platform and VR tours with teachers and students during classroom sessions and Professional Development days and we look forward to a more concerted effort to get the platform into our schools in the fall.

Aquaculture 101 content can be found at <https://aquaculture101.com/>

The Aquaculture101 platform was developed as a collaboration between NAIA, Keyin College and St. John’s-based Learning Labs.

NAIA would like to thank the Department of Immigration, Population Growth and Skills for funding this initiative under it’s Labour Market Partnership Program.

We would like to acknowledge the efforts of the Town of Grand Falls – Windsor in hosting and co-organizing the career fair and networking event in May.





Oystergro – A Profitable, Trusted and Proven System for Oyster Aquaculture

As we all adjust to the ever-increasing costs in the global marketplace, we must be more conscious of how we spend our money in order to ensure we are getting the best possible value. When you invest in the OysterGro system, you are getting the best in the industry.

Delivering farmers a ruggedly-engineered system designed for efficiency and high yield is what the OysterGro system is all about. Developed over the course of two decades, this trusted oyster farming method is now in service with hundreds of farms worldwide, growing high-quality, restaurant-ready oysters for clientele with discerning palettes who are looking for that exceptional oyster experience. A proven building block for coastal communities, this tried and tested method has built a reputation for delivering profitable results for business success, while at the same time working in constant harmony with Mother Nature.

Not only is oyster farming environmentally friendly, it actually has positive benefits as well. Oysters are considered nature's ecosystem engineers and have the reputation of transforming

a water system's quality and clarity. One single adult oyster can filter up to 50 gallons of water a day. These bivalves have the ability to remove certain pollutants, such as nitrogen, restoring the water system to its natural state. In addition, OysterGro equipment has been engineered and designed to be "storm-ready" with industry-leading longevity to drastically reduce the possibility of marine debris.

The OysterGro aquafarming system is a trusted farming method and a proven performer, delivering convenience, strength and durability in even the harshest of weather conditions. It has been successfully tested and used around the world, in varying water depths and a multitude of climatic conditions.

The OysterGro method is a proven business model with predictable investment, performance and results. For farmers looking to run a viable aquaculture business with attractive profitability, the freedom to choose their working hours regardless of tides and the reliability they demand, the OysterGro method is the clear choice.





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BUS: 709-538-3454 • CEL: 709-572-3080

EMAIL: roberta@naia.ca



Located in Marystown on Newfoundland & Labrador's Burin Peninsula, Marbase is Atlantic Canada's integrated aquaculture service hub – the first of its kind in Canada.

Marbase combines the know-how of its Canadian and Norwegian founders, Paul Antle of Pluto Investments Inc. and Bjorn Apeland of Amar Group AS. Apeland's entrepreneurial credits include growing Steinsvik into one of the world's leading suppliers of aquaculture technology.

Located between more than 80 aquaculture sites in Fortune Bay and Placentia Bay, Marbase will bring together key suppliers to enhance supply chain efficiency and provide Atlantic Canada's aquaculture industry with easy access to resources

while improving the transfer of advanced technology.

Marbase currently offers:

- Vessel berthing (over 656 ft / 200 m) in an ice-free bay
- Fabrication space
- Storage space and laydown areas
- Hatchery operation support
- A skilled workforce with extensive experience in marine industries
- Office rentals
- Close proximity to major shipping routes

Marbase provides expansion opportunities for domestic and international players in the aquaculture sector.



Community Profile

Grand Falls-Windsor



Photo: Aerial view – Town of Grand Falls-Windsor

All across Newfoundland and Labrador the aquaculture industry contributes to local rural economies by providing employment for residents and supporting infrastructure investments and service sector companies. Our towns support our sustainable industry by providing a positive and supportive environment for aquaculture development. With this in mind, the Community Profile Column, in each edition of the Cold Harvester magazine, will celebrate a community where the aquaculture industry is active and is boosting rural economic activity.



P. O. Box 439, 5 High Street
Grand Falls-Windsor, NL A2A 2J8
Contact: Stanley Singh,
Business Development
Ph: 709-489 4628

Population: 13,853

Grand Falls-Windsor is perfectly centered - it is easily accessible from virtually all areas of the island. The largest town in Central Newfoundland, it is located along the banks of the Exploits River, settled within a serene valley atmosphere—a great place to live, work, and play. Its location also makes it a favourable

place for doing business, and Grand Falls-Windsor is known as a major service centre for Central Newfoundland and a hub for most of the island. Grand Falls-Windsor acts as a service centre to the aquaculture industry, providing a neighbouring area for the purchase of motor vehicles, everyday household items and more. Grand Falls-Windsor also meets the need for industry's public services such as social, legal and medical aid.

Located within commuting distance to both main aquaculture regions in the province (Connaigre Peninsula and Notre Dame Bay), and with the Trans Canada Highway running right through, its central location makes it easy to live here and work there.

Grand Falls-Windsor is serviced

by two airports, Gander International Airport, one hour east and Deer Lake Regional Airport, two hours west.

With a strategy for business attraction and retention, Grand Falls-Windsor encourages business partnerships and provides significant opportunity for commercial development with fully serviced industrial parks and ease of transportation.

Not only is Grand Falls-Windsor an important service hub, but the town has embraced innovation as a core value. By facilitating research collaborations and providing support through human resources recruitment and skills development partnerships, we maintain not just local and regional, but both a national and international focus.

Economical Equipment for Aquaculture



Cape d' Or Nova Scotia. Silk Stevens design. Aquacare supply.

Aquacare was established in 1987 to supply cost effective industrial scale equipment to the growing aquaculture industry worldwide.

Distribution and OEM relationships with specialized manufacturers allow Aquacare to specify and ship the best value components available. Adapting equipment manufactured for the larger water treatment market to the specific needs of aquaculture provides considerable cost savings.

TANKS

Circular tanks are now widely accepted in the RAS industry as the most effective option due to their low cost per volume and their ability to concentrate and rapidly transfer solids to the particulate filters. Glass fused to steel tanks are suitable for freshwater; for more corrosive marine environments we recommend epoxy coated steel.

SOLIDS REMOVAL

Drum microscreen filters are the first line solids removal mechanism used in modern fish farms. We have supplied many these robust and reliable machines over the years. For fine solids

removal we supply either stand-alone foam fractionators or custom low head in-sump models.

BIOFILTRATION

Biofiltration typically uses MBBR technology. With the right combination of polyethylene media with a high surface area, correctly sized aeration grids and retention screens, these filters will carry out the essential task of nitrification 24 hours a day without any attention required.

CO₂ REMOVAL

Fish farmers are much more aware of the deleterious effects of high dissolved CO₂ than in the past. Reduced appetite, stress and poor feed conversion are all the result of elevated CO₂. Removing it can be costly in terms of pumping and heat loss/ gain so efficiency is a challenge. Our preferred solution is forced air stripping using structural plastic media to achieve high air-to-water surface area paired with efficient low-head turbine pumps. These are scalable and cost effective to build and operate.

OXYGENATION

In any RAS facility, continuous supply

of dissolved oxygen to the fish is a critical part of the operation. There are many designs; cones, LHO's, PPC's, U-tubes, in-line diffusers, etc. One design that has been gaining a serious following recently is the Oxyflow®. Designed by Bohumil Sevic, a French engineer with decades of experience, it represents probably the most efficient way to dissolve oxygen into the water. Depending on its size, OXYFLOW® dissolves 1.0 to 60.0 kg oxygen/hour at >95% efficiency. In our experience, adopters of this technology become permanent converts once they see the benefit to their bottom line.

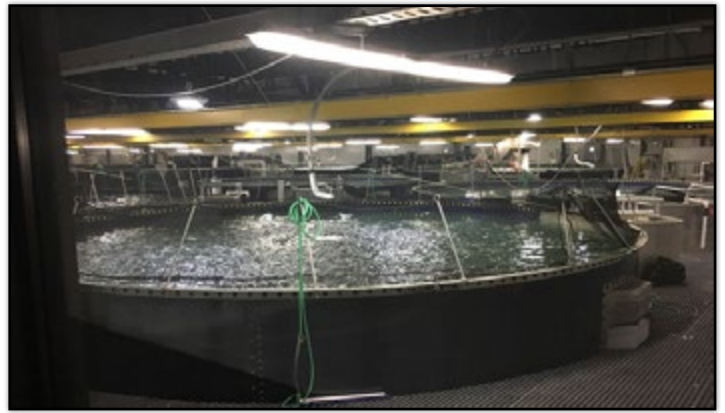
PUMPING

Moving water is the heart of an intensive aquaculture system. We focus on low head systems where the water is pumped only once, after solids removal and biofiltration just before oxygen enrichment through the Oxyflow® and back to the fish tanks with sufficient head to create a healthy current in the rearing tank. We supply all types of pumps and are very careful to select durable and efficient models.

continued next page



Mainstream Werribee. JLH Design. Aquacare supply.



Hudson Valley Fisheries, Hudson NY. JLH design. Aquacare supply.

FEEDING

Precision, computer-controlled feeding is essential for profitable aquaculture. One of the best ways to distribute feed is to use pneumatic feeders which deliver precise doses of feed frequently to each tank population. Frequent smaller feedings also help to maintain a balanced load on the biofilters and help to assure optimum feed conversion ratios. Fish Farm Feeder based in Galicia, Spain manufacture what we believe to be the highest quality feeding system for fish farms and we have supplied a number of these to our customers.

CONTROLS

Human operators cannot be replaced by machines, however knowing what the critical water parameters and the status of all critical equipment is in real time is an essential management tool. This is where customized monitoring, alarm and control systems as supplied by Aquacare provide a significant return on investment to the farm owners.

As the demand for controlled environment aquaculture systems continues to grow Aquacare is ready to engage with clients to build efficient, scalable and manageable fish farming systems world-wide. www.aquacare.com



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Let Financial Data Drive Your Decisions

Bookkeeping and accounting do more than keep you compliant. They could boost your profitability.

Matthew Galgay has seen the situation repeat itself time after time: An international company lands in Canada and struggles to find a trusted provider of business services. The challenge extends to nuts-and-bolts needs like accounting and bookkeeping.

“It can be difficult for a company that’s just starting out to find the right accountant to do the work,” says Galgay, BDO’s National Industry Leader for Fishing & Aquaculture. “It can be much better to outsource that service to a professional firm that knows the industry and adds more value than just debits and credits.”

The bookkeeping, payroll and accounting environment in a company’s home country often differs from the rules and regulations in Canada. Whether the company is expanding from Norway, Scotland, Chile or other aquaculture nations, it will require local expertise to set up its operations.

The needs go beyond books and accounting. If the company hires workers in Canada, it needs to handle payroll and payroll tax, payments to employment insurance and the Canada Pension Plan, workers’ compensation and income tax.

Companies that do not locate a reliable provider can experience compliance issues with the Canada Revenue Agency or financing challenges with a local bank that expects financial statements to align with Canadian assurance standards.

As the business grows in Canada, the company typically turns to the same advisor for larger needs: regular reporting on past performance and, even more valuable, forecasting and budgeting for the future. At this point companies decide whether to hire a CFO to manage the Canadian financial operations or to manage the function remotely and create an outsourced finance team. This outsourced team can be scaled up and down as the needs dictate. By selecting a provider such as BDO’s Outsourcing services, the company can gain access to a cloud-based solution featuring a secure global portal.

Financial data is especially valuable for business leaders managing operations remotely. Separated from the site by geography and time zones, they need timely insight on the business to make quick decisions. Financial data fills this role—providing information on granular elements such as vessel performance. They can then use these detailed metrics to improve productivity, adjust strategy, and spur profitability.

To learn more about steps to launch in an emerging market, read our full report:

insights.bdo.ca/agriculture/aquaculture-report-2020



CONTACT

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Ideas that Improve Water Quality in Aquaculture

*Fish jacuzzis can improve the lives of both salmon and farmers,
and they work well with efforts to get rid of sea lice*

By: Simon Kveinaa, Farming Equipment Expert in NorseAqua-Bluegrove

Water quality matters to us all, though for farmed salmon it is a matter of life and death.

Unlike other fish species that have evolved to inhabit slow-running or stagnant water, salmon simply cannot and will not tolerate poor water quality. It affects their growth, health and welfare, and their ability to use their gills. In extreme situations, poor water quality can lead to death.

Salmon farmers know this, but they also know about other problems that harm salmon, such as sea lice. Sometimes, farmers use lice skirts to prevent sea lice from entering the salmon cages, or tubenets to make the salmon swim down to a water level below which sea lice are present. These are efficient solutions to that particular problem. They can amplify another problem, however, if they prevent the water from flowing freely thus resulting in stagnant water and decreased water quality within the cage or the tube.

Fortunately, farmers don't have to choose which of these two problems to tackle first. Both can be tackled at the same time. Thanks to sophisticated under cage aeration technology, which improves water quality by lifting water into the cage from below, farmers can keep the lice skirts and tubenets in place, thereby protecting the fish against sea lice in an environment that encourages growth and safeguards health and welfare standards.

The process involves pumping additional air into the cage where it helps the water circulate, which in turn creates a more homogenous environment throughout the water column. It is suitable for cages with or without lice skirts. All of that might sound simple, but there are still a few things that farmers who wish to make good use of the technology should consider:

1. FARM DESIGN

No two fish farms are the same, as they are invariably placed in waters where conditions differ. In places such as the Nordics, Canada and Chile, the oceans provide excellent growth and living conditions for salmon. It is nevertheless important to understand how the natural ebbs and flows of the sea can either help or hinder operations.

With this in mind, the farms must be designed in ways that take full advantage of the natural movement of the ocean, as this can help prevent the water from becoming stagnant. When lice control measures are used, it can be difficult nonetheless to ensure sufficient water flow to the upper levels of the cage, even in the best natural environments. Having a bespoke cage that has been well-designed from the outset is an excellent start as the farmer strives to achieve the best water quality possible.

2. MEASURE AND MONITOR

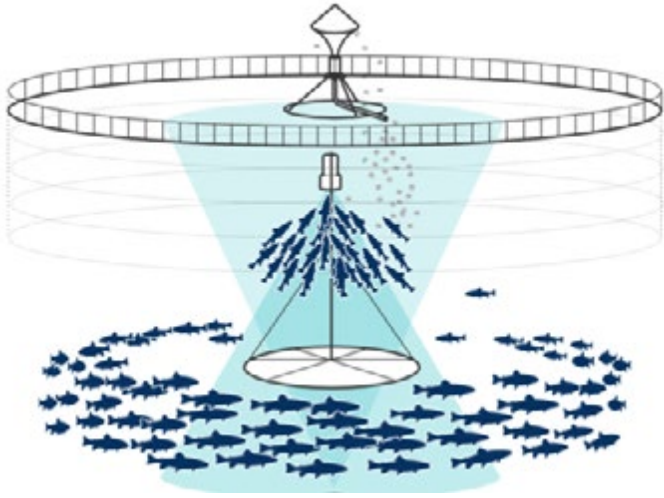
There are a multitude of reasons why a fish farming site might experience poor water quality. Stagnant water flow is one of them, though algae and jellyfish may also reduce water quality to the detriment of the health and welfare of the fish.

To make sure the water is of good quality, farmers regularly check key indicators such as oxygen saturation, temperature and salinity. Other water quality challenges, such as low pH, buffer capacity and low oxygen levels, must also be monitored, as they can severely affect the salmon's gills and the time it takes to delouse the fish.

When these measurements are off, farmers have to respond. They sometimes do this by removing the lice skirts or tubenets, thus ending the delousing process earlier than

intended. This response can itself introduce new risks that threaten the health and welfare of the salmon. Farmers are therefore constantly on the lookout for solutions that work even while the equipment for fighting sea lice are left in place.

3. TEST THE WATER QUALITY



One such solution can be undercage aeration, a process where air bubbles generated by natural water currents or compressors are used to improve the water quality.

Norseaqua's solution, the Mid-Norwegian Ring, uses a compressor system that produces and purifies compressed air from the surrounding atmosphere, and blows it into a ring that hangs one to two metres above the bottom of the cage. The ring has many small nozzles that cause small air bubbles to form. The bubbles carry the water and create an ascending water flow within the pen. This process results in water moving upwards from the bottom to the top of the cage.

For the process to be effective, the water that is pumped up from the deepest level of the cage must be clean and fresh, so farmers must ensure the water quality is tested at the site before they install the undercage aeration system.

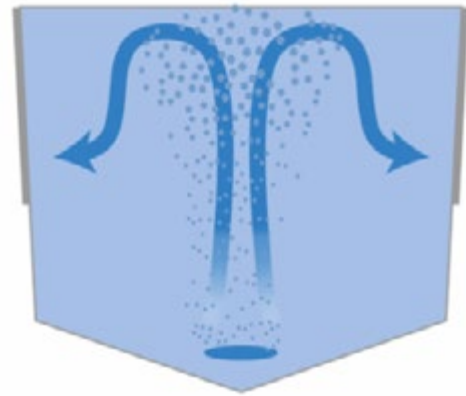
4. BENEFIT FROM WELFARE ASPECTS

The health and welfare of farmed salmon is obviously improved by clean and fresh water, but undercage aeration systems have additional benefits. It is easy to observe how their behavior changes when undercage aeration systems are turned on in cages where water flow and oxygen levels

are poor.

The salmon will seek out the air bubbles and the water flow caused by the aeration systems, and farmers at several sites believe the fish enjoy coming together around the rising bubbles.

It is possible that they are attracted by the improved water quality, or maybe they're enjoying some kind of bubble massage, or perhaps it is a game they play. As yet, we simply do not know, but our scientists are looking at it. For now, all we can say is that they clearly enjoy the undercage aeration systems' 'jacuzzi' effect.



MEMBERSHIP BENEFITS

- | | |
|--|--|
| <ul style="list-style-type: none">• Participate in public education and awareness activities• Company promotion on our website and social media channels• Opportunities to collaborate on research and various innovative projects• Subscription of NAIA's Cold Harvest magazine• Representation at all levels of government on issues of industry importance. | <ul style="list-style-type: none">• Community leadership & development win-win partnerships• International promotion at high-profile seafood shows• Member discounts for a variety of industry training and workshops• Sector-specific business and technical training and advice• Member discount at annual NAIA Cold Harvest Conference & Trade Show |
|--|--|

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NAIJA and its partners and youth in the province celebrated World Oceans Day this year and participated in many wonderful events. The organizing committee included: NAIA, Fisheries and Oceans Canada, Fisheries, Forestry and Agriculture, Miawpukek Band Council, MAMKA, Cooke Aquaculture, Mowi Canada East, and Ocean Education Specialist Jan Negrijn. Students learned about the importance of aquaculture in our communities and the many careers available in aquaculture. They also learned about marine debris and the importance of keeping our waters clean!

On Thursday, May 26, staff and volunteers gathered with the K-6 elementary students of Fitzgerald Academy in English Harbour West and spent the morning on the beach. They participated in an AIS trap demonstration and a marine debris scavenger hunt. Jan Negrijn also had various plankton on demonstration. In the afternoon, staff from NAIA and DFO did book reads to them to conclude their day at the school. In the afternoon, students from grades 11-12 participated in an Atlantic salmon dissection with staff from Fisheries, Forestry and Agriculture as a part of their school curriculum. NAIA also discussed the recently launched Aquaculture 101 program with them and they enjoyed watching the 360-degree shellfish and finfish videos on the VR headsets. Special thanks to Cooke Aquaculture for donation of the Atlantic salmon and plankton tows. On Friday, May 27, K-6 students at St. Joseph's Elementary in Harbour Breton enjoyed visiting various booths that were set up in the gymnasium promoting aquaculture, alien invasive species and species at risk. Jan Negrijn also offered a plankton viewing session. Staff from NAIA, DFO, and Fisheries, Forestry, and Agriculture also did book reads to the groups of students who were all very eager to ask questions and partake in discussions about the marine environment, aquaculture, and how to avoid marine debris.

Students at St. Anne's School in Conne River also partook in a variety of activities to celebrate World Oceans Day/Week. Grades K-3 enjoyed a book reading of Charley-A Day in the Bay, which teaches young children the importance of keeping our waters free of marine debris. They were also provided with Indigenous-themed MAMKA giveaways. Grades 4-6 participated in a scavenger hunt, rock painting and wiener roast on the beach. They were also provided with the opportunity to see demonstrations on eel and green crab traps, eel spears, and how to collect microplastics in the ocean. DFO, FFA, MAMKA and NAIA provided t-shirts and prizes for the students.



WORLD OCEANS DAY CELEBRATIONS



Special thanks to Conrad Fitzgerald Academy, St. Joseph's Elementary, Bay d'Espoir Academy and St. Anne's School for allowing us to celebrate World Oceans Day with them. As well, thank you to all organizations and NAIA members who travelled to the areas to take part: Jan Negrijn - Ocean Education Specialist, staff from Fisheries, Forestry, and Agriculture, Fisheries and Oceans Canada, and Cooke Aquaculture.

MORE THAN 300 YOUTH PARTICIPATE IN NAIA WORLD OCEANS DAY MARINE DEBRIS SCAVENGER HUNT

NAIA invited youth in grades K-6 across the province to participate in a World Oceans Day Marine Debris Scavenger Hunt again this year. Families and schools got to spend a few hours at the beach while collecting as many items on the list (marine debris) as they could to enter for a chance to win a \$100 Visa gift card.

A total of 333 youth participated overall in twenty-one schools in twenty-two communities across the province from as far as Lanse Au Loup, Labrador to Conception Bay South, Newfoundland. Special thanks to the schools and youth residents that participated and sent in photos. Although they all deserve to win, the lucky winner of the Visa gift card is: Jeramiah McDonald, Grade 2 of Bay d'Espoir Academy. Congratulations!



CLOVER FARM ST. ALBAN'S WORLD OCEAN'S DAY MARINE THEMED YOUTH BAKING CONTEST

Again this year, a marine themed cake/cupcake decorating contest was held by Clover Farm St. Alban's, and NAIA was proud to sponsor a \$25 gift card for the winner. Each submission was entered into the contest and the winners were Jane and Olive Lilly of St. Alban's! Congratulations!

Special thanks to Clover Farm St. Alban's for hosting the World Oceans Day contest and to all the youth for the photos with their artistically designed baked goods. Be sure to check out all the lovely photos on our FaceBook page! Happy World Oceans Day!



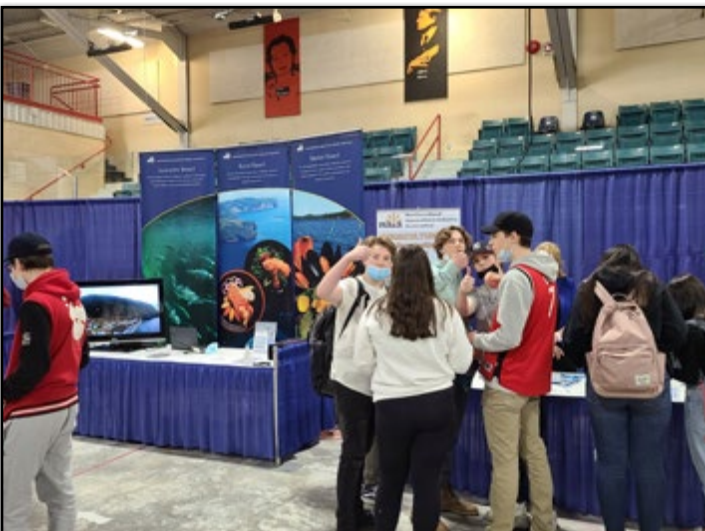
Aquaculture Career Fair & Business Opportunities & Partnerships Event in Grand Falls-Windsor

In partnership with the Town of Grand Falls Windsor and NAIA, an aquaculture career fair was held at the Joe Byrne Memorial Stadium for students of Exploits Valley High on May 18. Grades 10-12 took part in a multitude of events, starting in the morning with presentations by Cooke Aquaculture and Grieg Seafood Newfoundland on career opportunities in aquaculture. NAIA's online learning platform, Aquaculture 101 was also launched and media was in attendance. Students then visited a variety of 12

exhibitors and participated in VR Aquaculture 101 demonstration videos. The career fair was open to the general public until noon.

That afternoon, there was a public Aquaculture Business Opportunities and Partnerships Forum. The Town of Grand Falls-Windsor provided a welcome followed by presentations by Jamie Baker, Executive Director of NAIA, Miranda Squires of Grieg NL Seafood and Andrew Lively of Cooke Aquaculture. Guests in attendance were then given a chance to visit the booths. A final presentation was given from Grieg Seafood Newfoundland by Miranda Squires and Candice Way.

Special thanks to the Town of Grand Falls Windsor for partnering with us on the event and providing a complimentary lunch to the presenters and exhibitors. To the service and supply companies/NAIA members for travelling to the area: Department of Advanced Education and Skills, College of the North Atlantic, Cooke Aquaculture, Fisheries and Oceans - Aquaculture Branch, Fisheries, Forestry and Agriculture, Grieg Seafood NL, Marine Institute of Memorial University NL, Mowi Canada East, Employment Options, and Fisheries and Oceans Canada – Policy and Enforcement.



Aquaculture Career Fair at Bay d'Espoir Academy

An aquaculture career fair took place at Bay d'Espoir Academy on June 2, leading up to World Oceans Week. Students from grade 7-12 were invited to visit the gymnasium where various aquaculture service and supply related exhibitors offered hands-on interactive equipment and supplies, capturing the attention of the students.

They were able to view microscopic organisms, plankton and fish scales and experience the feeling of surface and supply occupational scuba dive gear and equipment. VR headsets were set up at NAIA and Grieg NL Seafood booths, where students who watched the Aquaculture 101 mussel and salmon videos in their classrooms before attending, could view the salmon aquaculture experience video/Aquaculture 101 in 360°. The students were happy to hear that they complete the program online on their own time and gain a certificate.

Fisheries, Forestry and Agriculture staff had a dissected Atlantic salmon on display at their booth that was generously provided by Mowi Canada East. Aquatic Invasive Species information was also provided by Fisheries and Oceans Canada.

That same afternoon, three groups of students in grades 9-12 had the pleasure of participating in a series of three Atlantic salmon dissections in Mr. Hughes lab with staff of Fisheries, Forestry and Agriculture. Prize draws took place in the afternoon with items provided by the exhibitors.

NAIA staff visited grades K-4 in the afternoon where they read a variety of books on the importance of keeping our waters free of marine debris and the life cycle of a salmon.

On June 7th, NAIA staff returned to Bay d'Espoir Academy and organized the World Oceans Day Marine Debris Scavenger Hunt with all of the students from K-6. It was a very busy but wonderful few weeks.

Special thanks to staff of Bay d'Espoir Academy for allowing us to use their state-of-the-art gymnasium. As well, to Mowi Canada East for providing the fresh Atlantic salmon for display and dissections. Thank you to all the service supply companies/NAIA members, organizations and volunteers for travelling to the area: Fisheries and Oceans Canada - Conservation, Management, and Protection, Fisheries, Forestry and Aquaculture, Jan Negrijn - Ocean Education Specialist, Newfoundland Aqua Services, College of the North Atlantic, Tay Aus Diving, Cooke Aquaculture, Mowi Canada East, and Grieg Seafood Newfoundland.



Ross Butler Receives Fisheries and Marine Institute Alumni Award



During its spring convocation in June, the Fisheries and Marine Institute (MI) awarded Ross Butler, CEO of Cooke Aquaculture USA and Wanchese Seafood Company with its Alumni Award.

Butler, a member of MI's graduating class of 1982, has made a tremendous impact on the worldwide seafood industry and remains rooted and devoted to his beloved Newfoundland and Labrador. For over 40 years Ross Butler has been a friend and promoter of Memorial's Marine Institute, its mandate and mission, its students, its faculty and staff, and a longtime volunteer of various MI-led boards.

Forty years ago, Ross went to work with what would become in the early 2000s the largest seafood marketer in North America, Fishery Product International (FPI) with his Diploma of Technology, Food Technology (Marine Products). With hard work, Ross quickly rose to the executive level, where he was recruited by Cooke Aquaculture, a family-owned business from Atlantic Canada, looking to expand.

Ross has built his extraordinary career with his formal knowledge gained at Memorial and the qualities the Fisheries and Marine Institute of Memorial University strives to inspire within all students and alumni: integrity, empathy, communication, understanding, respect, being a team player, and championing change, progress and goodwill.

Ross has long been a champion for progress. He was instrumental in moving MI forward to offer its first Bachelor program within the Memorial family, the Bachelor of Technology. The B. Tech. has opened even more doors for MI diploma graduates

to obtain undergraduate degrees within one year, and amplify skills, especially in the areas of management. Currently, Ross is on track to receive his own Bachelor of Technology from Memorial University in the near future.

Ross has played a pivotal role as an ambassador for the Canadian fishing industry and a strong advocate for the Marine Institute. He readily extolls MI's virtues and acknowledges the value of his MI training and education in his career success. He contributes generously of his time as an Industry advisory committee member to MI and board member to the Canadian Centre for Fisheries Innovation. He encourages others to come to the Marine Institute as a student or industry partner for programs and capacities for development of sustainable seafood production in Newfoundland and Labrador, Canada, and beyond.

Despite all of Ross's success and career moves and living away, Ross never forgot his roots, those important connections he forged four decades ago - with his community of fellow MI graduates and alumni, his friends, families and colleagues and for the province he proudly calls home. Congratulations, Ross!

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How Autonomous ROVs are Innovating Remote Aquaculture Site Inspections

By: Riley Kooh, Deep Trekker



Canada's Ocean Supercluster has awarded a new innovation project to Deep Trekker, an Ontario based robotics company. Totalling \$6,000,000, this grant will be used in part to develop Project Sentry, a Resident Autonomous Aquaculture Cage Inspection system. Project Sentry consists of a remotely operated vehicle (ROV) stationed in an underwater garage. This ROV will be ready to deploy to conduct inspections and report irregularities on a preprogrammed autonomous routine. Working in collaboration with partner Visual Defense, Deep Trekker's inspection system will utilize artificial intelligence and machine learning to reduce the burden of identifying defects on the human operators.

PROJECT GOALS

Project Sentry's mission is to push what is known to be possible for ROV automation. Advances in mechatronics will allow for seamless automatic netpen and environmental monitoring, reducing the workload for existing and future farm staff. Additionally, with in-cage ROVs capable of analyzing and reporting complex situations for breaches or mortalities, the burden of decision making is reduced for the operator. Traditionally, farms would have to inspect nets, anchors, mooring lines, environments, and the stock health via divers.

This manual method is neither timely nor cost effective and comes with the inherent risks of commercial diving. Threats like equipment malfunction,

insufficient gas, delta P, and entrapment can be fatal to divers. Implementing an autonomous ROV enables farm owners to have constant surveillance of their site, without ever putting a human at risk.

With the use of video, machine learning and AI, resident ROVs will be able to identify where breaches of nets have occurred, as well as determine the position and volume of mortalities in the cage. If a breach or mortality fish is detected, the system will automatically record a photograph and/or short video clip, as well as log the position and depth of the issue for enhanced reporting.

Additionally, the vehicles can be equipped with sondes capable of holding four simultaneous environmental sensors to monitor for hazardous compounds. Standard sampling methods can be time-consuming and manual intervention raises the cortisol level of fish. During times of the year when oxygen levels are lower, farms try to minimize handling to prevent loss.

Battery-operated ROVs are an effective alternative to manual intervention, since they operate near-silently and attached sondes are effective at building dissolved oxygen profiles or monitoring for hazards like phosphorus and chlorophyll. The introduction of autonomy in these vehicles allows for year-round monitoring of dangerous compounds or parasites without allocating any staff hours.

The Importance of Aeration and Oxygenation in Aquaculture

By: Allan Hirsch, Innovasea

When it comes to running a profitable ocean-based fish farm, two of the biggest obstacles are fish loss and poor growth rates. While there are many possible causes for each of those challenges, environmental conditions often play a key role. Fortunately, there are ways to address both of those issues using aeration and oxygenation.

Both processes use a system of valves and supply hoses that are connected to diffuser assemblies at the bottom of each fish pen. Operators can then pump either air or oxygen into the water to achieve their desired results.

Although the two systems have much in common, they are used for different purposes.

AERATION

Aeration systems use an air compressor to distribute diffused air at the bottom of the fish pen. This creates upward

water movement that brings colder, cleaner, oxygen-rich water to the fish in the pen.

Aeration is used to fend off harmful algae blooms, improve poor water quality caused by tarps/lice skirts and help regulate fluctuating water temperatures.

OXYGENATION

Similar to an aeration system, oxygenation uses an oxygen generator to distribute diffused oxygen into a fish pen. Oxygenation is mainly used when there are low levels of dissolved oxygen in the water or when dissolved oxygen has dropped to the point where fish will not feed, which can lead to starvation and death. Adding pure oxygen directly into the pens can quickly stimulate feeding and growth and improve fish health.

STRATEGIES FOR AERATION AND OXYGENATION

The best way to ensure healthy fish through aeration or oxygenation is to follow the 3M approach: monitoring, mitigation and management.

- **Monitoring:** An effective aeration or oxygenation strategy begins with proper environmental monitoring. Farm operators need to closely track key fish health factors, such as dissolved oxygen, water temperature, plankton levels and currents.
- **Mitigation:** Once farm workers understand the environmental conditions in their fish pens, they can begin developing a mitigation strategy. The amount of air or oxygen sent into a pen is determined by what operators are seeing from their environmental sensors, and operators continue adjusting levels based on the data they see. System adjustments are important to find the right technique for each period within the grow out cycle and for different water conditions.
- **Management:** Addressing long-term environmental conditions requires a detailed response plan to combine and analyze monitoring data with mitigation results. Having this data and properly analyzing it enables users to regularly adjust their strategy for future improvement.



Innovasea's digital control panel enables remote operation.

Taking this approach to aeration and oxygenation at the start – and then sticking with it to fine tune your operations – will help greatly improve fish health and maximize growth for the highest returns at harvest.

A NEW BREAKTHROUGH

While aeration and oxygenation systems have been in use on fish farms for more than a decade and have remained largely unchanged, last year Innovasea introduced [aquaControl](#), an autonomous aeration and oxygenation system that enables operators to quickly react to environmental events whether they're present at the farm or off-site.

The new system revolutionizes aeration and oxygenation by enabling the user to:

- Use real-time environmental data to identify issues and see the results of treatment
- Operate the system remotely from anywhere thanks to a first-of-its-kind digital valve system
- Easily pinpoint problems and treat just the pen or pens experiencing them
- Reduce energy costs associated with aeration and oxygenation

Although aeration and oxygenation systems have many



How aquaControl distributes air or oxygen through a fish pen.

similar components, they differ greatly in application. Both technologies, however, require a data-driven management to effectively combat the challenges faced by ocean-based fish farms. This data-driven approach to mitigation provides farmers with the ability to make the right decisions each day to maximize fish health, ensure strong growth and boost productivity.

Allan Hirsch is a global product manager at Innovasea and has more than 10 years of experience developing innovative monitoring and control solutions for the aquaculture industry.

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How eDNA Can Support the Aquaculture Industry

The sampling of environmental DNA (eDNA) is proving a game changer for ocean industries, including aquaculture.

All organisms shed into the environment traces of their DNA, which serve as reliable identifiers of species. The eDNA in one water sample can reveal a large quantity of data about the variety and number of organisms present, including even the smallest microbes.

eDNAtec is a Newfoundland-based company on the forefront of the rapidly growing eDNA technology field. Using advanced sequencing technologies and computer programs, they can sequence and identify any species from environmental samples such as water, soil or even air.

Typically, aquaculture stocks are monitored for pathogens using biological samples that are taken routinely or when there are changes in the health of animals. The use of eDNA can discover these pathogens even before they become apparent in the fish themselves.

"There's a range of pathogenic species, including viruses, bacteria, parasites and even algae blooms," said Nicole Fahner, Associate Director of the Centre for Environmental Genomics Applications (CEGA) within eDNAtec. "With eDNA monitoring, you don't need to collect the fish to detect the pathogenic or potentially pathogenic species. We can design a monitoring program that includes DNA references to all pathogens of interest, then monitor over time and watch for changes that might be an early warning of problems."

Any aquaculture monitoring program would be designed and calibrated to the organisms of interest in the water column and

the benthic environment. Water and benthic samples might be taken inside the pen, directly outside it and some distance away, as a control.

"Pathogen detection through comprehensive eDNA monitoring helps to create a healthier ecosystem, which results in a better environment to raise fish stocks and that has a benefit for the whole ecological community," Fahner said. "Importantly, eDNA sampling can be completed in a fraction of the time required for conventional monitoring, is highly cost effective and reveals an order of magnitude more species."

EDNAtec established its CEGA facility as a centre of excellence to advance environmental genomics technologies for real world applications.

"CEGA is a one-of-a-kind R&D centre with high throughput sequencing platforms and specialized data analysis tools that are completely dedicated to environmental genomics applications," said Mark Ploughman, Senior Advisor, Sustainability, with eDNAtec. "We are one of the few eDNA labs certified to the ISO 9001:2015 standard of Quality Management System. We have developed the EnviroSeq® end-to-end standard operating procedure, hardened and tested through hundreds of genomics projects around the world. We have the latest technology, including the Illumina MiSeq and NovaSeq 6000 sequencing platforms. Last but not least, we have the people, including pioneers who were pivotal in the development of eDNA technologies along with some of the brightest young scientists in the industry."

For more information, please visit ednatec.com.



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How Badinotti Avoids Net Cleaning Downtime with NLB Pumps

By: Jordan Smietana, Marketing Manager, NLB Corp



To keep the fish in their net pens healthy — and increase yields to meet global demand — marine fish farmers in British Columbia depend on Badinotti Services Canada Ltd. to keep waste and algae from building up on their nets. That's why Badinotti cleans the nets with NLB pumps.

"Any given farm in B.C. at harvest time has about 3,500 metric tons of production sitting there at any one time, in 10 - 12 nets," said Kevin Onclin, "The amount of growth can go from one ton to five or six tons in five days."

When marine organisms attach themselves to the netting (a condition called

marine fouling or biofouling), water flow is reduced. This traps marine litter and promotes the growth of algae, which can cause stress and disease in fish. It also diminishes the water's oxygen levels and overall quality. If the build-up gets heavy, it weighs down the nets and makes it harder to keep fish in the pens (and predators out).

To keep up, Badinotti cleans the nets every 10 to 14 days. In peak season the company operates five vessels 12 hours a day, seven days a week. They can't afford downtime, so when they had difficulty keeping their water jetting pumps running and getting parts in a timely

manner, they called NLB Corp.

NLB pumps are specifically designed to operate reliably in the harshest of environments and have been proven in countless applications over the past 50 years. The NLB 205, 305, 405, and 505 Series pumps provide up to 4,000 psi (275 bar) of trouble-free performance with minimal maintenance and are easily integrated with many existing net cleaning head systems.

Reliability is designed and built into NLB pumps. Their slow-running design minimizes wear on key components, and those components are made of galvanized or stainless steel to withstand the ocean environment. For extra protection, each Badinotti pump is contained in a lightweight aluminum enclosure, with roll-up doors for easy maintenance access.

"NLB's simple design and components let us repair in a timely manner," said Trevor Schiele. "A cost benefit analysis showed we could reduce pump maintenance and repair costs by about 50% with an NLB pump."

Quick response to parts orders was another advantage, according to Kevin Onclin. "NLB understood that our business needs parts overnight," he said. "We cannot afford to be down."

"For us," said Schiele, "NLB checks every box for a pump."

Cloud Technology is a Game Changer for the Seafood Industry

By: Andrea Riser, Maritech

As technology advances, many seafood companies are investing more and more in digitalization and in transforming their businesses into data-driven ones. Data-driven organizations require data infrastructure. For these forward-looking companies, the increased use of cloud technology is proving to be a game changer.

The future is digital, we see that everywhere in the world. To be credible, claims of sustainability, legality, or social responsibility need to be linked with verifiable traceability. Consumers have come to expect the availability of digital technology telling the story of the fish they consume. But the advent of whole supply chain technology such as that offered by Maritech Cloud systems offers so much more than traceability and compliance.

CONNECTING PEOPLE

Seafood production can be thought of as the ultimate remote workforce. Whether based on wild catch, fish farming operations, or both, fisheries are not conveniently clustered in central locations. With such a dispersed workforce, the challenges of communication from ship to shore and factory floor to sales office are difficult. In the past, too often, information has flowed from the top down, with production and sales

planning tools missing the real-time forecasting of incoming harvest or catch or outgoing logistics to be effective. Cloud systems mean that information can be accessed and shared by all, wherever they are located. Operations can act as one informed crew.

MITIGATING RISK

Out of date technologies and old servers pose security risks. As many companies have focused on updating operational and hardware technologies, they have failed to update their legacy systems to comply with modern security standards. These can cause major operational outages and complete shutdowns if compromised. For most companies, the expense of managing cyber-security in-house, without a dedicated team, is virtually impossible. Maritech's cloud-based software suite, built on Microsoft Azure, offers cost-effective data protection with a powerful and secure, hardened infrastructure which would not be possible using traditional legacy on-premises systems.

DATA-DRIVEN DECISIONS

The complex business of sustainably producing seafood also produces a lot of operational data that rarely gets used as business intelligence to drive the value of the product at the end of the line. Information data links all of the various



Proper quality control is essential when transporting fresh fish or seafood from processor to market. To maintain your product quality use Styropack (expanded polystyrene shipping containers) manufactured by NEWFOUNDLAND STYRO. Styropack is rigid, lightweight, water tight and has excellent insulating properties. These features allow Styropack to out perform most other containers.

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facets of the fish business together. BI tools, such as Maritech Analytics, collect and combine vast amounts of data, presenting key information and performance data, in near real-time, fusing it with selected external data sources such as crucial trade and market price flows. These critical tools enhance your ability to overlay and benchmark your own performance, strategically plan production, and forward price plan to gain a truly competitive edge.

LEVELING THE PLAYING FIELD

“Maritech’s cloud-based software has really meant that sophisticated digital systems that would once have been out of reach for small operators are now readily available with

absolutely no huge up-front capital costs and complex IT implementation cycles,” says Kristjan Kristjansson, Maritech’s manager for North American sales operations. “We have seen, for example, one of our small Maritech Purchase and Sales software customers, who is based in New Jersey, be fully set up and running our software to manage international seafood sales operations within the space of a week. In addition to our core software suite, we provide integrations to our own solutions with labeling and packing systems, logistics, quality, claims, and IoT, as well as open, standards-based data integrations to 3rd party systems such as accounting, ERP, or even governmental reporting. This kind of flexibility is revolutionizing the way seafood companies can now do business.”



Photo: Maritech Staff







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Servicing the Aquaculture Industry



‘Tremendous people, incredible potential’

New Executive Director Meets with Industry Players and Stakeholders as NAIA Builds Vision for Future



While the head offices of the NL Aquaculture Industry Association (NAIA) may be in St. John's, most of the action happens in small coastal communities on the northeast and south coast of Newfoundland – many kilometres from the capital city.

This is a fact not lost on NAIA's board and staff including Executive Director Jamie Baker and Research and Development Coordinator Darrell Green.

Both Baker and Green spent a week in June getting out to various finfish and shellfish growing areas to meet directly with people engaged in the quarter-billion-dollar sector.

Baker says the experience was very worthwhile on a personal and professional level, especially being new in the role. And he added the experience Green brings to his role after 15 years with NAIA was an integral part of the process.

“There is really no substitute for being able to meet face to face with our highly experienced industry people directly in their environment, be it in an office, at a plant, on the wharf or on the farm,” Baker said. “These meetings were educational and rewarding, and it gives such a direct sense of the challenges and issues being dealt with on a daily basis in our sector.

“Above all else though it shows you clearly the depth and breadth of the expertise we have engaged in aquaculture here – the sector clearly boasts some tremendous people and incredible potential.”

The trip began in St. Alban's with a tour of Cooke Aquaculture's Swangers Cove hatchery and a farm site provided by NAIA President Sheldon George. The group spent the morning on the water checking out a feed barge and meeting the people on site. The growing, healthy-looking fish were as amazing to see as the workers in their element.

From there Baker and Green visited with municipal leaders in Hermitage and Harbour Breton, before heading out on a Mowi Canada East farm site visit led by Zachary Strowbridge. They also dropped in on workers at 360 Marine and visited Conne River.

“It was striking to hear the stories from local people in Hermitage and Harbour Breton talk about the impact of the

sector,” Baker noted. “There are a great many young people, for example, building businesses and careers around the sector, it’s just amazing to see the activity and pride.

“We know there are clear challenges, and we heard a lot about that was well. We remain committed to working with our members, our companies, and our municipal and provincial leaders to address those going forward.”

Leaving the Coast of Bays, Baker and Green then travelled to Grand Falls-Windsor to participate in the Aquaculture Opportunities event at the Joe Byrne Arena on May 18. During this event NAIA launched its Aquaculture 101 program and met with high school students from Exploits Valley High (see additional story in this issue).

Following that event, the last stop on the trip was to visit shellfish sites from Little Bay to Triton, including meeting with mussel farmers Gilbert and Shane Simms about some of their ongoing concerns.

“I think our shellfish sector is deserving of more love and respect on a lot of levels – I would never want anyone to take for granted that these folks are consistently producing some of the best organic product on the planet by any measurement,” Baker said. “All the people we have engaged in shellfish right

now are all lifers who have been doing it now for years, so they understand in intimate detail the challenges and opportunities being faced.

“I learned a lot about their issues and some of things we’ll need to do collectively for that industry to advance, develop new products and ultimately prosper.”

Baker said going out and meeting with NAIA members will become a continuing part of how the association carries out its mandate. He said more direct meetings would be planned around the upcoming Aquaculture Canada WAS North America 2022 Conference and also later in the fall.

“I think NAIA’s role is critical in developing a long-term, successful sector, and having these sorts of direct conversations ultimately help us represent our members’ interests on a more comprehensive level. I look forward to working closely with all our members.”





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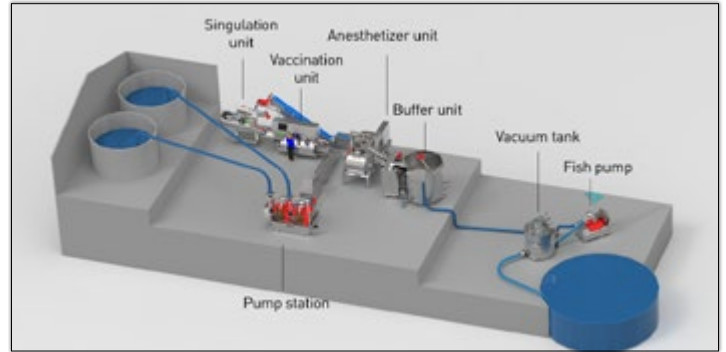
Automation in the Aquaculture Industry

Skala Maskon develops solutions for the aquaculture industry that streamline and ensure quality

The Marine industry is one of Skala Maskon's focus areas, and we have already delivered several development projects to this sector. Among other things, we have developed a system for fully automatic vaccination and pumping of fish at hatcheries. These machines have attracted international attention and sold to most of the largest players in the market. Skala Maskon is continuously working on several exciting development projects for the aquaculture industry.

Maskon Fish Pump System is a complete solution for automatic and gentle fish transport. The pump can be used stand-alone, or you can install Maskon Vacuumtank for long pump runs, or if you have an air problem in your pipes, as you tend to get in the final phase of emptying a tank.

For large lifting heights, Maskon Fish Pump can be connected in series. The pumps are automatically synchronized with each other. They also communicate with the vaccine machine, and automatically deliver the right amount of fish



according to the need for the vaccination. Everything can be controlled from the vaccine machine.

Maskon vaccination system is developed in a close cooperation with the world's largest salmon producers. Skala Maskon's fully automatic vaccination machine is operated by a single operator and can vaccinate and grade up to 40 000 smolt per hour and will handle fish in the size range 30-170 grams. The machines can vaccinate single, double, triple, and intramuscular doses simultaneously.



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Cooking with Chef Steve Watson

Lemon Pan Seared Fillet of Salmon with Organic Newfoundland Mussel Marianna Gnocchi



INGREDIENTS:

- 4 x 5 Oz Atlantic salmon fillets
- 2 Whole lemons, cut in half and grilled
- 2 Oz. Grape seed oil
- 3 Lbs. Steamed mussels with meat removed
- 2 Pkg. of Gnocchi
- 1 Cup Marianna sauce
- 2 Oz. Olive oil
- ¼ Cup of capers
- 2 Tbs. Chopped parsley

METHOD:

Boil gnocchi until tender. Remove from water and sauté in olive oil. Add marianna sauce and capers. Just before serving, add mussels and chopped parsley. Pan sear the seasoned salmon evenly on each side until opaque. Serve on top of the organic mussels marianna gnocchi with grilled lemon. Enjoy!



TIPS FOR HOW TO REMOVE COOKED MUSSELS FROM THEIR SHELLS

- Once the mussels are cooked, strain and allow to cool
- Discard any mussels that haven't opened during the cooking process
- Using your fingers, delicately prise each mussel away from the shell – they should come away easily
- Keep covered in the fridge until required
- Reserve the mussel cooking liquid to use as a base for a rich sauce.
- When preparing the mussels for the finished dish, remember that they are already cooked so only require very gentle reheating for a very short time. Too much cooking at this stage will make the delicate mussels rubbery.

CHEF STEVE WATSON served as an apprentice in London, and worked in Scotland, Belgium, France and Germany before moving to Canada in 1977 to study North American cooking. He taught culinary arts at the Cambrian College in Sudbury, ON before joining the Canadian Pacific Hotels chain in 1988. He recently retired as Territory Sales Manager and Executive Chef with Agropur, and has taken on a new passion of working as a tour guide with McCarthy's Party in St. John's, NL. He's also a devoted family man and a prominent member of the local community. Steve epitomizes the definition of a volunteer, including his work with NAIA and his quarterly submissions to the Cold Harvester, and spends countless hours giving back to the people of a province he now calls home. ✨



Couturier on Culture

Aquaculture in Canada

By: Cyr Couturier, Fisheries and Marine Institute of Memorial University and Darrell Green, NL Aquaculture Industry Association
(Article reprinted with modification with permission of the Publisher World Aquaculture Magazine June 2022)

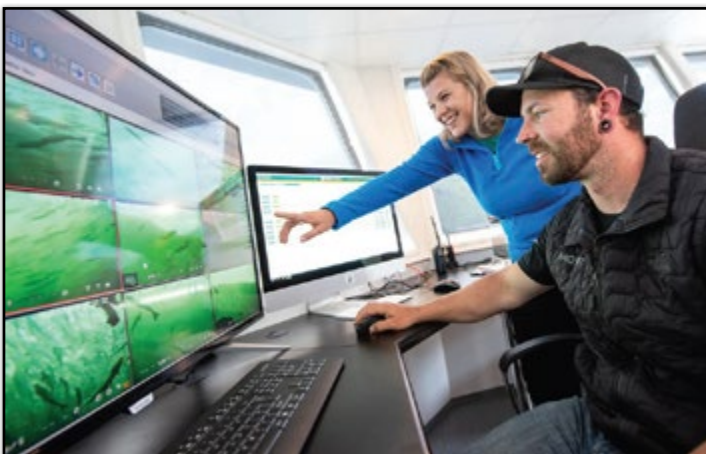
Cyr Couturier is marine biologist, aquaculture scientist and chair of the MSc Sustainable Aquaculture program at the Fisheries and Marine Institute of Memorial University. He has 35+ years of experience in applied research and development, training and education in aquaculture and fisheries. He is a Board and Executive member of several farming & development associations, including CAIA, CFA, CAHRC RDÉE TNL, and is a past president of AAC and NAIA. He has worked in aquaculture and fisheries development in over 18 countries. The views expressed herein are his own. Contact: cyr@mi.mun.ca or follow on Twitter [@aquacanada](https://twitter.com/aquacanada)

BACKGROUND AND HISTORY

To use a quote from a famous explorer “We must plant the sea and herd its animals using the sea as farmers instead of hunters. That is what civilization is all about - farming replacing hunting.” Cousteau, 1971. Well, as it turns out this farming of the seas began on the North American portion of the continent hundreds, if not thousands, of years ago with First Nations and indigenous peoples ranching and carefully managing local seafood resources in a sustainable farming fashion.

Fast forward to the 1800s and European settlers in what is now known as Canada began restorative aquaculture primarily for pond and lake enhancement of freshwater salmonid stocks

for sport fisheries using basic aquaculture techniques. The first marine finfish hatchery in North America (cod incubation and release of fry) was established over several years in the 1880s by a Norwegian scientist, who released billions of small fish into the Atlantic Ocean in Newfoundland with the hopes of enhancing local stocks that had plummeted in the previous decades. In the early 1900s attempts to restore a variety of dwindling natural stocks on the East and West Coasts of Canada introduced the Pacific oyster, the Manila clam and several other species to the West Coast of Canada and several other non-native species of finfish and shellfish to the East coast – all with the express purpose of rejuvenating dwindling



A compliance and certification coordinator with a farm manager on a remote salmon farm in Newfoundland (MOWI Canada East) monitor fish appetite, feeding behavior and environmental conditions in real time on a state-of-the-art, fixed feeding barge (Photo: D. Green, NAIA).



New farm employees learning the ropes on a Newfoundland salmon farming site. Recruitment is difficult in rural and remote regions of Canada and there is an annual labor gap in the sector nationally. However, there is hope as more and more young people become aware of the opportunities for sustainable seafood production, year-round employment, in well-paying positions (Photo: D. Green, NAIA).

native seafood stocks or enhancing fishery productivity for recreational or commercial purposes across the nation. All of these “restorative aquaculture efforts” employed fairly well-established freshwater and saltwater hatchery- nursery principles of aquaculture (read: enhancement) developed by Europeans and Asians and adapted to the Canadian conditions.

It was not until the second part of the last century in the 1960s, roughly six decades ago, that Canadian scientists with the Fisheries Research Board of Canada (Fisheries and Oceans predecessor), local universities inland and on the coasts, and provincial governments started to experiment with production techniques of various native and non-native freshwater and saltwater species of animals and plants for commercial aquaculture purposes, to create sustainable seafood farming industries from coast to coast to coast.

Canada is blessed with an abundance of freshwater and relatively pristine coastal waters spanning three oceans. The productive area for commercial seafood farming is barely used by aquaculture, with less than 1% of the suitable farming areas utilized for commercial farming purposes. Once in the top 10 “fishery” nations in terms of productivity, based on landings of seafood in the 1980s, Canada now sits around 22nd globally, in terms of production of seafood. Arguably, if it was not for aquaculture growth in the past four decades (see Fig. 1 for production levels), we would be much further behind. Most seafood-producing countries have embraced sustainable aquaculture as the future of food production globally, to provide environmental, social and economic opportunities to over 20 million farmers (FAO 2020). There are currently over 3 billion seafood meals consumed daily by the 8 billion citizens of the

planet, of which more than 50% comes from aquaculture. This is expected to grow over the next decades as humanity searches for sustainable solutions for food security and supply, and aquaculture will play a major role.

Today, there are commercial seafood farming operations in all 10 Canadian provinces, and at least 1 of its 3 territories, with over a dozen species at the commercial or pre-commercial stages of production. Species range from eels, scallops, oysters, mussels, clams, seaweeds (several species), phytoplankton, to trout, charr, salmon, whitefish, black cod (sablefish), and several others in various stages of development including sea cucumbers, sea urchins, and seaweeds and others.

TODAY SEEKING INNOVATION AND LIVING ON THE EDGE

The principal species of farmed seafood making up the bulk production in Canada (95% by volume) consist of Atlantic salmon, blue mussels, oysters (Eastern and Pacific species), and rainbow trout, with several others showing promise. Production facilities include Recirculating Aquaculture Systems and hatchery-nurseries for on-land production of “seedlings”, net-pen and longline systems for open waters, and even ponds for seasonal on-growing.

Today, commercial aquaculture in Canada is a thriving business employing over 20,000 Canadians in the production process from egg to plate. The sector is relatively young, speaking demographically, and about 30% are women in various positions. There are in excess of 50 First Nations participating

Continued Next Page



Badger Bay Mussel Farms, NL, seed collection farm. Farms have prescribed navigational channels and site markings according to federal regulations. These farms are sunk below the ice from December to May in Newfoundland waters (Photo: C. Couturier, Memorial University).



Cold Ocean Salmon nursery operation in St. Albans, NL. One of the first large scale RAS facilities built 15 years ago and producing roughly 600,000 post-smolts of 300+ g (Photo: C. Couturier, Memorial University).

DID YOU KNOW – CANADA LEADS

- The first marine finfish hatchery in Canada was in Dildo, Newfoundland, for cod in the 1880s
- The World's first sea scallop farm (*Placopecten magellanicus*) was in Little Mortier Bay, Newfoundland and Labrador (NL) in 1981
- The first genetically engineered fish for food was created in a lab in the mid-1980s at Memorial University in NL
- The World's first commercial-scale marine finfish hatchery for cod was in NL in 1997 but an electrical mishap burnt it to the ground
- The first ever shellfish farm to be certified to the Best Aquaculture Practices (BAP) standard was in NL, as was the first 4-star Atlantic salmon operation
- North America's first organically-certified blue mussels came from NL, soon to be followed by mussels from PEI.
- Canada is the leading producer of Arctic charr eggs
- A small family salmon farming operation that started in 1985 in New Brunswick is now one of top 5 seafood farming companies in the World, farming shrimp, bream, bass, salmon with production facilities in Europe, Canada, South and Central America
- The world-leading commercial land-based seaweed farm is located in Nova Scotia, and is a provider of algal extracts, nutraceuticals, cosmetics, animal and human food



A Newfoundland mussel farmer at Connaigre Fish Farms inspecting the crop prior to harvest. Newfoundland shellfish farmers have adapted continuous longline culture technology in the sub-Arctic environment nearly two decades ago and all are certified to the Canadian Organic Aquaculture Standard for sustainability (Photo: D. Green, NAIA).

in the aquaculture sector in Canada.

These First Nations are either sole enterprise owners or operate in partnership with their local communities in farming, processing, or supplier activities.

Few people would know that in the 1960s, Canadian government scientists, as well as handful of academics, were intimately involved in the underlying experiments and trials for commercial Atlantic salmon, scallop and mussel farming with young entrepreneurs and academics in Europe, Norway, and Canada, to try and bring aquaculture to the World. These efforts continue today with various academic and government labs continuing to provide support and innovation in the areas of fish nutrition, fish health, production technologies, environmental mitigation, new product and process development, genetics and genomics, breeding, and climate-adaptation. Moreover, much of the innovation and trials on farming seafood in Canada's Northern climate, which is literally frozen in ice in the winter in many places, has been from home-grown solutions through the entrepreneurial spirit by the industry pioneers – it's not easy farming in the ocean or on land when the ice is 1-meter-thick! Innovation and adaptation are the keys to success. Winter harvesting below the ice, submersible longlines and ice-booms are just some of the innovations seafood farmers have adapted so they can supply fresh products year-round.

The sector has always been innovative, always seeking solutions, using science and technology in partnership with



Mussel farmers, like these at Badger Bay Mussel Farms, harvest their crop carefully and keep the live shellfish isolated from the elements before transport to processors 100-200 km away. Harvesting 30 t of live mussels typically takes just a few hours (Photo: D. Green, NAIA).

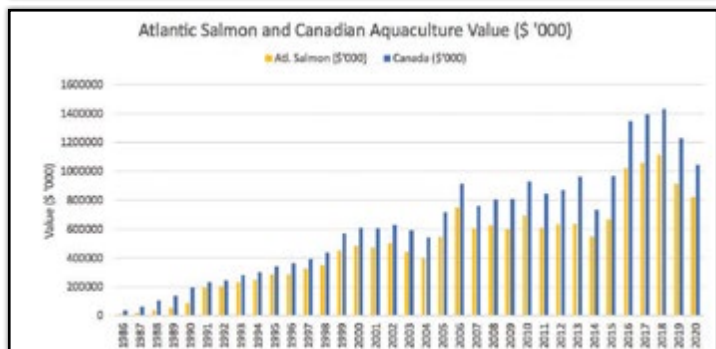
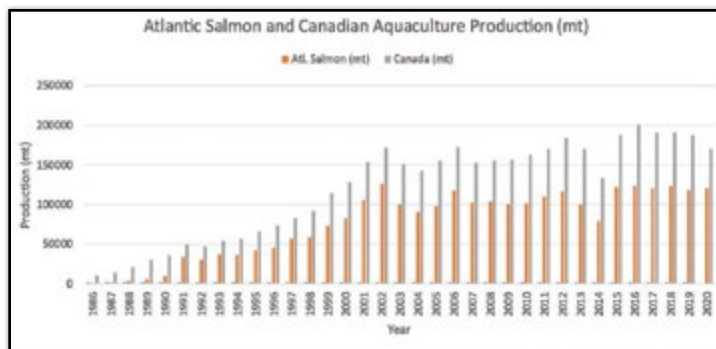
governments, universities, research organizations, and the private sector to find those solutions. Fish health management is a major challenge for aquaculture worldwide, so leading scientists on Canada's east and west coasts along with aquaculture companies are developing a variety of tools to combat the principal scourges from microbial and parasitic pathogens (cleaner fish, vaccines, pre- and pro-biotic feed supplements). As well, climate change and global warming are a worldwide threat to all seafood farmers, and there are Canadian teams leading the charge on adapting to production vagaries in the sector, among other challenges.

Unfortunately, Canada continues to fall behind in terms of production of farmed seafood, compared to its competitors. There has been no overall growth in production in that last twenty years. There are indeed challenges with the regulatory frame and there is limited support for research, development and innovation, compared with other countries, so efforts to

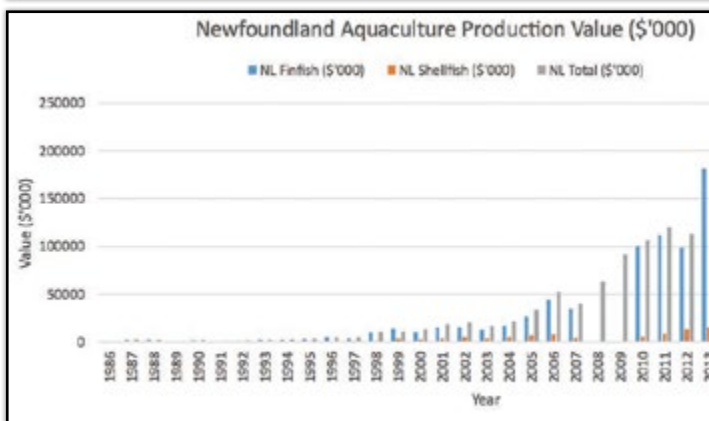
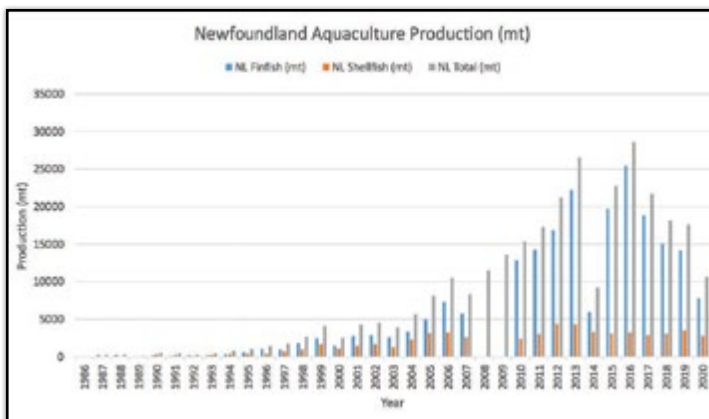
improve matters have been the subject of vigorous advocacy for about two decades. The challenge is to take advantage of the opportunity to grow the sector in today's framework of social, environmental and economic "sustainability", and to become a top-5 leader in the blue economy of the future. With our abundant natural resources, ingenuity, and some fortitude, there is no reason why Canada cannot become a global leader in science and production of sustainably farmed seafood.

Notes: Cyr Couturier is a past-president of the AAC (4x), the NAIA (3x), CAIA (3x). Darrell Green has been in industry for 20+ years. Their combined experience in teaching, training, research, policy and regulatory development spans 100+ years in over 20 countries, but principally focused on Canadian seafood farming.

Thank you to Jay Parsons for providing the figures with the Canadian and Newfoundland and Labrador aquaculture statistics and their descriptions.



Overall Canadian production has been flat for the last 20 years with a five-year average annual production of 188,214 t, for a five-year annual production value of \$986 million. Atlantic salmon and shellfish (blue mussels and Pacific and eastern oysters) represent the main commercial aquaculture production species in Canada, with Atlantic salmon representing 64.4 percent of the production quantity and 76.5 percent of the production value.



Aquaculture production in Newfoundland and Labrador commenced in the late 1970s to early 1980s and has been growing at a modest rate. The average annual Newfoundland production quantity over the last five years has been 19,353 t for a five-year annual value of \$130 million. Newfoundland total production and value represents about 10 percent of the total Canadian production and value. The main species of current commercial production are Atlantic salmon and the blue mussel. Atlantic salmon in Newfoundland represents 84 percent of production quantity and 89 percent of production value.

Cooke Aquaculture Announces New Managing Director



pleased to announce the appointment of Philip Wiese as Managing Director of East Coast Aquaculture Operations in Canada.

Mr. Wiese joins family-owned Cooke from his most recent leadership role as Chief Executive Officer at Huon Aquaculture Group Limited, Australia's second largest, vertically integrated salmon farming company employing 800 Tasmanians.

Wiese brings significant aquaculture expertise to Cooke having successfully delivered for nearly 15 years with Huon including as Chief Financial Officer with responsibility for financial management, information technology, human resources and operations.

Over the course of his career, Wiese was Director of the Tasmania Salmon Growers Association where he led collaboration across the Tasmanian salmon industry and managed the Tasmanian salmon brand globally. He has held

various senior commercial management roles in finance, insurance and trading in the manufacturing, distribution and retail business areas.

In response to significant global growth in recent years, Cooke has created the role of Managing Director of East Coast Aquaculture Operations to augment North American leadership and provide additional structure, ensuring the company's long-term success while maintaining an employee-centric culture.

Reporting to Glenn Cooke, Chief Executive Officer, the Managing Director oversees and leads all operations of Cooke Aquaculture's Atlantic Canadian organization by fostering the alignment of people and resources and championing operational excellence and sustainability by driving efficiency, financial performance and profitability, employee engagement and stakeholder relations.

July 13, 2022 – Blacks Harbour, N.B.
– Cooke Aquaculture Inc. is very

An advertisement for Naia Aquaculture. It features a photograph of three people (two women and one man) smiling in a large industrial facility, likely a salmon processing plant. A large white net is visible in the background. The text "Bringing so much to the table" is written in a circular graphic in the top right. At the bottom, there is a call to action to learn more at aquacultureNL.ca and a paragraph about the industry's positive impact. The Naia logo is in the bottom right corner.

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