STATE OF MAINE
BOARD OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF

NORDIC AQUAFARMS, INC Belfast and Northport Waldo County, Maine	)))	APPLICATION FOR AIR EMISSION, SITE LOCATION OF DEVELOPMENT, NATURAL RESOURCES PROTECTION
A-1146-71-A-N L-28319-26-A-N L-28319-TG-B-N L-28319-4E-C-N L-28319-L6-D-N L-28319-TW-E-N W-009200-6F-A-N	)))))))	ACT, and MAINE POLLUTANT DISCHARGE ELIMINATION SYSTEM/WASTE DISCHARGE LICENSES

PRE-FILED REBUTTAL TESTIMONY OF SIMON DUNN AND DAVID NOYES

On behalf of Nordic Aquafarms Inc. (NAF) we providing this testimony as a response to the pre-filed testimonies of Bill Bryden, and Brian Dixon for the Northport Village Corporation and Upstream Watch. The purpose of this response is to address instances where the above referenced testimonies differ substantially from the facts of the case, and provide, to the best of our ability, a factually accurate response.

Simon Dunn graduated as a civil engineer (M.Sc.Eng.) in Biotechnology and Aquaculture from Aalborg University in 2000. Since then he has undertaken numerous projects in collaboration with the private sector in commercial-scale ongoing Recirculation Aquaculture Systems (RAS) both in terms of product- and production optimization and water treatment technologies to improve performance of the systems (European eel, Gilthead seabream and Rainbow trout) and has co-authored several peer-reviewed and published articles. A summary of his experience and his CV are in Addendum A.

David Noyes has a degree in Marine Biology from the University of Maine and has worked in land based aquaculture for approximately a decade. His land based aquaculture experience includes private businesses, academia, and for governmental agencies. He is currently employed as the Chief Technology Officer for Nordic Aquafarms, Inc. A copy of his CV is in Addendum A.

1. *Mr. Bryden describes the facility as a flow through design.*

2. The proposed facility does not use a flow through design. Our recirculation aquaculture systems (RAS) recycle and reuse 99% of our water. We are international industry leaders with regards to both our water reuse rates and nutrient removal.

3. *Mr. Bryden incorrectly identifies Penobscot Bay as class A waters.*

4. Penobscot Bay, the receiving body for our discharge is class SB. *See* Nordic Exhibit 37.

5. *Mr. Bryden states on page 20 of his testimony " There is simply no system that humans have designed that can filter more than 750 gallons per minute of freshwater, nor nearly 4,000 gallons per minute of sea water to the nanometer level at 99.9% efficiency. Physically filtering out viruses requires membranes and pressure and is only available on the desktop scale. Nor is there a series of systems that will eliminate viral contamination at this pace."*

6. Mr. Bryden fails to recognize that every municipal water district in operation is capable of successfully eliminating viral contamination at large scale. Desalination and water reclamation for water reuse has been employed around the world for many years. Nordic Aquafarms will employ ultrafiltration (a higher level of filtration than microfiltration), UV and Ozone to treat up to 7.7MGD in our facility.

7. *Mr. Bryden claims no one has ever been able to utilize surface water to raise fish.*

8. Many species of fish, including salmon, have been successfully raised in systems utilizing only surface water for centuries. The very first hatcheries were indeed little more than diversions of streams or rivers through holding channels or ponds. This method is still used extensively and successfully throughout the world. Some local examples would include the State of Maine hatcheries where millions of trout and salmon are raised every year for stocking programs. Craig Brook, the US fish and Wildlife hatchery in Orland, has relied solely on surface water to raise over 3 million Atlantic Salmon annually for years.

   It is important to note that NAF will not rely solely on surface water. Our fish will require freshwater for the first stage of life, and we will primarily use saltwater sourced from Penobscot Bay to grow our fish. We will source freshwater from production wells on site with additional needs met by the municipal water supplied by the Belfast Water District. The Belfast Water District sources their water from ground water wells in the Goose River aquifer. We will employ surface water from the Lower Reservoir as a third source of freshwater in order to provide a resilient and flexible fresh water supply. It is important to note that this reservoir was employed as the source of drinking water for Belfast for almost a century providing 500 gallons per minute of clean, safe drinking water.

9. *Mr. Bryden claims we ignore fish to fish transmission within the tank and makes many claims about antibiotic use.*

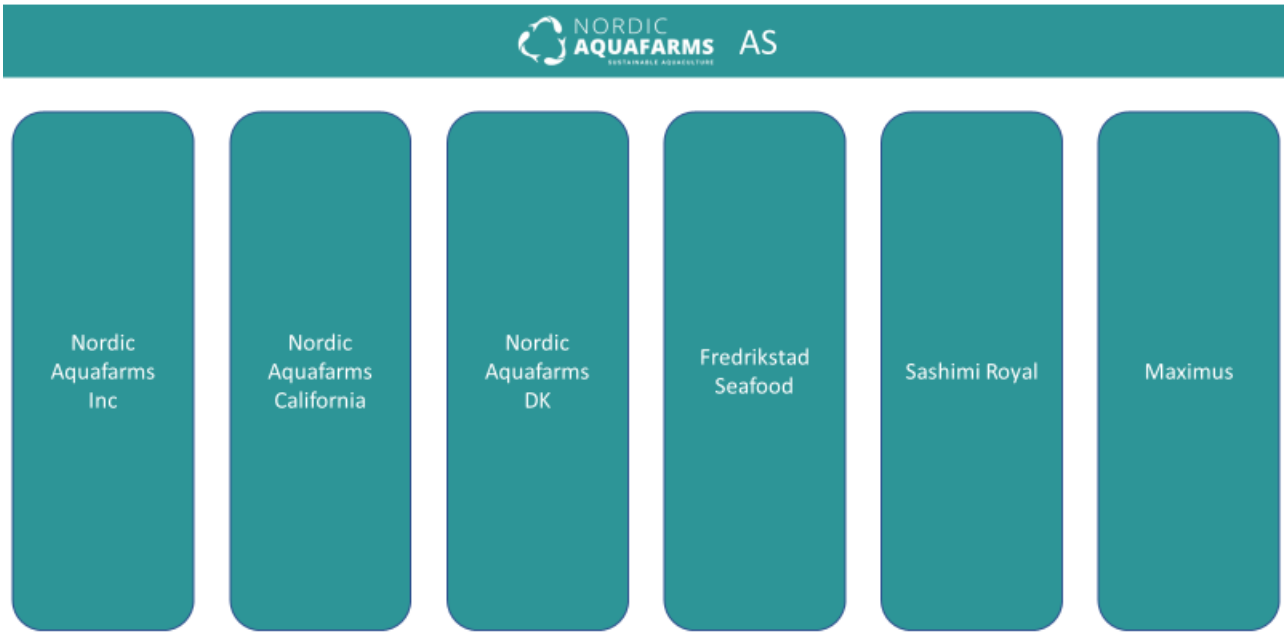
10. We have not and do not intend to use antibiotics. Antibiotics are considered a last resort to treat fish specific pathogens. We use UV and Ozone, two well established technologies in a layered approach to prevent pathogenic material from entering, establishing in, or leaving the facility. One well established practice we will employ is vaccination. This is an effective means of both preventing fish from getting sick and preventing fish to fish transmission the same way vaccines help prevent person to person transmission.

11. *Mr. Bryden claims we have ignored humidity and water evaporation within our buildings.*

12. We have extensive experience with successfully preventing high humidity in our facilities. By keeping our air temperature slightly warmer than the water temperature, utilizing properly zoned air exchange rates and dehumidification, we can maintain acceptable relative humidity levels in the facility, preventing water vapor from moving about the building. Surfaces are dry to the touch at our facilities. This prevents issues such as mold while protecting the equipment and building from moisture and salts. These well-established methods are the same ones employed at newer aquatic athletic facilities where the typical odor and humidity problems are prevented through proper design and operation.

13. *Mr. Bryden sites the lack of a pilot project as a key part of his underlying issues argument.*

14. Nordic Aquafarms is the second largest RAS company in the world. Belfast will be our fourth RAS facility with a fifth in development in California. Amongst our facilities we list Sashimi Royal, the largest RAS Yellowtail Kingfish facility in the world, and Fredrikstad Seafood, the largest RAS growout facility for Atlantic Salmon in Norway. Below is an organizational chart listing Nordic Aquafarms and its subsidiary companies to include our internal engineering Nordic Aquafarms DK.



15. *Mr. Bryden claims effluent from our "intake pipes is simply dumped into a drain" and insinuates this will be put into the public sewer system.*

16. Nordic's effluent will be treated in its wastewater treatment plant, with the exception of sanitary sewer waste (from facility restrooms and staff kitchen areas). The scope of the City's disposal is discussed below in an email exchange between Wayne Marshall, City of Belfast Director of Code and Planning, and Gregg Wood of the Maine DEP:

From: Wayne Marshall <wmarshall@cityofbelfast.org>
Sent: Friday, January 3, 2020 3:44 PM
To: Greggwood@maine.gov
Cc: Jon Carmen <joncarman@uninets.net>; Jon Carman <wwtp@cityofbelfast.org>; William S. Kelly <bkelly11@bluestreakme.com>; Mandy Olver <mandy@olverassociatesinc.com>; Ed Cotter <ec@nordicaquafarms.com>
Subject: Nordic Aquafarm connection to City sewer

Mr. Wood.

You contacted me earlier today, January 3, and asked about the public sewer connection that Nordic Aquafarms will be extending to and from the land based aquaculture facility that they propose to construct near the lower reservoir of the Little River. The private (force main) sewer line that they are constructing will be connected to the City public (gravity) sewer line that is located at the intersection of Route 1 and Perkins Road.

Nordic's connection to the City sewer is solely for the purpose of accepting sanitary sewer waste from the Nordic facility. Nordic Aquafarms does not propose to deliver any fish processing waste to the City sewer and the City has clearly stated to Nordic Aquafarms that it will not accept any processing waste. To that end, the City has required Nordic Aquafarms to ensure that all internal floor drains in their growing and processing areas are connected to their on-site wastewater treatment facility rather than having this waste and wastewater enter the sewer connection to the City sewer system.

The City, prior to Nordic's submission of their permit applications to the City, engaged the services of Olver Associates, the engineering firm that provides services to the wastewater treatment plant, to examine the potential impact of the City accepting wastes and wastewater from Nordic Aquafarms,. The analysis by Olver Associates illustrated the potential problems that accepting such wastes would pose to the City wastewater treatment plant. Shortly thereafter, the City indicated to Nordic Aquafarms that it did not have the capacity to accept any wastewater from their production and growing facilities.

I also note that Nordic Aquafarms, in all of their permit applications to the City that are now being reviewed by the Belfast Planning Board, has clearly indicated that their facility is only sending sanitary wastewater to the City Wastewater Treatment Plant.

Let me know if you have any further questions.

Wayne

Wayne Marshall, Director

Code and Planning
City of Belfast
131 Church St
Belfast, ME 04915
(207) 338-1417 x 125
wmarshall@cityofbelfast.org

17. Mr. Bryden's testimony contains numerous other misstatements regarding NAF's proposed operations including: describing Ozone as bleach on page 8, claiming UV will only be applied in "a millisecond blast" on page 12, claiming we will not utilize Ozone on page 12, and asserting that "turbidity can dramatically plug" a UV light on page 14. Mr. Bryden likewise states that UV is a pasteurization method (page 14). None of these statements is accurate. Ozone and bleach are not the same compound. The project will use ozone as a disinfection treatment. Ultraviolet light utilizes a high energy light to damage the genetic material of any pathogens to prevent them from being able to replicate. Pasteurization utilizes heat over a given period of time to kill pathogens. Nordic will use UV dosage at 250-300 mJ/cm^2 which is more than sufficient to terminate pathogen reproduction.

18. Mr. Bryden attacks the safety of a public water supply and system design. Mr. Bryden explains that these problems would be corrected by using "virtually virus free aquifer water, extreme filtration and UVc" (page 22). In fact, this is the system Nordic proposes to use.

19. On page 50 of his testimony, Mr. Bryden states that "ISAV is sensitive to UV irradiation (UVC) and ozone. A 3-log reduction in infectivity in sterile freshwater and seawater was obtained with a UVC dose of approximately 35 Jm–2 and 50 Jm–2, respectively, while the corresponding value for ISAV in wastewater from a fish processing plant was approximately 72 Jm–2. Ozonated seawater (4 minutes with 8 mg ml–1, 600–750 mV redox potential) may inactivate ISAV completely. Incubation of tissue homogenate from diseased fish at pH 4 or pH 12 for 24 hours inactivated ISAV. Incubation in the presence of chlorine (100 mg ml–1) for 15 minutes also inactivated virus (Rimstad et al., 2011)."

20. The UV dosage levels referred to by Mr. Bryden are significantly lower than those Nordic proposes to use: 250-300mj/sec/cm2. The Oxone contact time of 4 minutes is significantly less than we will employ with 6-8 minutes. Last, the ensilage systems we will employ will hold mortalities at a pH of 4.

21. Dr. Dixon cites several papers that, in the case of the 2002 article by Dr. Summerfelt, has been updated several times Dr. Summerfelt alone. The generalizations set forth by Dr. Summerfelts 2002 paper are still useful as Ozone is commonly utilized for both

disinfection and for improving water quality in RAS systems. Dr. Dixon makes several suggestions that were incorporated into Nordic's designs at its earlier stages: including the use of physical barriers to eliminate the risk of escape, the use of well-established biosecurity measures and technology to prevent pathogenic material from entering, establishing in, or exiting the facility through a layered redundant approach to water quality management, and the use of sensors on UVs to provide real time feedback on performance. In addition, Nordic will use sensors on the ozone systems, fine filtration upstream of our ozonation systems with 6-8 minute contact times, and the positioning of our UV downstream of the ozonation system to allow for full destruction of an residual ozone into harmless and useful oxygen before it enters the fish rearing tanks.

22. *Dr. Dixon states on page 1 of his testimony that "In order to filter pathogenic bacteria from ocean water, one would need to filter that water through a 0.22 micrometer filter"*

23. Nordic's waste water treatment plant will include filtration that is comprised of a scalable 0.04 micron pore size Ultrafiltration MBR system. This, using Dr. Dixon's standard, is sufficient to filter pathogenic bacteria material such as *Aeromonas salmonicida* from our effluent. ISAv is rendered non pathogenic by UV doses much lower than the 250 and 300 mj/sec/cm2 dose we will employ.

24. *Dr. Dixon states on page 2 "It may be prudent to modify the treatment design such that each tank has its own bioreactor…"*

25. Nordic's modular design provides dedicated bioreactors for each grow out module, and small clusters of the smolt and hatchery tanks for each cohort of fish. Additionally each production module and smolt system has its own denitrification unit.

26. *Dr. Dixon notes that "if separate systems for fresh and saltwater are used, then ozone treatment can be used on the freshwater flows."*

27. Nordic proposes to utilize separate systems for fresh and salt water phases of the natural salmon life cycle and we intend to utilize ozone in our systems. Ozone has been successfully used in RAS systems around the world for decades.

28. Dr. Dixon writes *" A clear plan to ensure there is not excessive release of those (*antimicrobial*) compounds should be in place."*

29. Nordic does not use and does not intend to use antibiotics in any of our facilities. Should a situation arise where a veterinarian prescribes the use of antibiotics for fish welfare under a situation where disease has rendered treatment necessary, that treatment will

be prescribed and administered by a veterinarian and properly recorded and reported to the regulatory authorities as required under Maine law.

[INTENTIONALLY LEFT BLANK]

Dated: January 8, 2020

By. _____

David Noyes Nordic Aquafarms Inc..

STATE OF MAINE

January 8, 2020

County of Waldo, ss.

Personally appeared the above-named David Noyes and made oath as to the truth of the foregoing pre-filed testimony.

Before me,

Candice Hutchison

Notary Public / Attorney at law

Candice Hutchison
My commission expires 2/4/2021

Dated: January 16, 2020

By _____
Simon Dunn
Nordic Aquafarms (DK)

The above-named Simon Dunn made oath as to the truth of the foregoing pre-filed testimony.

Before me,

_____
Witness

ADDENDUM A

David Noyes

dsn@nordicaquafarms.com
1-207-949-2242

Education: B.S. Marine Biology University of Maine

Professional Experience

October 2018-present *Chief technology officer, Nordic Aquafarms Inc. Portland, Maine.* Integrate needs of production team with technical solutions in engineering concepts. Coordinate communications with international team to provide innovative technical solutions for proprietary modular recirculating aquaculture system concept. Conduct community outreach and present technical concepts to the senior company leadership, academia, local community members, regional and industry stakeholders, local, state and federal regulators and legislators. Integrate academic research into coordinated goals that will benefit company and industry at large by steering grant work. Communicate with subsidiary companies to provide guidance and problem solving networking across multinational corporate structure. Developing food pantry iniative for large scale seafood donation to feed the needy across the regions where we operate through established connections and momentum from previous work in this area with previous fish farms I worked at.

November 2017-September 2018 Laboratory *assistant, National Cold Water Marine Aquaculture Center USDA Agricultural Research Services, Franklin Me.* Assist with ongoing work on atlantic salmon *(Salmo salar),* arctic char (*Salvilinus alpinus),* and sea lice *(lepeophtheirus salmonis).* Perform aspetic laboratory techniques for various analysis, and ongoing genetic work with a focus on selective breeding. assist with animal care, and hatchery work, system maintenance and repair, and troubleshooting.

2003-Present: *Sergeant First Class: US Army*
Platoon sergeant, operations sergeant, petroleum manager, heavy equipment operator. Responsible for supervision of 30 individuals. Advise and provide planning for Platoon Leader. Responsible for engineering assets, logistical needs, payroll, and personnel. Supervise repair and services for Statewide electronic assets such as cryptographic communications, thermal vision, night vision, satellite communications, and mine detection equipment. Track, plan and coordinate Fueling needs for regional area of responsibility of Battalion and the units it supports. Personally, responsible for $3 million of equipment. Battalion test team member responsible for testing and licensing unit's soldiers. Provided convoy/base security. Deployed OIF II/Iraq, Operation Katrina, Operation Irene and Operation jump start on Arizona/Mexican border. Request DD 214 for deployment dates and awards.

February 2016- November 2017 *Operations manager and systems lead, Acadia Harvest Incorporated, Franklin Me.* Managed four employees. Oversaw operation of multiple recirculating aquaculture systems for raising multiple species from hatchery stock to harvest size: Yellowtail (*Seriola lalandi*), black sea bass, sandworms, American oysters, macro and micro algae. Hand-built two RAS systems, one being a highly complex integrated multi-trophic aquaculture recirculating system that incorporated four species. Redeveloped and implemented husbandry procedures, developed stocking and harvest plans, troubleshot RAS systems, implemented mechanical failsafe and emergency procedures for systems. Managed water chemistry and unique biological needs of various species. Managed daily logistical needs to operate multiple systems in multiple buildings. Provided detailed tracking of inventory, growth rates, feed conversion ratios, and forecasting of needs, payroll, and prepared and conducted training of safety protocols. Conducted sales and marketing for greater New England and expanded sales into mid Atlantic area. Procured new suppliers for high volume items significantly reducing operating costs.

September 2015-February 2016 Technician *at Genetic Repository, Jackson Laboratory, Bar Harbor, ME.* Performed fast paced animal care and genealogy logging for more than 27,000 mice in maximum barrier room. Utilize aseptic husbandry techniques for more than 300 strains of mice with little to no immune function for local and international sales.

April 2015- September 2015 *Genotyper at Transgenic Genotyping Services, Jackson Laboratory Bar Harbor, ME.* High throughput molecular biology department utilizing multiple PCR platforms. Responsible for tracking requests analyzing and optimizing protocols performing fast paced quality work with molecular biology skills and analytical software.

June 2011- April 2015: *Scientific research assistant at Aquacultural Research Institute: University of Maine Orono*
Aseptic laboratory techniques for RNA, DNA, bacterial, viral, parasite research, and care of live animals. Worked extensively with sea lice and Atlantic salmon from 40 grams to 1 kilogram in fresh and saltwater RAS to include smoltification in RAS. Responsible for supervising and training undergraduate lab technicians. Worked in both lab and field setting, independent and group efforts. Responsible for designing, building, troubleshooting and maintaining recirculating, and flow through aquaculture systems for finfish, crustaceans, gastropods and corals. Designed and built first sea lice hatchery in New England. Built five multipurpose reconfigurable biosecurity level 2 aquaculture systems for disease trails work. Responsible for validating and optimizing assays and techniques. Responsible for collecting, cataloging, transcribing, and presenting data. Worked on clinical trials for Merck, Pfizer, and Fish Vet Group. Worked on projects for the USDA, and NOAA.

Aug 07- Sept 09; *Earthwork foreman/heavy equipment operator, Eastwood Contractors: Brewer, ME*
Responsible for residential and commercial projects to include foundation prep, septic system installation, storm water, sewer, and water main installation and tie in. Read and interpret blueprints, coordination with various city engineers and code enforcement officers as well as various general contractors to ensure work was completed both on time and to specification.

Jan 07 – July 07: *Blaster, Cianbro Construction Company: Pittsfield, ME*
Steel preparation and reconditioning work, quality control and shipping. Trained 12 new employees in various technical steel conditioning work on 4 different platforms.

Professional development: Advanced leadership course for Engineers, Warrior leaders course, Petroleum specialist Course, Combat lifesaver, suicide first aid, Hazardous material handler and transportation course, ATEC 22ton crane operators course, Pile driver course, Unit public affairs representative course.

Licenses: (43) request DA form 5984-E for full list of licenses.

IACUC and HAACP certified**.**

CURRICULUM VITAE

SIMON DECLAN DUNN
Address:
Genvej 4, Hvilsom
DK 9500 Hobro
Cell-phone: +45 2896 8100
Mail: simdunn@gmail.com

LinkedIn Profil: http://dk.linkedin.com/pub/simon-d-dunn/3/393/ba4/
Born: February 18th, 1974
Marital Status: Married
Childen: 4 (2 at home)

PROFESSIONAL EXPERIENCE

2018-Present **Senior Engineer, RAS**, *Nordic Aquafarms DK ApS*

When Inter Aqua Advance went into bankruptcy in August 2018, I joined Nordic Aquafarms along with a select team from Inter Aqua to provide a full complement of the best resources for detailed design/drawing and other competences needed to continue our work with NAF.

Key responsibilities today are:

- Principal RAS design (Production tanks required from bioplans, RAS treatment processes and equipment specs for main items, oxygenation and degassing specs, sizing of MBBRs, flowrates, etc.), technical solution strategies both for RAS and intake/wastewater treatment and principal design thereof, budgeting, supplier benchmarking etc.
- Technical & Operational improvements in ongoing NAF operations in Denmark and Norway

2014-2018 **Sales Manager**, *Inter Aqua Advance – IAA A/S*

Following restructuring of Inter Aqua Advance, I took over the daily responsibility for the sales department again.

Noteworty achievements relevant to the purpose of the CV:

- **5.500 tons/year Salmon Growout RAS – Norway**. Principal RAS design, budgeting, quotation, strategies and negotiations with Nordic Aquafarms. Entered into exclusive cooperation agreement for the smolt RAS and one production module for market-size salmon.
- **1.500 tons/year full marine Barramundi RAS – Oman.** All principal RAS Design, cost calculation and quotation work, negotiations and contractural exclusive agreements signed for a project in Oman for 1500 tons/year capacity of Barramundi (*lates calcarifer*) production from fry to 1.2kg harvest size, including >95% nutrient removal wastewater treatment system. Cooperation work with the client included total project budgets for financing approval by the governments of Oman and Quatar, product marketing strategies and interviews with key wholesalers and retailers in the UAE region. The project would have started up in October 2018 as financing and permits were all in place.
- **2 x 5.000 tons/year African Catfish RAS modules – Russia.** All principal RAS Design, cost-calculation and quotation work, negotiations and contractural exclusive agreements signed for 10.000 tons capacity/year of African Catfish from Broodstock/Hatchery to market size of 1.2 kg in Russia.

- **1.000 tons/year Arctic Charr RAS – Norway.** All overall RAS Design, cost calculation and quotation work and negotiations for 1000 tons/year capacity of Arctic Charr RAS project from hathcery to market size in Norway. Project is still seeking final investment capital but would have been won.
- **9 million smolt/year Salmon Smolt RAS – Norway.** Overall RAS design, cost calculation and quotation work for formal tender to produce 4 mil 100g smolt + 5 mil 400g smolt from eyed eggs and up. Passed pre-selection phase (3 out of 6 vendors chosen) and were invited to discuss detailed design work to proceed into the next selection phase.
- **3 million Post-Smolt/year RAS – Canada.** All overall RAS design, cost calculation and quotation work for 2 mil 200g smolt/year + 1 mil 775g smolt/year in New Foundland. Project has begun construction.
- **2 x 3 million Post-Smolt/year RAS – Norway.** Overall RAS design, Cost calculation and quotation work for 2 x 3 million post-smolt/year from 80g up to 900g. Permitting phase still ongoing.
- **1.400 tons/year capacity European Seabass RAS – Ireland.** Principal RAS design, cost calcuation, quotation and feasibility studies assistance for development of a 1400 tons/year growout RAS facility in Ireland from fry up to 400g market size. The project is now financed but looking for alternative RAS suppliers.

2011-2014 **Project Developer (Sales)**, *Inter Aqua Advance A/S*

International project sales work of RAS projects and wastewater treatment

Overall RAS Design work, production plans, operational budgets & feasibility studies, Cost Calculation, Proposal/Quotation writing, marketing, sales & marketing strategy and responsible for the managing of international agents and cooperation partners.

2008-2011 **Managing Director (CEO)**, *Createch Aqua ApS*

Following a successful trial period of two years in development of the wastewater sector, Createch Aqua was formally established as a sister-company to Inter Aqua Advance, which I headed with 15% ownership and 5% ownership in Inter Aqua Advance.

The former responsibilites as Area Sales Director carried over along with CEO and Board work.

Several successful MBBR projects were implemented, hereunder:

- Municipal wastewater treatment plant for 15.000 people new housing development projects (The Palm and Sharjah)
- Industral effluent MBBR treament plants for Danone and Volvic in France (Dairy and Beverages industries)
- Upgrade of an Oil&Gas effluent treatment system to MBBR Technology in Norway
- Several containerized MBBR treatment systems in Romania for slaughterhouses
- two Palm oil projects in Malaysia.

Due to the financial crisis in Europe, it was decided to rationalize our efforts and administrational work in 2011 and focus on our core business of Aquaculture projects. Createch Aqua was dissolved and I returned to the sales department of Inter Aqua Advance under the Sales Director.

2006-2008	**Area Sales Director**, *INTER AQUA Advance A/S (Wastewater & Aquaculture)* • With reference to the Chairman of the Board, I was charged with developing the wastewater industry as a new market segment for the company as well as upgrading/retrofitting existing older aquaculture systems to RAS. • Responsibilites included Strategy, Market Development, MBBR Design and sales, marketing and strategic cooperation agreement negotiations with key players in the wastewater industry. • Production manager for bio-media production in Germany - incl. Production planning, purchasing, materials- and product optimization and budgeting. Optimized packaging and achieve 36% higher capacity per truck/container.
2004-2006	**Aquaculture Engineer**, *INTER AQUA Advance A/S* · Dimensioning/Design of RAS treatment for various projects (Tilapia, Catfish, Trout, Salmon, Kingfish). · Development of RAS model to rationalize work efforts in the preliminary design phase to predict water quality values. · Responsible for the production and new product development for bio-media to be used in MBBR technology in Germany.
2003-2004	**Independent**, *AquaNome* · While searching for a new job, I started my own 1-man company and did 3D renditions of products for marketing and product development purposes.
2003	**Reaserch Director**, *Aquaculture Systems Technologies, LLC New Orleans USA* · In charge of the R&D department · Product development and commercialization efforts via Small Business Innovation Research (SBIR) grants. Started up 3 projects, of which 2 now are commercial. · Responsibility for coordination and planning of tests and analyses with private and institutional partners in the product development phase. · Due to a family crisis, I was forced to move back to Denmark
2001-2002	**Project Engineer**, *Cimbria Aquatec A/S* · Design, Cost Calculation, Production planning and CAPEX/OPEX budgets for 10,000 MT Cod RAS

EDUCATION

1994-2001	Civil Engineer (*M.Sc.Eng.*) Biotechnology & Aquaculture, *Aalborg University*
1990-1993	Mathematic Line, High-School, *Marselisborg Gymnasium, Aarhus*
1989-1990	Foreign Exchange Student (Senior) USA *Ben Davis High School, Indianapolis, Indiana*

TRUSTED & VOLUNTARY WORK

2008-2011	Non-member Board of Directors work under Createch Aqua ApS & INTER AQUA Advance A/S
2007-2009	Member of the Board of Directors, Aquacultural Engineering Society, for two consecutive terms. www.aesweb.org.
1999-2000	Manager of the Student Bar, Aalborg University (voluntary social work)
1990	Youth For Understanding (YFU) – voluntary work for Foreign Exchange Student program
1990-1992	Leader, Catholic Youth Club (KUK) in Aarhus

PREVIOUS MEMBERSHIPS & AFFILIATIONS

DANISH WASTEWATER ASSOCIATION

DANISH WATER TECHNOLOGIES GROUP

INNO-MT (INNOVATION NETWORK FOR ENVIRONMENTAL TECHNOLOGY

With kind regards,

Simon Declan Dunn

PROFESSIONAL SUMMARY

Private:

Simon Declan Dunn
Genvej 4, Hvilsom
9500 Hobro
Denmark

Professional:

Senior Engineer, RAS Technology
Nordic Aquafarms DK ApS
Skaeringvej 88, bld. K1
DK8520, Lystrup, Denmark

I graduated as a civil engineer (M.Sc.Eng.) in Biotechnology and Aquaculture from Aalborg University in 2000. During this period, I have undertaken numerous projects in collaboration with the private sector in commercial-scale ongoing Recirculation Aquaculture Systems (RAS) both in terms of product- and production optimization and water treatment technologies to improve performance of the systems (European eel, Gilthead seabream and Rainbow trout) and have been co-author of several peer-reviewed and published articles.

The education included skills in physics, organic- and water chemistry, biology and microbiology, immunology, unit processes in water treatment, etc. to provide a wide palette of tools necessary to work with RAS and water treatment design.

From 2001-2002, I was employed as Aquaculture Project Engineer by Cimbria Aquatech A/S in Denmark (which later became Aquatech Solutions and now are part of AKVA Group) as a natural extension of the work undertaken during my thesis period in collaboration with them in a commercial RAS for eel. My work at Cimbria Aquatech entailed the RAS design and financial budget for commercial-scale RAS projects for cod.

In 2003, I was employed as Research Director at Aquaculture Systems Technologies LLC in New Orleans.

The focus there was head the R&D efforts towards development and commercialization of technologies and products in RAS or in relation to RAS (e.g. commercial-scale continuous algae production for hatchery operations). During my time there, I was successful in obtaining several Small Business Innovation Research (SBIR) grants that were implemented in collaboration with both institutional and commercial partners. I designed and built R&D RAS systems there both for Tilapia and the algae production.

Since 2004, I have worked for Inter Aqua Advance and have accumulated extensive experience in most aspects of commercial-scale RAS and water treatment technologies:

2004-2006: Aquaculture Engineer

2006-2008: Area Sales Director

2008-2010: Managing Director of Createch Aqua ApS, which was a spin-off sister company that I started, dealing with the Wastewater Industry to develop new business areas. During this time, I successfully designed and sold numerous wastewater treatment projects both for industrial and domestic wastewater treatment internationally. Primarily, the projects were based around the supply of the biological MBBR treatment processes in collaboration with major companies in the wastewater treatment sector. We successfully supplied and implemented treatment systems for:

- Slaughterhouses (Eastern Europe)

- Food & Beverage (Volvic and Danone in France)
- Palm oil (Malaysia)
- Oil&Gas (Norway)
- Pig Manure (total nitrogen reduction in Holland)
- Domestic Sewage (UAE, Hungary)

2010-2014: Project Developer (design and sales). We decided to focus on our core business of aquaculture and RAS and I was brought back into design and sales of RAS projects, although we have continued to work with the wastewater industry on the side since then.

2014-2018: Sales Manager, Inter Aqua Advance A/S. I assumed responsibility for the sales efforts including costing, quotations and contract negotiations, referring directly to the CEO. Under that, I was the lead for tailoring customer requirements for RAS projects in terms of production planning, facility tank layout and principal RAS water treatment design and specifications for detailed drawing/design.

Since August 2018 I have worked as Senior engineer, RAS Technology at Nordic Aquafarms DK as part of the RAS design team for NAF projects internationally. I lead the Process Team of engineers as part of the design work, thus in principle continuing my previous responsibilities.

Memberships & Affiliations (past and present)

Member of the Board of Directors of the Aquacultural Engineering Society, where I served for two consecutive terms from 2007-2009. www.aesweb.org

Member of the Danish Wastewater Association

Member of Danish Water Technology Group

Member of Inno-MT (Innovation Network for Environmental Technology)

During my professional career, I consider myself to have acquired extensive knowledge and experience in a vast variety of different RAS designs and technologies:

- commercial large-scale RAS design
- upgrading existing aquaculture systems
- upgrading municipal wastewater treatment plants
- cost calculations, proposals and quotations and sales.
- Feasibility studies
- Business plans
- Product development, production planning and purchasing.
- Patents and patent applications.
- Marketing and sales strategy.
- Wastewater Treatment

With kind regards

Simon Declan Dunn

Designated Uses and Criteria for Maine Marine Classifications

Class	Designated Use	Dissolved Oxygen Numeric Criteria	Bacteria Numeric Criteria	Habitat Narrative Criteria	Aquatic Life Narrative Criteria
Class SA	Habitat for fish and estuarine and marine life Recreation in and on the water Fishing Aquaculture Propagation and harvesting shellfish Navigation	As naturally occurs	As naturally occurs *except that enterococcus not higher than 8/100 ml (g.m.*) over 90-day interval or 54/100 ml(inst.*) in no more than 10% of the samples in any 90-day interval*	Free flowing and natural	As naturally occurs; no direct discharge of pollutants**
Class SB	Habitat for fish and estuarine and marine life Recreation in and on the water Fishing Aquaculture Propagation and harvesting shellfish Navigation Industrial process and cooling water supply Hydroelectric power generation	Not less than 85% of saturation	Enterococcus not higher than 8/100 ml (g.m.*) *over 90-day interval* or 54/100 ml (inst.*) *in no more than 10% of the samples in any 90-day interval* from *4/15 to 10/31* Not to exceed criteria of National Shellfish Sanitation Program for shellfish harvesting	Habitat for fish and other estuarine and marine life, unimpaired	Discharges may not cause adverse impact to estuarine and marine life in that the receiving waters must be of sufficient quality to support all indigenous estuarine and marine species without detrimental changes in the resident biological community. Discharge not to cause closure of shellfish beds.
Class SC	Habitat for fish and estuarine and marine life Recreation in and on the water Fishing Aquaculture Propagation and restricted shellfish harvesting Navigation Industrial process and cooling water supply Hydroelectric power generation	Not less than 70% of saturation	Enterococcus not higher than 14/100 ml (g.m.**) *over 90-day interval* or 94/100 ml (inst.**) *in no more than 10% of the samples in any 90-day interval* from *4/15 to 10/31* Not to exceed criteria of National Shellfish Sanitation Program for restricted shellfish harvesting	Habitat for fish and other estuarine and marine life	Discharges may cause some changes to estuarine and marine life but the receiving waters must be of sufficient quality to support all species of indigenous fish and maintain the structure and function of the resident biological community.

* "g.m." means geometric mean and "inst." means instantaneous level.

** Limited exceptions apply.