

T0: Mr. Robert Duchesne, Chairman Board of Environmental Protection
FROM: Holly Faubel, 1 Steamship Point, Belfast ME

RE: Public input regarding Nordic Inc; permits & licenses

DATE: Feb 18, 2020

Cc: Gerald D. Reid, Commissioner, Maine Department Environmental Protection
Pat Keiliher , Commissioner, Maine Division of Marine Resources
Heather Johnson, Commissioner, Maine Department of Economic & Community Development
Janet T. Mills, Governor of Maine

EXECUTIVE SUMMARY:

Maine has a \$6 billion tourism industry and a \$2 billion fishing industry. These industries employ thousands of Mainers directly and indirectly in ancillary businesses. All of who are crucially dependent on the management of Maine's natural resources.

Our iconic working waterfronts, recreational, and residential communities can adapt to the rapid changes that are being driven climatic and economic pressures, but only if all interests are carefully considered and the proper regulations are in place.

Over \$30 Million is about to be spent restoring the last great runs of Endangered Atlantic Salmon in our rivers and bays. This is in addition to the hard work and effort that has been spent to date on this project that is just beginning to show progress -- not only for salmon but for other critical migrating and non-migrating species.

Having spent the past 2 ½ years conducting careful due-diligence, researching the technologies and market forces driving the emerging Land-Based Aquaculture industry, it is clear that Maine is at an inflection point.

Managed properly, this fledgling industry can contribute much to Maine's economy and general prosperity. However, the inverse is also true. If we fail to rise to the challenges in front of us, recovery may not be an option. The risks are that high, and the potential for reward is still vague.

The emergence of this new industry bears a striking resemblance to the “boom and bust” cycle that Silicon Valley went through in the 1980's-1990's, with one important difference. Those fledgling industries were not so tightly coupled to and dependent on the public's natural resources held in trust by the State .

INTRODUCTION & METHODOLOGY:

I am submitting this letter to Mr. Duchesne, as input for the upcoming decisions that are before the Board of Environmental Protection regarding the permits and licenses currently under consideration. These decisions weigh heavily, will have significant impact, are interrelated, and the decision making time is very short; therefore I am distributing this input more broadly.

By way of introduction, I and my husband David L. Sprague built our retirement home over 20 years ago in Belfast. He and I retired from very active careers in technologies research and development, and corporate business development careers. Prior to retirement, I worked as a Business Development Manager at Intel Corp, reporting directly to the Founder of Intel Capital, Avram Miller.

Mr. Miller, together with Les Vadasz Intel's then CFO, managed and grew Intel Capital to a \$60 Billion strategic investment organization by evaluating and partnering with over 400 companies. Those partnerships yielded either outright acquisitions or equity investments.

Prior to my work at Intel, I was an International Marketing Manager for GE. Before that I was Applications and Product Manager for computer based multimedia systems at RCA's David Sarnoff Research Center, Consumer Electronics Division in Princeton, New Jersey.

My research into land-based aquaculture began with the review and comment on the Whole Oceans effluent permit, in regard to its environmental impacts and its relation to aspects of the Clean Water Act. I then focused on the industry more broadly, as it became clear that in addition to Whole Oceans and Nordic Aquafarms, Maine would become a beacon for a plethora of potential licensees.

I have spent the last few years visiting facilities first hand including Sustainable Blue in Nova Scotia, interviewing CEO's and Chief Technology officers including those from AquaMaof, and KingFish Zeeland. I subscribed to and voraciously read the various trade journals such as IntraFish, Salmon Business, and Hatchery International.

Additionally, I attended almost every public meeting and presentation held by Nordic Aquafarms in Belfast, and KingFish Zeeland in Jonesport. I have combed through countless scientific articles on fish virology, algal blooms, tidal and current stratification from NOAA and other sources. Reviewed the various patent applications filed by Nordic. Read through the trade journal reports on spot market pricing for salmon and the ups and downs of a variety of operators and operations in aquaponics, net-pen farming, and open & closed RAS

systems. Read through translated technical materials including veterinary and fish health reports from Norway, Denmark, and the EU.

After reviewing hours of investors conference video's and investment presentation materials from Atlantic Sapphire, Nordic AS, and Nordic Inc. the picture has become clearer and leads to my findings below.

FINDINGS:

The primary financial driver in this emerging industry, just as in other emerging high-tech industries, is the endeavor to reach an Initial Public Offering (IPO)

The preeminent example of this can be found by reviewing the last years progress made by Atlantic Sapphire growing salmon in a Zero Liquid Effluent to Surface Water configuration in Florida. (Their effluent is sent to a sub-aquifer boulder-field beneath their facility.. It is also the best example of a disruptive technology company that shook the industry with it's novel approach. Atlantic Sapphire did their pilot R&D project in Denmark, and still maintains a facility there that is growing out salmon for the broader market. They chose a path and methodology that was not obvious to anyone. In return their primary early investors, and their current publicly traded stocks have thus far proven successful.

The emergence of a 40% “resource use tax” on both net-pen and land-based aquaculture in Norway is the primary driver for the rush to establish factory “beachheads” in the US.

The complications of this “resource use tax” would be added not only to the capital gains tax and “biomass” tax reporting strategies that have been traditionally used in the net-pen industry but would also be applied to new land-based industries along with significant real-estate taxes. While much has been made about the desire to reduce air freight charges for shipping salmon into the US market as a move toward “sustainability”, that reason pales in comparison to what will drive profit margins. Most seafood is and will continue to be distributed primarily using air-freight for anything other than short trucking distances, until smaller facilities of 5,000-6,000 metric tons are located close to urban areas.

Zero Liquid Effluent discharge operations are the Best Practice and in commercial use today for raising and selling fin-fish including salmon.

These companies include Sustainable Blue, who utilize their licensable technologies and methodologies to grow-out Atlantic Salmon in salt water. They are selling their salmon throughout Nova Scotia and New Brunswick Canada.

I have spent several days at Sustainable Blue's 55 acre farm in Nova Scotia, inspecting their hatchery, smoltification and grow-out operations. Their President/CTO described how their system could be utilized by Whole Oceans, Nordic Aquafarms, KingFish Zeeland and others. Sustainable Blue has a clever method for sterilizing all incoming water using ozone, recovering, reusing the ozone, and never sending out any liquid effluent. All fresh and salt water is 100% recycled. The only water that leaves the facility is contained in the harvested fish and the only water intake required is to replace the water in those harvested salmon along with a small amount lost to evaporation or splash.

They are currently selling their fish through their retail/whole distributor Afishinado. Head on Guttled (HOG) 7-8 pound salmon are selling for (US) \$60, and their skinned and 8 oz. filleted salmon for approximately (US) \$8. I have tasted their fish by selecting randomly from a list of several restaurants in Halifax which purchases their fish wholesale, and found it tasted great. The metric from Sustainable Blue is they need .6 acres (just over ½ acre of land) to grow-out 1,000 metric tons of fish. They do not vaccinate or treat their fish with antibiotics or antifungals as the fish are in a constantly sterilized environment.

In Wisconsin, Superior Fresh combined their salmon grow-out with aquaponic gardens. They sell the harvest fish into retail groceries within a range of approximately 200 mile radius and their greens into retail outlets like Whole Foods as far away as Nebraska and Michigan. They are in the process of expanding. It should be noted that aquaponics can be used to grow not only fresh vegetables but sea-vegetables and estuary restoration plants like eelgrass as well.

Based on my discussions with AquaMaof's CTO they will target their Zero Liquid Discharge operations, as others are also planning, to grow out microalgae for use as fish-food and bio-fuels. Like most operators I spoke to, they are targeting between 5,000 metric tons and 6,000 metric tons as the "sweet spot" for scalability.

Zero Liquid Discharge is not an "after-thought" or an "after-filter". The complex nature of a land-based Closed RAS (CRAS) facility and operation must be accommodated in the initial design.

To date only one effluent permit and license has been let the State of Maine, to Whole Oceans, and as it was based on The Conservations Fund/FreshWater Institutes original design model with multiple round tank configurations. Whole Oceans is also now headed by a new CEO who came from Pranger, and Pranger has purchased Hydronov one of the most experienced hydroponic operators worldwide. Thus the facility is well suited to a Zero Liquid Effluent approach. Over the last two years the dense cold salt water barrier that is preventing further dispersion of mercury into the Penobscot Bay has only gotten more

vulnerable due to warming and changes in tidal currents. Therefore, a Zero Liquid Discharge facility would seem to be a prudent path to follow at this site.

To date Nordic Inc. has presented little in the way of confidence building that it's design based a small number of very large tanks can even be built properly let alone operated successfully as it's design continues to change.

The elongated race-track shaped tank is problematic from a design standpoint in terms of laminar flow and biologic uniformity. Going from a .4 micron filter to a new regime that now calls for .04 micron filtration without updating their previous estimates of pump size, flow rates, maintenance and system software design and testing is dubious. Given the failure of Nordic's single source freshwater filtration system in it's Fredrickstad facility has yet to be solved it does not bode well for a far more complex configuration. Nordic has claimed that it has never had any fish that needed antibiotics or therapeutic treatments but they have not yet raised salmon to full grow-out which is the point at which these diseases become evident.

One mega-factory that uses 16 tanks, and will vaccinate and process their fish using the most automated systems available is hardly the definition of " sustainable job creator" for the State.

Rather, the State of Maine is well poised to accomodate a large number of facilities, which distributes the biologic risk of single farm internal contamination, and distributes the potential benefits of thriving land-based aquaculture operations throughout it's communities. Promoting not only more community economic benefits, but driving innovation as well.

Maine's brand of clean water and pristine shorelines is at stake. Maine's coastline is vastly different from most others in the U.S., which makes Maine uniquely wonderful but also uniquely vulnerable. Our coastline does not rapidly drop off to deep ocean currents until you reach the narrow outflows of the Georges and Browns Banks on the far eastern side of our Gulf.

Rather, our coastline consists of 3, 000 miles of deeply undulating coast of shallow rocky and muddy banks, with a few precious sandy swimming coves. Those deeply carved shorelines and sandy coves are not simply mainland features, but are also defined by the vast necklace of islands that are quintessentially Maine. Some like those at and surrounding Roque Island Downeast, are stunningly beautiful. All of this, together with our increasingly challenged rivers and aquifers, is what is at stake.

If we are to truly kickstart this Land-Based industry, it is imperative that the best methodologies be applied right at the beginning. The decisions that are to be made over the next weeks and months will either set the stage for a thriving, ecologically sustainable source of revenue and jobs or not

There are no “empty gold mines”. Every operator has at one time or another said the exact same words to me “we will do what Maines regulatory agencies say we must do”. These operators aren’t going anywhere else fast, and if they do, others will be more than happy to take their place. There is the time to do the “right thing”, and go for the “win-win”.