NOTE TO PUBLIC
PUBLIC COMMENT SUBMITTED TO CITY - APRIL 17, 2018 PUBLIC HEARING
PROPOSED ORDINANCE AMENDMENTS REGARDING THE NORDIC AQUAFARM PROJECT

The City of Belfast is accepting public comment for the upcoming April 17 Public Hearing on proposed Ordinance amendments regarding the Nordic Aquafarm project via email and letter. The Council also will be accepting verbal comment at the April 17 Hearing. This folder includes public comment that has been received to date regarding the project. As additional comments are received, the City will update this section of the site from time to time.

The initial information was posted on April 10 and includes public comment that was submitted between the dates of March 21 and April 9. This folder includes a list of the information submitted between certain dates and then the specific comments that were submitted (bundled together).

Questions regarding this information should be directed to Wayne Marshall, Director, Code & Planning at 338-1417 x 125 or at wmarshall@cityofbelfast.org.

APRIL 17 PUBLIC HEARING - NORDIC AQUAFARM ORDINANCE AMENDMENTS
LIST OF PUBLIC COMMENT RECEIVED FROM MARCH 21 TO APRIL 2

The following public comment has been received via email or via letter regarding the April 17 public hearings associated with Ordinance amendments for the Nordic Aquafarm project between the dates of March 21 and April 2, 2017.

- Sid Block, April 2 email, (Northport)
- Mike Silverton, March 31 email (Belfast)
- Penny West, April 1 email (Belfast)
- Ryan Drake, March 31 email (No address listed)
- Marsha Smith, March 29 email (I believe she lives in Camden)
- Philip Prince, March 28 email (Belfast)
- Sandra L. Haire, PhD, March 26 email (Belfast)
- Sid Block, March 25 email (Northport)
- Nancy Caudle-Johnson, Arborist, Treekeepers, LLC, March 22 Fax (Camden)

Comments are provided following this list in a single combined file.

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Nordic Aquafarms Meetings

2 messages

Block <smblock@myfairpoint.net> Mon, Apr 2, 2018 at 8:55 AM
To: planner@cityofbelfast.org

Dear Wayne,

As you know, I am very interested in the progression of the proposed Nordic Aquafarms project. Can you advise me of the next City Council or Planning Board (or any other meetings) regarding the project that are scheduled and to which I might attend?

I checked on line for the City Council and Planning Board agendas but came up empty-handed.

Thank you very much,

Sid Block

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 2, 2018 at 10:55 AM
To: Block <smblock@myfairpoint.net>

Hello Sid

The next Council meeting at which the zoning amendments and other amendments is scheduled for consideration is Tuesday, April 17. We are posting the official public hearing notice (see attached) tomorrow, and will have updated information on the City website under Nordic Aquafarm Information Page on Wednesday. That said, the information we posted for the Council's March 20 public hearing is essentially the same as will be considered on April 17th, with the only exception being the date of the sunset provision in the Zoning Ordinance. The Council changed the sunset date from December 31, 2021 to December 31, 2019.

Also, the Planning Board does not have an active role in this project at this time. The Planning Board will not play any role until a permit application may be submitted by Nordic Aquafarms.

Let me know if any questions.

Wayne
[Quoted text hidden]
--

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

fish farm

5 messages

Mike Silverton <hensteeth@aol.com> Sat, Mar 31, 2018 at 7:54 AM
To: wmarshall@cityofbelfast.org

Mr Marshall, the objections raised over the establishment of a fish farm in Belfast have validity.I'd go so far as to call them urgent.

Ground water in much of the country is dangerously high in contaminants and no little of it is downright undrinkable. It would be a pity and a shame to contaminate ours -- to what degree would remain to be seen, alas, ex post facto.

Route 1, an interstate highway, more closely resembles a county road in our area. The truck traffic the fish farm would likely require is the last thing a modest road and drivers need.

Belfast's attractions are many and diverse, not least of which is the area the fish farm would occupy. I doubt that aesthetics is on the fish-farm developers' minds.

Surely other activities and industries can create the jobs the fish farm would have required.

So, from this Belfast resident, an emphatic NO!

Thanks for taking the time to read this. Regards,

Mike Silverton
86 Church Street
338 5585

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 1, 2018 at 1:32 PM
To: Mike Silverton <hensteeth@aol.com>

Dear Mr. Silverton:

Thank you for submitting your comment. I will include your comment in the official public record and I will provide copies to all City Councilors. The next public hearing on this issue is scheduled for Tuesday, April 17 at 7:00 pm at the Council Chambers.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

Mail Delivery System <MAILER-DAEMON@aol.com> Sun, Apr 1, 2018 at 1:33 PM
To: planner@cityofbelfast.org

*** ATTENTION ***

Your e-mail is being returned to you because there was a problem with its delivery. The reason your mail is being returned to you is listed in the section labeled: "----- The delivery status notification errors -----".

The line beginning with "Diagnostic-Code:" describes the specific reason your e-mail could not be delivered. The following lines contains the RFC822 header of the original email message.

Please direct further questions regarding this message to your e-mail administrator.

--AOL Postmaster

----- The delivery status notification errors -----

< hensteeth@aol.com>: host lmtp.mail.aol.com[10.96.116.150] said: 554 5.7.1 Your mail could not be delivered because the recipient is not accepting mail that contains specific words or phrases.If you feel you received this in error, please contact the recipient directly and ask them to check their email settings. (in reply to end of DATA command)

Final-Recipient: rfc822; hensteeth@aol.com
Original-Recipient: rfc822;hensteeth@aol.com
Action: failed
Status: 5.7.1
Remote-MTA: dns; lmtp.mail.aol.com
Diagnostic-Code: smtp; 554 5.7.1 Your mail could not be delivered because the recipient is not accepting mail that contains specific words or phrases.If you feel you received this in error, please contact the recipient directly and ask them to check their email settings.

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Fish Farm: please no

2 messages

Penny West <penelope7west@gmail.com> Sun, Apr 1, 2018 at 11:08 AM
To: wmarshall@cityofbelfast.org

Dear Wayne,

I am concerned that the Salmon Farm will be a bad thing for Belfast. We have already done the slaughter of thousands of chickens here. To have captive fish, swimming in circles, killed, packaged and trucked out seems like a sad mistake for Belfast to make.

"Come to Belfast we take the wild out of Maine". Will the fish be genetically modified: for fish-like protein. Once the firm is here it will be hard for the City to monitor there every move.

Our town has a certain scale of building, this installation will squat over some of our lovely Little River watershed acres near approach to the town. Bucksport already had a huge lumber mill, and I am rarely enticed to stop there for any reason. Hold your nose and keep driving.

Will it really decease property taxes? Front Street Boat yard did not make any difference to me either on Maine Street or at my residence. I pay more in than my brother in Washington DC who has a three story brick home in a fine neighborhood. I bet if the city gets more money to disperse, projects will appear.

there is a lot of land down east where such a plant could be planted without ruining a town, any town. Fish could be shipped by ship out of Eastport direct to the east coast markets: Boston, New York, Philadelphia, an save our roads and bridges.

waste, water, I remember the chicken packaging plants: wholesale butchers breed a hard sort of worker: do we want this as a future for our school children.

Yes, I eat meat and fish, and yes I have the luxury to live in Maine where I can either raise my own or find humane sources for my protein needs.

Yes, there are a lot of us humanoids out there and in a capitalist system we should let other nationals come, buy our land, build ugly buildings, make a killing with the big salaries going out of the country.

Yes, I am flattered that a lovely country like Norway thinks Belfast might be a good place do business.

Boats: they can do the fish in Norway where there is also plenty of fresh and salt and brackish water, and put it on boats to the US markets.

we didn't even want Walmart or the Tank here.... yes we have something special. and we might be flattered that others want it/recognize it. But our land, culture and status as a Vacation town is fragile and easily trashed.

if you travel out of the state, or to the more developed Maine towns..... don't you hate the sprawl of industry, minimalls, shopping centers that only look new for five years and then head down the economic slide?

the benefit to Belfast of the Salmon Fish Farm eludes me.

--
Penny West

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 1, 2018 at 1:28 PM
To: Penny West <penelope7west@gmail.com>

Hello Penny

Thank you for your email and sharing your thoughts. I will include your comments in the official public record for this project and will provide such to the City Council in advance of the next public hearing.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

BFD

2 messages

Ryan Drake <ryan_s_drake@hotmail.com> Sat, Mar 31, 2018 at 10:18 AM

To: Wayne Marshall <wmarshall@cityofbelfast.org>

Sir;

It seems rather STUPID TO WASTE public time debating the use of plastic bags (NOT "one-time use," BTW); they get reused ALL THE TIME by those with enough brains to do so and not waste PUBLIC TIME on BS about their existence! That having been said, getting RID OF STYROFOAM in ANY FORM is a great idea...Apparently some fools want to split hairs over different types of this POLLUTANT, well then let's just ban it all for food & beverage distribution all-together.

Nordic Comment

With regard to the salmon farm, I agree that the property SHOULD BE LEASED to the company interested in HELPING us with the EXORBITANT TAX RATES. Naturally, the neighbors are not going to want things changed AT ALL from the way they are used to but we all experience that from time to time; as long as it is a positive change that is done tactfully (like leasing the Little River property to the aquafarmers rather than THROWING AWAY municipal leverage by selling out) it IS WORTHY of our community.

Anyway, thanks for all of your hard work, DEDICATION, sacrifice and assistance in making our city so fabulously fantastic and GREAT!!!

Most Appreciatively;
--R. Drake, Erin Herbig & our friends in AND around Belfast

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 1, 2018 at 1:35 PM

To: Ryan Drake <ryan_s_drake@hotmail.com>

Dear Mr. Drake:

Thank you for submitting your comment. As your comments also involve the Nordic Aquafarm project, I will include such in the official public record and will provide copies of your comments to the City Council .

I also thank you for your kind comments about me.

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

salmon farm

3 messages

Marsha Smith <marsha@midcoast.com> Thu, Mar 29, 2018 at 2:41 PM
To: wmarshall@cityofbelfast.org

Passing along this information. Why Farmed Salmon Is a Toxic 'Junk Food'

Regards,
Marsha Smith

Wayne Marshall <planner@cityofbelfast.org> Thu, Mar 29, 2018 at 4:54 PM
To: Marsha Smith <marsha@midcoast.com>

Dear Ms. Smith.

Thank you for the link. I will ensure that the City Council is aware of and has access to the link.

I do note that this analysis is based on pen raised salmon in a marine/ocean environment, and that the Nordic Aquafarm project is a land based salmon project. Eric Heim, President, Nordic Aquafarm has noted that they do not use pesticides or antibiotics in their operations, and that there is no likelihood of sea lice because the salmon are not being raised in the ocean.

Wayne.
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

Beedy Parker <beedyparker@gwi.net> Thu, Mar 29, 2018 at 7:01 PM
To: planner@cityofbelfast.org
Cc: marsha@midcoast.com

Hello Wayne Marshall

I am happy to believe that the landlocked salmon farm might be environmentally sound, and not a threat to the health of wild salmon, as the sea pens were, however, using so much wild fished seafood, to make the farmed salmon feed, is a threat to the world fisheries. I also felt that the farmed salmon eaters ought to realize the farmed salmon as a food for humans is not nutritionally equivalent to the oily wild fish that we are advised to eat (I actually think we should slow down because the fisheries are so threatened), because the feed is so different from the wild food (which is why wild salmon meet is pink but farmed salmon have to have color added artificially)

Thank you

Beedy Parker, Camden

From: Marsha Smith [mailto:marsha@midcoast.com]
Sent: Thursday, March 29, 2018 5:29 PM
To: beedy parker
Subject: Fwd: salmon farm

from Belfast

M.

Begin forwarded message:

From: Wayne Marshall <planner@cityofbelfast.org>

Subject: Re: salmon farm

Date: March 29, 2018 at 4:54:56 PM EDT

To: Marsha Smith <marsha@midcoast.com>

[Quoted text hidden]

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

re: Nordic Aquaculture

2 messages

Philip Prince <pap.1@myfairpoint.net> Wed, Mar 28, 2018 at 1:52 PM
To: planner@cityofbelfast.org

hello– this question may have been asked and I missed it:

Are the proposed zoning changes regarding Nordic Aquaculture specific and exclusive to Nordic Aquaculture?

Thank you, Philip Prince. Belfast --

Wayne Marshall <planner@cityofbelfast.org> Wed, Mar 28, 2018 at 2:27 PM
To: Philip Prince <pap.1@myfairpoint.net>

Dear Mr. Prince.

No, the proposed zoning changes are not specific and exclusive to Nordic Aquaculture. That said, the proposed amendments are only being considered by the City Council because of the current proposal that Nordic Aquafarms intends to submit to the City. To that end, the Council has directed that the proposed amendments include a 'Sunset Provision'; meaning that if a Permit application is not submitted by December 31, 2019 that the zoning ordinance (Chapter 102 of City Code) amendments would expire and would revert to the prior zoning ordinances that were in effect (see attached language, in both word and pdf).

I hope that this information helps. If you would like to discuss further or have other questions please feel free to send another email or to give me a call.

Wayne

.

[Quoted text hidden]

--

Wayne Marshall
Director, Code & Planning
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131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Comments on proposed Nordic Farms development

3 messages

Sandra Haire <shaire@eco.umass.edu> Mon, Mar 26, 2018 at 6:36 PM
To: planner@cityofbelfast.org
Cc: mayor@cityofbelfast.org

26 March 2018

To: Wayne Marshall (cc: Mayor Paradis)
Director of Code & Planning
City of Belfast
Belfast, Maine

Subject: Comment on proposed development by Nordic Farms

I am writing to advocate for wide solicitation of public comment regarding the proposed salmon farm development, and to recommend a role for science in assessing its potential impacts. Thus far, both of these information-gathering processes have been insufficient to provide a solid background for decisions. I urge you NOT to approve zoning changes, given this lack of information.

A project of this magnitude deserves careful consideration, given its demands on and alteration of the natural resources on which all life depends. These resources include available clean air and water, and habitats for native fish and wildlife.

In addition, a socio-economic assessment is needed to understand the effects of a large, non-local business utilizing resources in ways that may compete with local fishing industries, including the Fishermen's Cooperative at Port Clyde, as well as traditions and livelihoods of Indigenous Peoples.

Furthermore, a climate-adaptation plan is now critical for every coastal community, with current and proposed land use a central component. The influences of salmon farm development on local and regional ecology and economy require evaluation in the context of a changing climate.

Fortunately, our community members hold a wealth of local knowledge acquired from many years of living and working along the mid-coast. Moreover, there are many local experts in fields including climate-adaptation planning, ecosystem conservation and management, and local and regional economics whose opinions could be brought to bear on these important issues.

In a forward-thinking community like Belfast, we cannot rely on regulatory agencies alone to decide whether or not this new facility should be allowed to go forward. It is our responsibility as citizens and public servants to take a deliberate and systematic approach to gathering information, so that decisions are based on a solid foundation of knowledge. Otherwise, we are following the whims of politics and profits in lieu of a well informed view that we can advance with confidence and pride.

Sincerely,

--
Sandra L. Haire, Ph.D.
Research Landscape Ecologist

Haire Laboratory for Landscape Ecology
66 Village Rd.
Belfast, Maine

USA 04915
tel +1 413.362.4500
email shaire@eco.umass.edu

Wayne Marshall <planner@cityofbelfast.org> Mon, Mar 26, 2018 at 9:32 PM
To: Sandra Haire <shaire@eco.umass.edu>
Cc: Samantha Paradis <mayor@cityofbelfast.org>

Dear Ms. Haire.

Thank you for submitting your comment. I will ensure that your comments are part of the public record and that they are provided to all members of the City Council.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

Samantha Paradis <mayor@cityofbelfast.org> Tue, Mar 27, 2018 at 8:06 AM
To: Wayne Marshall <planner@cityofbelfast.org>
Cc: Sandra Haire <shaire@eco.umass.edu>

Dear Ms. Haire,
Thank you for your comment. As Wayne relayed, your comments will be part of the public record and available to all councilors.

Best,
Samantha

[Quoted text hidden]
--
Samantha Paradis, RN
Mayor
City of Belfast, Maine
(207) 338-3370 ext 146

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Re: A Question About the Salmon Farm Plans of the City Council

1 message

Samantha Paradis <mayor@cityofbelfast.org> Sun, Mar 25, 2018 at 8:49 PM

To: Block <smblock@myfairpoint.net>
Cc: Councilors <councilors@cityofbelfast.org>, Joseph Slocum <citymanager@cityofbelfast.org>, Wayne Marshall <planner@cityofbelfast.org>

Mr. Block,
Thank you for reaching out again. The questions and comments brought forward have certainly been important considerations for the council and myself. Many of the questions are things that we had not thought of before. The city staff is working diligently to provide as many answers as available as the process goes along. To date there has been no change in the contracts or agreements. We will have the second public hearing on the zoning changes on April 17th.

As more information becomes available we will strive to keep the public informed. Please continue to follow the city website at http://www.cityofbelfast.org/index.aspx?NID=366 For the most up to date information. There is a link to a March 23rd update from the company. In the update they share that they plan to preserve the water district building as a visitor center.

Best,
Samantha

cc: Councilors, Joe Slocum, Wayne Marshall

On Sun, Mar 25, 2018 at 10:30 AM, Block <smblock@myfairpoint.net> wrote:

> Dear Mayor Paradis,
>
> Regarding the proposed salmon aquafarm, by now the City Council has had a lot of exposure to various opinions and recommendations from public hearings, letters to the editors of local newspapers and direct citizen contact.
>
> My question at this time is whether any of this has in any manner influenced the Council, either directly or via the Planning Board, to request any changes in the established contracts or other agreements between the Belfast Water District, Nordic

Aquafarms and the City, and whether the City will make approval of necessary zoning changes contingent upon such changes.

Of course, I am especially interested in the scenic views from U.S. 1, but I am sure that others have voiced concerns and suggestions that the Council may have found to be of merit.

Please share this letter with the members of the Council, Joe Slocum and Wayne Marshall.

I will look forward to your response (and the response of any of the others who might choose to reply). Thank you.

Best regards,

Sid Block

--
Samantha Paradis, RN
Mayor
City of Belfast, Maine
(207) 338-3370 ext 146

JOHNSON'S ARBORICULTURE

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Cabling/bracing • Removals
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Workshops/training programs
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Nancy Caudle-Johnson
Douglas N. Johnson, Arborist
Maine licensed • Insured • ISA certified

TREEKEEPERS℠

FAX

DATE: March 22, 2018

TO: Joe Slocum, Samantha Lesser, Wayne Marshall

Of: City of Belfast

Fax #: 338-2419

FROM: Nancy Caudle-Johnson

Fax #: 236-6855

SUBJECT: Little River Dam & Pump House

This message has a total of 2 pages, including this cover page.

Will whoever receives this fax, please see that the three named above get copied as soon as possible?
Please phone me at 236-6855 if there are questions. Thank you!

NANCY CAUDLE-JOHNSON
43 Pearl Street
Camden, ME 04843
207-236-6855

DATE: **March 22, 2017**

TO: **Mayor Samantha Paridis**
City Manager Joe Slocum
City Planner Wayne Marshall
CITY OF BELFAST

FROM: **Nancy Caudle-Johnson, Arborist**
TREEKEEPERS LLC, Camden

RE: **Save Little River Dam and Pump House**

Probably Belfast residents aren't interested in hearing from a Camden person (although a proud Mainer since 1973), but here goes anyway.

Belfast has only two areas with beautiful scenery along historic Route One. The bridge with its breathtaking views of the Passie River and your wonderful city at the Northern Gateway. And the Little River Dam and Pump House which, for me (and, I'm sure, for many others) marks your Southern Gateway.

Although I've never walked back to the dam, that beautiful view is something I never miss when traveling either north or south. It is unique, it's yours alone, and it's seeming serenity combined with the wildness of the cascading water, soothes and delights me in all seasons. Personally, I love it and am pained to think that you Belfastinians (??), Belfasters (??) wouldn't care enough to save it for yourselves and the rest of us. I have no doubt that others -- residents, Route One commuters, and tourists alike have had a similar experience. So, DON'T BLOW IT NOW!

You have the opportunity to purchase it, protect it, interpret it, and preserve it as your city's Southern Gateway focal point. Win! Win! Win! Win! The historic brick structure in so many ways echoes the incredible brick buildings in your historic downtown. Right out there along the highway, its preservation and interpretation would communicate, in effect, "We in Belfast are embracing the future, but we also treasure our historical past -- the culture and history that brought us to where we are today."

I was so thankful when former Mayor Hurley and others stepped up to save former Route One -- now the walking bridge. Truly heroic. Such foresight and courage! Where else can one walk across a mighty river on a quiet summer night and feel (right near a city) alone for a moment in the universe -- gazing up at the moon and stars, imagining oneself far out at sea, and then turning and walking back toward the lights of a small historic city. For me, it is like being momentarily suspended in time.

Belfast -- look to your future, but honor your past. Please do this one small thing, now.

NORDIC AQUAFARM PROJECT REZONING
PUBLIC COMMENT FOR APRIL 17 PUBLIC HEARING
COMMENT RECEIVED FROM APRIL 2 - APRIL 8, 2018
From Wayne Marshall, Director, Code & Planning (April 8, 2018)

I previously sent the Council an email that identified and included copies of all public comment submitted by email or via letter regarding the Nordic Aquafarm project between the dates of March 21 (day after the First Reading public hearing on March 20) and April 2. This document identifies all public comment received between the dates of April 2 and 1:00 pm on April 8. I intend to provide printed copies of all of this information to you at the April 10 Work Session so you can include this comment in your respective notebooks. I also intend to post the comments that have been received on the City website (plan to do so by Wednesday).

The public comment and 2 reports/articles that were submitted are bundled together in 4 separate files in this April 8 email to the Council. Following is a list of the comment in the respective bundles.

<u>April 2-4 Comment on Nordic</u>

- April 2 Letter from B.K. Keller, Northport
- April 2 email from Betty Becker-Theye and two accompanying photos
- April 2 email from Sydney Block, Northport
- April 3 email from John and Wendy Krueger, Northport
- April 4 email from Harold Richardson, Belfast
- April 4 email from Dorothy Odell & the Undercurrent News article on Atlantic Sapphire (see article in a separate attachment)

<u>April 5 - April 8 Comment on Nordic</u>

- April 8 email and accompanying letter from Elle Daniels, Belfast
- April 8 email from Nancy Nutt, Belfast
- April 7 email and accompanying letter from Jerry Finch and John Holmes, Belfast
- April 7 email from Anne Matava, Seaside Drive, Belfast
- April 6 email from Mj Viano Crowe, Belfast
- April 6 email from Andrew Watkins, Belfast
- April 6 email and letter to the editor from Cynthia Anderson, Belfast
- April 6 email and letter to the editor from Janet Williams, Belfast
- April 6 email from Tom McKay, Belfast
- April 6 email from Natalie Charles, Belfast
- April 6 email from Jaap Helder, Belfast
- April 6 email from Kathy Kreamer, Belfast
- April 5 email from Lisa Sadler, Co-Housing, Belfast
- April 5 email from Joanne Moesswilde, Belfast
- April 5 email from Deborah Capwell, Belfast

Report entitled: The Evolution of Land Based Atlantic Salmon Farms, prepared by the International Salmon Farmers Association. This report was provided to the City by Ridgley

Fuller who requested that it be part of the official record. This is a 22 page report prepared in 2017.

April 2, 2018 article that appeared in the Undercurrent News entitled Atlantic Sapphire's land-based salmon farm on track for 2020 that was submitted by Dorothy Odell

To: Wayne Marshall, Director Code and Planning

I have been so happy to call Belfast 'my town' because of good decisions such as allowing our downtown to stay alive by keeping Walmart and discount big box stores out and the plastic bag and styrofoam ban. These decisions make me feel that I live in a progressive and environmentally healthy area.

I am surprised and very disappointed to read about the plan for the world's Largest Fish Factory Farm.

-First and foremost it would destroy one of the most beautiful spots in Belfast !!

-It will require tree cutting, construction and noise, all of which will destroy wildlife habitat

-There will be environmental impact on water quality and sea life if they choose to dig a tunnel into the middle of the bay for waste disposal

- Who will want to walk on the Little River Trail with a giant industrial farm taking up 40 acres ? It would totally change the character of what is now a beautiful trail in a beautiful and peaceful place.

-This area is known for small scale, local, organic farms and draws people here to farmer's markets and events. A factory farm feels very out of place. And the "pristine environment" that Nordic Aquafarms would purchase will no longer be "pristine".

PLEASE reconsider. Please don't destroy the beauty and habitat for $.

I understand the need for $ to help lower taxes, but please find another way, another business or help Nordic Aquafarms find a site that is already developed. There is a large industrial building across the street from Perkins Road, on the water and For Sale.

Please keep the Little River Reservoir area as it is.

Sincerely,
B.K. Keller
Northport

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Salmon farm

2 messages

John Krueger <jkrueg1@gmail.com> Tue, Apr 3, 2018 at 10:28 AM
To: "planner@cityofbelfast.org" <planner@cityofbelfast.org>

I live on the northport side of this project and will seek opportunities to also participate in this project. Can northport become an intervenor?

"Nordic Aquafarms Proposal
Nordic Aquafarms is offering to build a land based fish farm that is capable of providing 8% of the entire US salmon needs on a pristine reservoir near the Belfast Northport line. This is 5 times the size of the land based farm that this company has built in their own native Norway and perhaps one of the biggest such farms in the country. This seems BIG to me. BIG in the sense of land mass being cleared and made imperveous for this project, BIG in the sense of the amount of energy needs, BIG in the sense of the amount of feed and waste to be used, transported and disposed/recycled, BIG in the sense of the amount of water (either dechlorinated Belfast water district water or from drilled wells in the in Belfast and Northport area), BIG in the sense of traffic considerations on Route 1, BIG is the sense of potential for a single accident to create a long term environmental problem, BIG in terms of the 50 foot high buildings, and BIG in the sense of unknowns for a project this size. BIG for Belfast and the Mid-Coast in my opinion. Safer might be a smaller scale. Nordic Aquafarms would like the Belfast City Council to rezone this reservoir to industrial. The feasibility of this proposal begins with the Belfast City Council asking the right questions and their determination if this project, a proposed, is indeed too BIG right now for Belfast.

While the increase in the number of jobs is relatively minor, probably the biggest benefit to Belfast and indirectly for this region and the state is the increase in tax base. For example, if Nordic Aquafarms is assessed at $100,000,000 and the (~$16,450,000) budget stays the same, the mil rate would drop for Belfast to 0.019 from 0.0219 assuming also, that Nordic Aquafarms pays ~$1,900,000/year in taxes. As we have seen in the past, mil rates do not stay reduced as budgets must now increase as the state now wants to reduce subsidies that are property evaluation based. Industries also apply for state tax breaks. The largest state subsidies that typically will decrease are education and municipal revenue sharing. Also education and county assessments increase proportionally to property assessments. Without getting too technical, in Belfast between the years 2001 and 2017 the city property valuation tax base increased from $435,862,300 to $750,596,300 and yet the mil rate actually increased from 0.0213 to 0.0219.

Such a BIG decision is happening on a very fast track. Five years from now I hope we can all say that the Belfast City Council asked the right questions and made the right decision. We should make the time for participation by our Waldo County neighbors and involve professionals familiar with this new technology to assure that the right decisions are being made for the right reasons.

John and Wendy Krueger
Northport, Maine 04849"

--
John Krueger
207-322-6297
291 Rocky Road
Northport, Maine 04849
--
John Krueger
291 Rocky Road
Northport, Maine. 04849
207 338 8676
207 322 6297
Jkrueg1@gmail.com

Wayne Marshall <planner@cityofbelfast.org> Tue, Apr 3, 2018 at 10:36 AM
To: John Krueger <jkrueg1@gmail.com>

Dear John & Wendy Krueger

The City of Belfast City Council is accepting public comment from all parties. I will include your email comment as part of the public record that will be considered by the Belfast City Council at their public hearing scheduled for April 17, and I will provide this comment to them in advance of the scheduled hearing.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

the view from 286 Northport Ave

2 messages

Larry Theye <ldtheye@gmail.com> Mon, Apr 2, 2018 at 4:18 PM
To: Wayne Marshall <planner@cityofbelfast.org>

Hi Wayne,
Can't help trying to soften the blow of losing the bucolic area of the Belfast Water District.

The attached photos are of the copse of mature pines we see from our house (two views: one winter, one today). Preserving these pines would maintain screening that is not easily replaceable along the Route 1 entrance to Belfast.

bbt
Betty Becker-Theye

"it's doesn't take much to see that the problems of two little people don't amount to a hill of beans in this crazy world."
Rick to Ilsa in the movie *Casablanca*

2 attachments

100_0439.jpg
2892K

100_0448.jpg
1624K

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 2, 2018 at 4:49 PM

To: Larry Theye <ldtheye@gmail.com>

Hello Betty

Thanks for the photos and comment. I will forward such to all of the Councilors. Your comment will be part of the formal record for the upcoming April 17 public hearing.

Wayne

[Quoted text hidden]

--

Wayne Marshall
Director, Code & Planning
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131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Fwd: Atlantic Sapphire's land-based salmon.pdf

6 messages

Samantha Paradis <mayor@cityofbelfast.org> Wed, Apr 4, 2018 at 11:45 AM

To: Wayne Marshall <planner@cityofbelfast.org>

Wayne,
Would you be able to include this in the public comment?
Thank you,
Samantha

---------- Forwarded message ----------
From: **Dorothy Odell** <dorothy.odell@gmail.com>
Date: Wed, Apr 4, 2018 at 11:43 AM
Subject: Re: Atlantic Sapphire's land-based salmon.pdf
To: Samantha Paradis <mayor@cityofbelfast.org>

Yes. We need to consider input from every available source.

On Wed, Apr 4, 2018, 11:33 AM Samantha Paradis <mayor@cityofbelfast.org> wrote:

> Thank you for sharing. Would you like to include this in the public comment for the upcoming hearing?
>
> On Tue, Apr 3, 2018 at 4:23 PM, Dorothy Odell <dorothy.odell@gmail.com> wrote:
>
> > This is from my son, who is the director of North American fisheries for the Nature Conservancy. After initial exuberance, I hear lots of people expressing reservations about the project. Aerial photos tell a lot.
> >
> > ---------- Forwarded message ---------
> > From: Jay Odell <jodell@tnc.org>
> > Date: Mon, Apr 2, 2018, 6:15 PM
> > Subject: Atlantic Sapphire's land-based salmon.pdf
> > To: dorothyodell@gmail.com <dorothyodell@gmail.com>, Dad <mainebanjos@gmail.com>
> >
> > Hi Ma & Pa

This (attached) is an article from a fisheries news service I subscribe to. Caught my eye because although it's about a new venture to develop land based salmon aquaculture in Florida, it makes reference to the Belfast project. And the discussion about the importance site suitability with respect to managing water supply and discharge was a little sobering – as I mentioned earlier, if you or your neighbors are getting involved in the planning of this you want to really make sure they have a solid plan for that.

Jay

--
Samantha Paradis, RN
Mayor
City of Belfast, Maine
(207) 338-3370 ext 146

--
Samantha Paradis, RN
Mayor
City of Belfast, Maine
(207) 338-3370 ext 146

Under Maine law, documents, including e-mails, in the possession of public officials or city employees about government business may be classified as public records. There are very few exceptions. A a result, please be advised that what is written in an e-mail could be released to the public and/or the media if requested.

Wayne Marshall <planner@cityofbelfast.org> Wed, Apr 4, 2018 at 11:50 AM
To: Samantha Paradis <mayor@cityofbelfast.org>

Hello Samantha

It will be part of the official record.

Wayne
[Quoted text hidden]
--

Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

Samantha Paradis <mayor@cityofbelfast.org> Thu, Apr 5, 2018 at 12:44 PM
To: Wayne Marshall <planner@cityofbelfast.org>

Thank you!
[Quoted text hidden]

Wayne Marshall <planner@cityofbelfast.org> Thu, Apr 5, 2018 at 3:34 PM
To: Samantha Paradis <mayor@cityofbelfast.org>

Hello Samantha

In looking at the email that you sent to me I did not see the aerial photo that was referenced in the email. Can you send me the attachment.

Many thanks.

Wayne
[Quoted text hidden]

Samantha Paradis <mayor@cityofbelfast.org> Thu, Apr 5, 2018 at 3:38 PM
To: Wayne Marshall <planner@cityofbelfast.org>

---------- Forwarded message ---------
From: Dorothy Odell <dorothy.odell@gmail.com>
Date: Tue, Apr 3, 2018 at 4:24 PM
Subject: Fwd: Atlantic Sapphire's land-based salmon.pdf
To: Samantha Paradis <mayor@cityofbelfast.org>, Mike Hurley <mike@pilut.com>

This is from my son, who is the director of North American fisheries for the Nature Conservancy. After initial exuberance, I hear lots of people expressing reservations about the project. Aerial photos tell a lot.

---------- Forwarded message ---------
From: Jay Odell <jodell@tnc.org>
Date: Mon, Apr 2, 2018, 6:15 PM
Subject: Atlantic Sapphire's land-based salmon.pdf

To: dorothyodell@gmail.com <dorothyodell@gmail.com>, Dad <mainebanjos@gmail.com>

Hi Ma & Pa

This (attached) is an article from a fisheries news service I subscribe to. Caught my eye because although it's about a new venture to develop land based salmon aquaculture in Florida, it makes reference to the Belfast project. And the discussion about the importance site suitability with respect to managing water supply and discharge was a little sobering – as I mentioned earlier, if you or your neighbors are getting involved in the planning of this you want to really make sure they have a solid plan for that.

Jay

--
Samantha Paradis, RN
Mayor of Belfast
mayor@cityofbelfast.org
207-338-3370 ext 146

Atlantic Sapphire's land-based salmon.pdf
810K

Wayne Marshall <planner@cityofbelfast.org> Thu, Apr 5, 2018 at 4:19 PM
To: Samantha Paradis <mayor@cityofbelfast.org>

Thanks.
[Quoted text hidden]

--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Council mtg

marci@tds.net <marci@tds.net> Wed, Apr 4, 2018 at 12:29 PM
To: ward1councilor@cityofbelfast.org, ward2councilor@cityofbelfast.org, ward3councilor@cityofbelfast.org, ward4councilor@cityofbelfast.org, ward5councilor@cityofbelfast.org, Joseph Slocum <citymanager@cityofbelfast.org>, mayor@cityofbelfast.org, Wayne Marshall <planner@cityofbelfast.org>

Dear City Officials,
No reply is necessary. You've heard enough from me lately but I wanted to give you another pat on the back for the handling of the Nordic proposal so far. The criticism is sure to pick up along with the rhetoric-much of it silly-but I'm sure you're up to the task. I understand that in the end this may not work out but I think until you find a deal breaker it's good to proceed as you are and facilitate the zoning and other issues to make this possible. The sooner you can get a proposed view from Rt 1 the better-I'm thinking that very little of this will be seen while driving by and just that will cut back on the naysayers. Whoever comes up with the millions of dollars to build this will surely make sure it's a viable concern.

Public works garage-I don't see anyone being against the new facility but I think you could make more out of putting the current site back on the tax rolls-maybe a good site for affordable housing

Not against tiny houses but these things in the paper lately are more like mobile homes cut in half and without foundations are not winter friendly. Most of the mobile home parks in Maine seem to look like the 1960's. A modest bit of landscaping could be required of the park owners and would make a huge difference.

Thanks
Harold Richardson

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Nordic Aquafarms Meetings

2 messages

Block <smblock@myfairpoint.net> Mon, Apr 2, 2018 at 8:55 AM
To: planner@cityofbelfast.org

Dear Wayne,

As you know, I am very interested in the progression of the proposed Nordic Aquafarms project. Can you advise me of the next City Council or Planning Board (or any other meetings) regarding the project that are scheduled and to which I might attend?

I checked on line for the City Council and Planning Board agendas but came up empty-handed.

Thank you very much,

Sid Block

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 2, 2018 at 10:55 AM
To: Block <smblock@myfairpoint.net>

Hello Sid

The next Council meeting at which the zoning amendments and other amendments is scheduled for consideration is Tuesday, April 17. We are posting the official public hearing notice (see attached) tomorrow, and will have updated information on the City website under Nordic Aquafarm Information Page on Wednesday. That said, the information we posted for the Council's March 20 public hearing is essentially the same as will be considered on April 17th, with the only exception being the date of the sunset provision in the Zoning Ordinance. The Council changed the sunset date from December 31, 2021 to December 31, 2019.

Also, the Planning Board does not have an active role in this project at this time. The Planning Board will not play any role until a permit application may be submitted by Nordic Aquafarms.

Let me know if any questions.

Wayne
[Quoted text hidden]
--

Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

---

2 attachments

PH Notice - Second Reading - NAF - April 17, 2018 CC Mtg..docx
15K

PH Notice - Second Reading - NAF - April 17, 2018 CC Mtg..pdf
21K

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Information and Concerns

2 messages

ellie@greenstore.com <ellie@greenstore.com> Sun, Apr 8, 2018 at 9:41 AM
To: Wayne Marshall <wmarshall@cityofbelfast.org>
Cc: Ellie Daniels <ellie@greenstore.com>

Hello Wayne,

I have been delving into the issues surrounding the proposed Salmon Farm. The attached information is regarding water use and discharge concerns. Kindly share it with the Councilors, Mayor, City Manager, and other concerned parties well in advance of the 4/17 meeting.

I want to express that my largest concern is the size of this proposed farm. The studies that informed my figures here are gleaned from reports of currently operating land-based fish farms of MUCH smaller scale, from 300-1,000 tons. It is deeply concerning that the City might vote to bring about a zoning change and to open a door to next steps for a theoretical, unproven, and massive scale proposal such as the one in front of us.

In the course of my research, I want to share that Washington State recently placed a moratorium on all fish farms pending further study of environmental, fish welfare, and public concerns.

Thank you for your attention,

Ellie

Ellie Daniels
The Green Store, Inc.

(207) 338-4045 x2 Work
ellie@greenstore.com

71 Main St.
Belfast, Maine 04915

4_7_18 Water and Discharge.docx
19K

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 8, 2018 at 1:46 PM
To: ellie@greenstore.com

Hello Elle

Thanks for submitting your comments and your letter, both of which are now part of the formal hearing record. I will be providing such to the City Council this week in advance of the upcoming April 17 public hearing.

On behalf of the City,

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

Land Based Fish Farms:

Facts and Concerns about Water and Discharge

The land-based fish farm being planned by Nordic Aqua Farms (NAF) would be the largest such facility in the world, raising up to 33,000 tons of salmon a year at full production. This facility is 16 times larger in scope than NAF's initial project in Norway, which is not yet at full production. In short, many questions that have been raised concerning the operation of such a facility can only be answered in theoretical models. A project of this magnitude has never been accomplished before.

However, land-based aquaculture has been extensively studied at smaller scales. A number of concerning issues have been identified by the International Salmon Farmer's Association (ISFA) in their report released in 2017, in which they studied Recirculation Aquaculture Systems (RAS) in Canada, France, the United States, Denmark, China, and Norway. RAS is the technology that is being proposed for the Belfast Salmon Farm. It will also use a mix of salt and fresh water, the proportions of which are not yet known.

http://www.salmonfarming.org/cms/wp-content/uploads/2015/02/ISFA_LandFarmingreport_web.pdf

NAF is prepared to buy a **minimum of 100 million and a maximum of 263 million gallons annually** from the Belfast Water District. While this number of millions of gallons may sound like a lot, calculations drawn upon the ISFA report for the total amount of water required to grow 33,000 tons of salmon annually at full production are actually staggering.

- It will take **484 million gallons** of water to fill the tanks initially.
- Any time a pathogen occurs in any tank, the tank must be emptied, scrubbed and purified, and then refilled.
- When fish are ready for harvest, at approximately two years of age, there is a depuration process which requires a complete water change in the tanks every hour over a 10-day period, to rid the fish of musty growing water taste.
- Although it is not likely that all the fish would be harvested simultaneously, it can be calculated that in the first two-year period of growing fish to maturity, a depuration process for 33,000 tons of salmon would involve **11.6 billion gallons of water per day**, or **116 billion gallons over the 10-day process.**
- In RAS tanks, between 1% and 2% of water is lost every day due to filtration and evaporation. This amounts to nearly **5-10,000 gallons of water loss daily**, or between **1.8 and 3.6 billion gallons a year.**

In total, over a **two-year period**, if there was only one full filling of the tanks (which is a highly unlikely scenario), and one complete life-cycle of the fish ending in depuration, and an average loss of water in the tanks, this salmon farm being proposed for Belfast would use nearly **122 billion gallons of water.**

To put this number in perspective, a Portland Press article written in February of 2017 discussed Poland Spring's operations in Maine. Poland Springs at that time was operating in three locations in Maine, drawing 900 million gallons of water a year, and was seeking a fourth location in order to be able to produce up to **1.3 billion gallons.**

What happens when that much water is drawn out of the ground? There are numerous sources that address this question, but here are two of them: www.usgs.gov/edu/gwdepletion.html , and www.groundwater.org.

- As the water table in the aquifer drops, it potentially results in neighboring residential wells diminishing their flow or going dry.
- A void is created in the aquifer, which pulls other water into it, particularly from nearby streams or ponds, such as the Little River and Reservoir. Any contamination existing in neighboring bodies of groundwater will also be pulled in.
- Streams and ponds are replenished by rain and snowmelt, but also by drawing water horizontally from aquifers. As the water table drops, the flow is diminished or stopped.
- Saltwater intrusion can occur, particularly if there is proximity of the aquifer to ocean water. As fresh water is drawn out more quickly than it can replenish, a balance is lost making it inevitable that saline water will be drawn in.
- When large amounts of water are drawn quickly out of an aquifer, the underground void can result in sinkholes and other dramatic alterations of the topography.
- 484 million gallons of water weighs 4.2 billion pounds

Finally, there are still numerous questions regarding the discharge that will flow into Penobscot Bay, and the 90% of solids that NAF believes it can effectively remove before discharge. The state of Maine has specific concerns and criteria for discharge into the marine environment. www.main.gov/dep/water/nutrient-criteria/index.html

In marine environments, excess nitrogen can:

- Cause blooms of algae and phytoplankton
- Cause loss of marine vegetation which provide habitats for young fish and invertebrates
- Decrease oxygen concentrations in bottom waters and affect fish and shellfish
- Cause declines in commercial fisheries

The summary conclusions that the ISAF made after analyzing numerous case studies of existing land-based aquaculture operations are:

- There has been some success in smaller-scale projects of between **300-1,000 tons**.
- There is ongoing research and development to make RAS feasible on a commercial scale.
- There needs to be responsible use of limited fresh water supplies.
- There are challenges to fish health and welfare, and demonstrated symptoms of stress in tanks.
- The energy footprint of land-based farms is large, representing **263 pounds of carbon footprint for every pound of fish grown.**
- There are **quantifiable ecological impacts** to land-based fish farms.

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

salmon farm

2 messages

Nancy Nutt <nancynutt3@gmail.com> Sun, Apr 8, 2018 at 11:18 AM
To: planner@cityofbelfast.org

Dear Sir:
I live in Belfast and I have many concerns about the possibility of a large operation like the Nordic Aquafarms coming here to "set up shop".

1. Why the hurry to move this very large project along?

2. Where is the wisdom in re-zoning a beautiful natural setting to accommodate a business that is coming from across the globe to set up a facility to do land-based salmon farming on a scale that is beyond anything that has been done before. Why have they chosen Belfast, Me.??

3. And not only Belfast which stands to lose the character and ambiance that attracts so many people who want to live here, but what of the bay. Penobscot bay --- there will be serious impacts on this beautiful body of water, regardless of what may be said to the contrary.

In all good conscience I respectfully ask the city councilors to vote not to approve this project until and unless there is much time and further effort put into studying the impact it could have on our city and the bay and surrounding area.

Respectfully yours,

Nancy Nutt

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 8, 2018 at 12:35 PM
To: Nancy Nutt <nancynutt3@gmail.com>

Dear Ms. Nutt:

Thank you for submitting your comment. Your comment is now part of the official record for the upcoming April 17 public hearing to be conducted by the City Council and will be provided to them in advance of the hearing.

On behalf of the City,

Wayne
[Quoted text hidden]
--

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Aquafarms Zoning

2 messages

Jerri Finch <jerri@jerrifinch.com> Sat, Apr 7, 2018 at 6:19 PM
To: planner@cityofbelfast.org
Cc: mcushman@cityofbelfast.org, wmarshall@cityofbelfast.org

In preparation for the next meeting, I am re-sending the attached letter from John and I. As almost abutters, our voice should count. And, we are not opposed, as long as that Sunset Provision for zoning is in place. Thank you. John and Jerri Holmes.

FINCH GALLERY

207-338-1060

www.jerrifinch.com

www.facebook.com/finch.gallery

Zoning Nordic Aquafarms b.docx
13K

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 8, 2018 at 12:39 PM
To: Jerri Finch <jerri@jerrifinch.com>, Manda Cushman <mcushman@cityofbelfast.org>

Hello Jerri:

I have received your letter and it will be provided to the City Council in advance of the upcoming April 17 public hearing. I do note that the sunset provision is part of the Ordinance proposal.

Wayne

March 19, 2018 Hello Jerri

I will provide your letter to the Council for the March 20 Hearing.

I note that I have included a proposed 'sunset provision' that was requested by the Council in the draft Zoning Ordinance amendments. Under this provision, if an application to construct a salmon aquaculture farm is not submitted by December 31, 2021, the zoning for this area will revert to the zoning that is now in effect.

Thanks for your comments.

Wayne

On Sun, Mar 18, 2018 at 7:27 PM, Jerri Finch <jerri@jerrifinch.com> wrote:

Hello. Regretfully, John and I are unable to attend the Council meeting Tuesday evening of this week. I am hoping that you will forward this attached letter to anyone you think should read it. We appreciate your taking the time to do this, and thank you for considering our comments. Jerri and John Holmes.

March 18, 2018

Dear Wayne,

Thank you for your February 27 response to my email. John and I are cautiously optimistic about Nordic Aquafarms. We would support a zoning change to allow this project to move forward. Although there is a fair chance that the Aqua Farm will find the Little River/Caswell site one that fits their needs, and continue the proposed project, we would like to protect our neighborhood from unspecified commercial or industrial development in the case that the site will not work for them.

If the Council votes to amend the zoning ordinance as proposed, we are not protected if Nordic Aquafarms does not find the site suitable. We are requesting the proposed zoning changes be in the form of Contract Zoning, for this particular project only. If the Future Land Use Plan amendments are generic, we are opening the door to any type of industrial use for that land, and we will be wide open to another industrial project. That quite frankly, is scary to us.

Thank you for your consideration of our perspective.

Sincerely,

Jerri and John Holmes

33 Battery Road, Belfast, Maine 04915 207-338-1211

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

salmon farm

2 messages

Anne Matava <annematava@gmail.com> Sat, Apr 7, 2018 at 1:36 PM
To: wmarshall@cityofbelfast.org

Dear Mr. Marshall,

As a property owner and resident of Sea Side Drive, I would like to voice my concerns about the proposed change in zoning to accommodate a salmon farm near my home.

This is a residential area. We understood of course when we purchased the property that is directly off route 1, a main highway. At that time, though, the development nearby was reasonable and fit the setting. The idea of locating the world's biggest anything here, in this beautiful unspoiled little city, near so many homes, is ill-conceived.

As it is in the summer we have a hard time turning left onto our street. There is a lot of traffic coming the other way so we have to stop in the lane to turn. Cars come up quickly behind us; it is nerve-wracking. The last thing we need over here is a huge industrial operation with its trucks and employees coming and going.

I use the Little River Trail to walk my dog, especially in the winter. One of the things that makes Belfast so special is that, while it is a vibrant little city, one can be alone in nature within the city limits. I understand that the plan is to leave the trail available to the public. Personally I'm not interested in using it if that salmon farm is there.

There is a quality of life here in Belfast that, in my opinion, would be threatened by development of this scale. Up until this point growth has been reasonable and has protected the balance that we all value here. I moved here from Searsport in part because I trusted the Belfast city government to make sane decisions about this kind of thing.

Finally, I have to say that I resent the use of my property tax dollars to assist this Norwegian company as they forever change the landscape of my neighborhood.

One way to look at it is this: if you have to change the existing zoning to make it fit, it's probably not the right thing.

I'd be grateful if you would make my concerns known to the city council.
Thank you for your time.
Sincerely,
Anne Matava
7 and 9 Seaside Drive

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 8, 2018 at 12:41 PM
To: Anne Matava <annematava@gmail.com>

Dear Ms. Matava:

Thank you for submitting your comment and expressing your concerns. Your email is now part of the official record for the upcoming April 17 public hearing and will be provided to the City Council in advance of the hearing.

On behalf of the City,

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

NO to rezoning/NO to Nordic Aquafarms

2 messages

Mj Viano Crowe <maximittgreta@icloud.com> Fri, Apr 6, 2018 at 7:08 PM
To: Wayne Marshall <wmarshall@cityofbelfast.org>
Cc: ward1councilor@cityofbelfast.org, ward2councilor@cityofbelfast.org, ward3councilor@cityofbelfadt.org, ward4councilor@cityofbelfast.org, ward5councilor@cityofbelfast.org

Dear Mr. Marshall,
I oppose rezoning the 40 acres at the Water District from residential II to Industrial IV for Nordic Aquafarms. I oppose rezoning this land to accommodate a foreign entity whose business may or may not benefit the community. From what I've seen and read to date, the disadvantages far outnumber and outweigh any claimed advantages.
Mj Viano Crowe
12 Vine Street
Belfast, ME

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 8, 2018 at 12:29 PM
To: Mj Viano Crowe <maximittgreta@icloud.com>

Dear Ms. Crowe

Thank you for submitting your comment. Your comment is now part of the formal record for the upcoming April 17 public hearing to be held by the City Council.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Nordic Aquafarms Concerns/Queries

2 messages

Andrew Watkins <andrewwatkins.watkins@gmail.com> Fri, Apr 6, 2018 at 7:59 PM

To: wmarshall@cityofbelfast.org

Please pass along my concerns and queries related to the proposed Aqua Farm.

1. Comparative Ecology - What is the difference between "Seafood" and "Vatfood" (as you might call Salmon grown in a vat). Salmon has a particular lifecycle and ecological basis that is key to its chemistry and nutritive value. I am concerned that the product coming out of the aqua farm will be lacking in those qualities that make seafood the valued species that it is.
2. Highest best use - If economic development is the ultimate fate of that property, what is the best use for it and would it be prudent to seek other opportunities in order to see how they compare?
3. If we are looking for protein, might there be better options for development vectors such as 3d ocean farming?
    - https://www.greenwave.org/
    - Ted Talk
4. What LFA (Life Cycle Analysis) has been done on this type of "farming". It would be unfortunate indeed if Nordic Aqua Farms were to build this giant complex and then have to abandon it because the market they were looking for dried up or became inaccessible.
5. What would be a theoretical price point for Land-Based Salmon? Will this be affordable in Belfast or even in Boston?
6. What would be the economic multiplier of this facility and how would this benefit the current residents of Belfast?

Thank you for looking at these,

Andrew Watkins, Belfast Resident

Wayne Marshall <planner@cityofbelfast.org> Sun, Apr 8, 2018 at 1:53 PM

To: Andrew Watkins <andrewwatkins.watkins@gmail.com>

Dear Mr. Watkins:

Thank you for submitting your comment. I have included such in the public record for the upcoming April 17 public hearing and will be providing such to the City Council in advance of the hearing.

While I cannot provide specific answers to all of your questions, I do note that salmon from a land based aquaculture operation is now available for sale on the market; see following link. You can apply your own judgement as to if this is or is not an affordable price. https://www.brownetrading.com/product/atlantic-sapphire-salmon/

Wayne

[Quoted text hidden]

--

Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Letter to the editor

2 messages

Cynthia Anderson <cynthiacanderson@gmail.com> Fri, Apr 6, 2018 at 3:42 PM

To: wmarshall@cityofbelfast.org

Dear Wayne,

Please include my letter to the editor, below, in the public record.

Thank you,
Cynthia Anderson

---------- Forwarded message ---------
From: Stephanie Grinnell <sgrinnell@courierpublicationsllc.com>
Date: Mon, Apr 2, 2018, 1:45 PM
Subject: Re: Letter to the editor
To: Cynthia Anderson <cynthiacanderson@gmail.com>

Thank you for your letter, Cynthia, I expect to include it in the April 5 issue of the Journal.

Stephanie

Stephanie Grinnell
Editor
The Republican Journal
156 High St.
Belfast ME 04915

From: Cynthia Anderson <cynthiacanderson@gmail.com>
Sent: Monday, April 2, 2018 4:40:03 PM
To: News
Subject: Letter to the editor

To the Editor:

When I first learned from the media about the Nordic Aqua Farms (NAF) facility proposed for Belfast, I thought it could be a feather in our cap. I thought this new technology might be a good way to produce healthy food for our stressed planet.

Then I learned more:

- that market salmon produced in this way have a huge carbon footprint, due to both production and transportation needs;
- that land based farming of *adult* salmon (i.e., beyond the fresh water smolt stage) is still highly experimental and perhaps unfeasible--in contrast to land based farming of adult fresh water fish, which is a proven technology;
- that to make the NAF facility profitable, the fish must be priced for a high end ("sushi grade") market.

Now the prospect does not look at all rosy!

I don't see the benefit to Belfast. The tempting selling point of lower taxes is anything but a sure thing. And is it worth it to gamble with our town's natural environment and precious aquifer for the promise of lower taxes?

The Nordic Aqua Farms website makes this installation look like a done deal. The website has photos of its three world wide sites--one of the three photos is of our scenic Little River Reservoir and Pump House.

Whoa! Slow down!

Cynthia Ciani Anderson

207 542 0578
Belfast

Wayne Marshall <planner@cityofbelfast.org> Fri, Apr 6, 2018 at 5:03 PM
To: Cynthia Anderson <cynthiacanderson@gmail.com>

Dear Ms. Anderson

I will ensure that your letter to the editor is included as part of the public record and I will provide copies of such to the City Council.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
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207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Proposed Salmon Farm

2 messages

Janet Williams <williajanet@gmail.com> Fri, Apr 6, 2018 at 3:33 PM
To: planner@cityofbelfast.org

Dear Mr. Marshall,

Please include the attached letter to the editor in the public record, and distribute copies to members of the City Council.

Thank you -

Janet Williams

Nordic Aquafarm letter to papers 4-1-18.docx
131K

Wayne Marshall <planner@cityofbelfast.org> Fri, Apr 6, 2018 at 5:05 PM
To: Janet Williams <williajanet@gmail.com>

Dear Ms. Williams

I have received your letter. It will be included as part of the formal public record and will be made available to the Council for the upcoming April 17 public hearing. Many thanks for submitting your comments.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

I believe the proposed Nordic Aquafarm is not appropriate for Belfast. Clear cutting nearly 40 acres of trees is a heartbreaking thought. The loss of habitat for animals and birds will be substantial, and destruction of trees means higher levels of carbon dioxide in the atmosphere. The Little River hiking trail will never be the same again, the peace and tranquility of the trail will be spoiled by the sights and sounds of a massive industrial operation. Once the land is cleared and covered in industrial buildings and paved roads, it is ruined forever.

Perhaps more important would be the never ending extraction and use of millions of gallons of fresh water. Maine may have plentiful water supplies at the moment, but with climate change happening no one knows what our situation will be in years to come. All around the world, previously fertile areas are suffering extreme drought. Here in the mid coast, we frequently experience drought conditions in summer, but the salmon farm would continue to draw vast amounts of water every day. So far, we have been lucky enough to recover from those droughts, but that could change. Clean fresh water is a finite resource and should be conserved.

This salmon farm in Belfast would be one of the largest in the world and, in my opinion, does not belong in a beautiful forested area of our watershed. The salmon farm coming to Bucksport will be built on an existing industrial site, which is where such a facility belongs.

At the public hearing, someone asked if the salmon would be for sale locally. The CEO hesitated before saying the finished product would be high-end and mostly destined for restaurants and hotels; he mentioned Boston and New York. So, affordable local salmon will not be available.

I urge members of the Belfast City Council to think long and hard about what this massive industrial project will do to the local water supply, the environment, and the feel of small-town Belfast. The lure of tax money is tempting, but it will never make up for the inevitable changes that will come with such a project, and once it is built there is no going back.

Janet Williams
Searsport

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Fish farm

2 messages

Tom Mckay <4477tfm@gmail.com> Fri, Apr 6, 2018 at 3:16 PM
To: wmarshall@cityofbelfast.org

As a commercial fisherman I am opposed to proposed salmon farm in belfast. Being born and raised in lincolnville This is not limited to the city of belfast but the whole of the bay .

Wayne Marshall <planner@cityofbelfast.org> Fri, Apr 6, 2018 at 5:08 PM
To: Tom Mckay <4477tfm@gmail.com>

Dear Mr. McKay

I acknowledge receipt of your email. Your comment will be included as part of the formal record for the upcoming April 17 public hearing and copies will be provided to the City Council in advance of the hearing

Wayne

On Fri, Apr 6, 2018 at 3:16 PM, Tom Mckay <4477tfm@gmail.com> wrote:

> As a commercial fisherman I am opposed to proposed salmon farm in belfast. Being born and raised in lincolnville This is not limited to the city of belfast but the whole of the bay .

--
Wayne Marshall
Director, Code & Planning
City of Belfast
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wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Nordic Aquaculture Salmon Farm

2 messages

Natalie c <mallard1843@gmail.com> Fri, Apr 6, 2018 at 11:45 AM
To: Wayne Marshall <planner@cityofbelfast.org>

Dear Director Marshall and City Councilors Arrison, Harkness, Hurley, Mortier and Sanders:

I do not support the zoning changes required for the salmon farm for the same reasons others have already stated.

Further, because the city council is the only elected body in Belfast that directly represents the citizens, I believe that approving changes to the zoning on April 17th, when there are so many unknowns, would be extremely premature. Instead the city council vote should occur after the unanswered questions are resolved along with new questions that arise, which, with a project of this magnitude, are bound to come up. This way citizens will be able to continue giving feedback to their representatives toward an informed decision as we all learn more.

Thank you for your consideration.
Sincerely,
Natalie Charles
Belfast

Wayne Marshall <planner@cityofbelfast.org> Fri, Apr 6, 2018 at 11:54 AM
To: Natalie c <mallard1843@gmail.com>

Dear Ms. Charles

Thanks you for submitting your comment. Your comment is now part of the official public record and will be presented to the City Council in advance of the upcoming public hearing scheduled for the Council meeting of April 17.

On behalf of the City,

Wayne
[Quoted text hidden]
--

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Salmon Farm

2 messages

Jaap Helder <jhelder@helderart.com> Fri, Apr 6, 2018 at 11:08 AM
To: wmarshall@cityofbelfast.org

Mr. Marshall,

I first learned about Belfast in the 80's while running a popular restaurant in Portland. One of my chefs was Melissa Hall, Mike Hall's (the former mayor) daughter. She told me about growing up in a stinky chicken town, and that she couldn't wait to leave!

I am afraid that because of the inadequate planning, and the fast tracking of the zoning, Belfast could become a salmon town with even bigger problems than it used to have during the chicken period!

I urge the city councilors to at least put a hold on changing the zoning of the 40 acre parcel, and to do a lot more studying on the impact on the city of Belfast. At this time Belfast has a very respectable and sought-after reputation, as the local real estate market reflects. People from Washington, New York, Houston and lots of other places are looking to relocate to Belfast. This might all change if the BIGGEST SALMON FARM IN THE WORLD becomes a reality!!!

Usually I am not involved in politics, but feel this is a very crucial moment for the city of Belfast!

Sincerely,

Jaap E. Helder
2A Grove Street
Belfast

Wayne Marshall <planner@cityofbelfast.org> Fri, Apr 6, 2018 at 11:17 AM
To: Jaap Helder <jhelder@helderart.com>

Dear Mr. Helder.

Thank you for submitting your comment. It is now part of the official public record and will be provided to the City Council in advance of the upcoming April 17 public hearing on the proposed Ordinance amendments.

On behalf of the City,

Wayne

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

proposed Belfast Fish Farm project

2 messages

Kathy Kreamer <kreamers@twc.com> Fri, Apr 6, 2018 at 7:22 AM
To: wmarshall@cityofbelfast.org

Hello Mr. Marshall:

I am a resident of Belfast and have concerns about the proposed Nordic Aqua Farms facility being built here.

1) Please slow the entire process down, but especially the zoning process. As I understand it this type of facility has never been built before and so no one knows the eventual impact on our "fair city". Let's take more time to really investigate the particulars and not immediately put us in the position of being past the point of no-return.

2) We don't know what the environmental impact will be, but we do know we'll lose the habitat in where animals and birds now reside, the rural beauty, the quiet atmosphere, the eventual impact on our water supply and our Penobscot Bay. The famous line in one of Joni Mitchell's songs applies here: "They paved paradise, put up a parking lot." I'm in favor of having a study done on the impact of this project.

3) The small number of jobs that are said to be available after building this facility hardly seems worth losing "paradise".

Thank you for the opportunity to express my views and please pass this letter on to City Council members.

Sincerely,

Kathryn A. Kreamer

129 Miller St.

Belfast, ME 04915

207-218-1037

kreamers@twc.com

Wayne Marshall <planner@cityofbelfast.org> Fri, Apr 6, 2018 at 9:06 AM
To: Kathy Kreamer <kreamers@twc.com>

Dear Ms. Kreamer.

Thank you for submitting your comment. I will include your comment in the official record and I will provide your comment to all Councilors in advance of the upcoming April 17 public hearing.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Salmon Farm

2 messages

Lisa Sadler <lisasadlersemail@gmail.com> Thu, Apr 5, 2018 at 4:15 PM

To: wmarshall@cityofbelfast.org

Hello -
My name is Lisa and I am a homeowner in Belfast Cohousing. I am writing to ask that the salmon farm progress be held off until more facts are gathered. At this point, what I am hearing, there are great risks to having this farm go through. These risks will, more than likely, greatly impact not only community members and visitors but the ecosystems on land and at sea. Ideally, the community, after being well educated on the pros/cons, should be able to vote on this business taking up shop. Thank you for your time ..

~ Lisa Sadler
Cell - 970-819-8695

"In nature nothing exists alone."
— ***Rachel Carson***

Wayne Marshall <planner@cityofbelfast.org> Thu, Apr 5, 2018 at 4:21 PM
To: Lisa Sadler <lisasadlersemail@gmail.com>

Hello Ms. Sadler.

Thank you for submitting your comment. It is now part of the official record for the upcoming April 17 public hearing. I will provide copies to Council members.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
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131 Church St
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207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Comments regarding proposed zone changes for Nordic aquafarms project.

2 messages

Joanne Moesswilde <jmoesswilde@gmail.com> Thu, Apr 5, 2018 at 2:40 PM

To: wmarshall@cityofbelfast.org

Dear Wayne and Belfast City Councilors,
I appreciate your ongoing work in due diligence as you consider the benefits and risks of the proposed Nordic aqua farms (NAF) project.
As new information comes available to you in the fast moving process of due diligence on the part of both the City of Belfast and NAF, I ask that you make this information available to the public as soon as possible. I am hoping for ongoing public conversation and constructive dialogue between the citizens of Belfast and the City council during all phases of this process. I encourage you to consider public conversations and input regarding all available information BEFORE you vote on proposed zoning changes.
It would be great to be able to sit down and talk with you all.
Lets work together to figure out what is best for Belfast.

Thank you,
Joanne Moesswilde,
Belfast

Sincerely ,

Sent from my iPad

Wayne Marshall <planner@cityofbelfast.org> Thu, Apr 5, 2018 at 3:01 PM

To: Joanne Moesswilde <jmoesswilde@gmail.com>

Hello Joanne

I acknowledge receipt of your email and comment. It will be part of the official record. I will be assembling a number of comments that I have received over the past few days and intend to present/email all to Council on Friday of this week.

Wayne

[Quoted text hidden]

--

Wayne Marshall
Director, Code & Planning

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

concerns about proposed salmon farm

1 message

Deborah Capwell <deborahflora@gmail.com> Thu, Apr 5, 2018 at 11:31 AM
To: wmarshall@cityofbelfast.org

Dear Mr. Marshall,

Several people have already written thoughtful letters re: the proposed salmon farm. I'd like to add my voice to theirs, and also to reflect on the project in a broader context.

Specifically, what comes up for me are questions:

-What kind of place do we want to live in? What do we value about Belfast?
-What do we who live here stand to gain from this project?
-What are we giving up if we allow the salmon farm proposal in it's present form to go forward?
-What are the risks?
-What are the unknowns?
-Is it worth it?

From what I've heard so far, what our community might gain is a decrease in taxes. Maybe. Maybe not. Historically, again from what I've heard, the reality hasn't lived up to this promise..
We would get up to 60 jobs. What kind of jobs? There are already jobs in our area which haven't been filled.

We also get a dozen or so semi trucks per day- a huge increase in traffic and noise, unknown amounts of waste with unclear disposal plans-acres of clear cut and increase in pavement (buildings and parking). We get a new company with next to no track record building a facility 5-6 times larger than anything they've done so far.

We get to take the environmental risk. If things don't work out and they leave, what are we left with?

I don't understand why this project is so attractive in its present form, nor why it is being rushed through so quickly. This is a very large project. We need to consider it carefully and vet it thoroughly. An Environmental Impact Study would be essential.

My personal view is that the proposal needs to be seriously scaled down so that it fits into our town more comfortably. Also, if the environmental concerns were addressed in a comprehensive fashion backed by facts rather than wishful thinking, perhaps we could have a fruitful conversation with Nordic Aquafarms and come up with a truly viable plan.

Thanks for considering,
Deborah Capwell
5 Court St. #C
Belfast

NORDIC AQUAFARM PROJECT REZONING
PUBLIC COMMENT for APRIL 17 PUBLIC HEARING
THIRD EMAIL
COMMENT RECEIVED on APRIL 8 (after 1:00 pm - APRIL 9, 2018
From Wayne Marshall, Director, Code & Planning (April 9, 2018)

I previously sent the Council two emails that included public comment received on the Nordic Aquafarm project between March 21 and April 8. This document identifies all public comment (10 separate comments) received between the dates of April 8 (after 1:00 pm) on April 9. I intend to provide printed copies of all of this information to you at the April 10 Work Session so you can include this comment in your respective notebooks. And as previously noted, I intend to post the comments that have been received on the City website (plan to do so by Wednesday).

This document includes the following public comment:

- April 8 email and letter from Ellie Daniels, Belfast. This letter makes a correction to the letter that she previously submitted.
- April 9 email from Denise Pendelton, Crocker Road, Belfast
- April 9 email from Lindsey Piper, Belfast
- April 9 email and letter from Randy Curtis, Perkins Road, Belfast
- April 9 email from Erik Ludwig, Belfast
- April 9 email from Connie Hatch, Belfast
- April 9 email from Mary Santiago, Belfast
- April 8 email from Tayla and Eilon Shomron-Atar, who are planning to move to the Belfast area from NYC
- April 8 email and letter from Joanne Moesswilde, Belfast
- April 9 email from Jasmine Fowler, Belfast

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Correction

2 messages

Eleanor Daniels <ellie1953@hotmail.com> Sun, Apr 8, 2018 at 9:13 PM
To: Wayne Marshall <planner@cityofbelfast.org>

Hi Wayne,
Thanks for confirming receipt of my email and attachment this morning. In sharing my water usage figures with a friend this afternoon, I found an error that I would like corrected.

I am attaching a fresh copy that should replace the one I sent you this morning.

Thank you,

Ellie Daniels

4_7_18 Water and Discharge 2.docx
19K

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 8:44 AM
To: Eleanor Daniels <ellie1953@hotmail.com>

Hello Elle

I will insert this new letter as a replacement letter.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)

Land Based Fish Farms:

Facts and Concerns about Water and Discharge

The land-based fish farm being planned by Nordic Aqua Farms (NAF) would be the largest such facility in the world, raising up to 33,000 tons of salmon a year at full production. This facility is 16 times larger in scope than NAF's initial project in Norway, which is not yet at full production. In short, many questions that have been raised concerning the operation of such a facility can only be answered in theoretical models. A project of this magnitude has never been accomplished before.

However, land-based aquaculture has been extensively studied at smaller scales. A number of concerning issues have been identified by the International Salmon Farmer's Association (ISFA) in their report released in 2017, in which they studied Recirculation Aquaculture Systems (RAS) in Canada, France, the United States, Denmark, China, and Norway. RAS is the technology that is being proposed for the Belfast Salmon Farm. It will also use a mix of salt and fresh water, the proportions of which are not yet known.

http://www.salmonfarming.org/cms/wp-content/uploads/2015/02/ISFA_LandFarmingreport_web.pdf

NAF is prepared to buy a **minimum of 100 million and a maximum of 263 million gallons annually** from the Belfast Water District. While this number of millions of gallons may sound like a lot, calculations drawn upon the ISFA report for the total amount of water required to grow 33,000 tons of salmon annually at full production are actually staggering.

- It will take **484 million gallons** of water to fill the tanks initially.
- Any time a pathogen occurs in any tank, the tank must be emptied, scrubbed and purified, and then refilled.
- When fish are ready for harvest, at approximately two years of age, there is a depuration process which requires a complete water change in the tanks every hour over a 10-day period, to rid the fish of musty growing water taste.
- Although it is not likely that all the fish would be harvested simultaneously, it can be calculated that in the first two-year period of growing fish to maturity, a depuration process for 33,000 tons of salmon would involve **11.6 billion gallons of water per day**, or **116 billion gallons over the 10-day process.**
- In RAS tanks, between 1% and 2% of water is lost every day due to filtration and evaporation. This amounts to nearly **5-10,000 gallons of water loss daily**, or between **1.8 and 3.6 million gallons a year.**

In total, over a **two-year period**, if there was only one full filling of the tanks (which is a highly unlikely scenario), and one complete life-cycle of the fish ending in depuration, and an average loss of water in the tanks, this salmon farm being proposed for Belfast would use nearly **116.5 billion gallons of water** over a two year period, or **58.25 billion gallons** in a year. Again, the proportion of salt to fresh water has not yet been determined as of the time of these calculations.

To put this number in perspective, a Portland Press article written in February of 2017 discussed Poland Spring's operations in Maine. Poland Springs at that time was operating in three locations in Maine, drawing 900 million gallons of water a year, and was seeking a fourth location in order to be able to produce up to **1.3 billion gallons.**

What happens when large quantities of water are drawn out of the ground? There are numerous sources that address this question, but here are two of them: www.usgs.gov/edu/gwdepletion.html , and www.groundwater.org.

- As the water table in the aquifer drops, it potentially results in neighboring residential wells diminishing their flow or going dry.
- A void is created in the aquifer, which pulls other water into it, particularly from nearby streams or ponds, such as the Little River and Reservoir. Any contamination existing in neighboring bodies of groundwater will also be pulled in.
- Streams and ponds are replenished by rain and snowmelt, but also by drawing water horizontally from aquifers. As the water table drops, the flow is diminished or stopped.
- Saltwater intrusion can occur, particularly if there is proximity of the aquifer to ocean water. As fresh water is drawn out more quickly than it can replenish, a balance is lost making it inevitable that saline water will be drawn in.
- When large amounts of water are drawn quickly out of an aquifer, the underground void can result in sinkholes and other dramatic alterations of the topography.
- 484 million gallons of water weighs 4.2 billion pounds

Finally, there are still numerous questions regarding the discharge that will flow into Penobscot Bay, and the 90% of solids that NAF believes it can effectively remove before discharge. The state of Maine has specific concerns and criteria for discharge into the marine environment. www.main.gov/dep/water/nutrient-criteria/index.html

In marine environments, excess nitrogen can:

- Cause blooms of algae and phytoplankton
- Cause loss of marine vegetation which provide habitats for young fish and invertebrates
- Decrease oxygen concentrations in bottom waters and affect fish and shellfish
- Cause declines in commercial fisheries

The summary conclusions that the ISAF made after analyzing numerous case studies of existing land-based aquaculture operations are:

- There has been some success in smaller-scale projects of between **300-1,000 tons**.
- There is ongoing research and development to make RAS feasible on a commercial scale.
- There needs to be responsible use of limited fresh water supplies.
- There are challenges to fish health and welfare, and demonstrated symptoms of stress in tanks.
- The energy footprint of land-based farms is large, representing **263 pounds of carbon footprint for every pound of fish grown.**
- There are **quantifiable ecological impacts** to land-based fish farms.

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Please proceed slowly and postpone/ reject zoning change to benefit Nordic Aquafarms

2 messages

Denise Pendleton <denpendlelight@gmail.com> Mon, Apr 9, 2018 at 4:37 PM

To: wmarshall@cityofbelfast.org, Mike Hurley <mike@pilut.com>, ward1councilor@cityofbelfast.org, ward2councilor@cityofbelfast.org, ward3councilor@cityofbelfast.org, ward5councilor@cityofbelfast.org, mayor@cityofbelfast.org

April 10, 2018

I am writing to urge you--the Belfast City Planner and the Belfast City Council--to postpone any changes in proposed zoning laws to allow for development of the Nordic Aquafarms project.

While it is flattering and exciting to think such a project could be of benefit to the Belfast community, there are many reasons to further research and question the cost of any such benefits and the reality of any such benefits actually occurring.

Among the research studies that should give this project pause is the 2017 International Salmon Farmers Association (ISFA) study of 11 currently operating land-based fish farms, producing between 300 and 1,000 tons of fish annually. According to this study, there are significant issues to be resolved about the potential negative impact on the environment of a large scale fish farm.

The Nordic Aquafarms project proposal for Belfast is 33 times larger in scope than the largest of the farms studied, larger than any fish farm in the world. It is disturbing to know that the model for NAF's proposal is purely theoretical, and is being planned by a company that only incorporated in 2014.

Belfast has been home to my family for generations, and I left here as a teenager in the 1970's when it was an ugly town I never wanted to return to. It has since become a welcoming, beautiful town that I did, much to my surprise and that of my parents, want to move back to and that I'm delighted to call my home and raise my family in.

In recent years, I've particularly enjoyed the Little River Trail, visiting there several times a week during three seasons of the year and ice-skating in the reservoir in the winter months. Belfast has many treasures and this is one of their very greatest, including the dam and water district buildings that mark the entrance to Belfast from Northport and Route One South. It would be a devastating loss to the Belfast community for generations to come if the ability to enjoy this natural treasure were compromised—for those hiking the trail, skating or swimming in the reservoir, or simply driving by. A remarkable feature of this resource is that it, like the footbridge, is enjoyed by a diversity of community members--those who have lived here for generations and those who are newcomers, those who like to fish and those who like to hike, those with disposable income and those living on a tight budget, and youth as well as retirees. The proximity of the large scale fish

farm to this trail, clearing over half (28 acres) of the 40 acres of the Little River habitat, would indeed significantly compromise this unique resource that Belfast should make every effort to protect.

Belfast wants young people to remain here and/or to move back to raise families and help maintain a healthy demographic balance in its community. Please keep Belfast a town that other young people, as I was once, will want to return to and raise families who can add to the quality of life we enjoy here now.

Letter to Wayne M..docx
17K

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 5:23 PM
To: Denise Pendleton <denpendlelight@gmail.com>

Hello Denise

I acknowledge receipt of your email and letter. It has been entered into the formal record for the upcoming April 17 public hearing.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
City of Belfast
131 Church St
Belfast, ME 04915
207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Fish farm

2 messages

Lindsey Piper <lindsey.piper@gmail.com> Mon, Apr 9, 2018 at 2:07 PM
To: wmarshall@cityofbelfast.org

Hi Wayne-

I'm writing to express my concern about the impending salmon farm business here. I can appreciate some of the stated benefits and feel like I and our community could use more time, and a slower process in order to understand more fully the potential negative impacts and possible positive rewards should OUR community choose this.

Thank you for your time.

Lindsey Piper
--
Lindsey M. Piper, MSN, WHNP

I like.....
http://www.mainecohousing.org/
http://emafund.org/

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 5:26 PM
Draft To: Lindsey Piper <lindsey.piper@gmail.com>

Hello Lindsey

Thank you for submitting your comment. Your comment is part of the formal public record for the upcoming April 17 public hearing and will be rpil aprirecornow
[Quoted text hidden]
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Wayne Marshall
Director, Code & Planning
City of Belfast
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wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Comment on Nordic Aquafarm Proposal

2 messages

randjackc@roadrunner.com <randjackc@roadrunner.com> Mon, Apr 9, 2018 at 12:46 PM
To: Wayne Marshall <wmarshall@cityofbelfast.org>

Dear Mr. Marshall,
I've attached a brief comment concerning the proposed Nordic Aquafarm project. I would much appreciate it if you would enter the letter into the public record and see that copies are made for the appropriate city officials.
Thanks,

Randy Curtis
34 Perkins Road
Belfast, Maine
338-4733

A Need for Further Study.doc
30K

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 5:29 PM
To: randjackc@roadrunner.com

Dear Mr. Curtis.

I have received your letter regarding the Nordic Aquafarm project. It will be included in the formal public record for the April 17 public hearing and will be presented to the Council in advance of the hearing.

Wayne
[Quoted text hidden]
--
Wayne Marshall
Director, Code & Planning
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131 Church St
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207-338-1417 x 125 (phone)
207-338-1605 (fax)
wmarshall@cityofbelfast.org

A Need for Further Study

My wife and I are looking forward to the April 17 public hearing and hope that answers will be available for the many questions that have arisen from the proposal by Nordic Aquafarms. The most pressing question is to understand why the urgency to change the zoning status. While City officials may have been negotiating with Nordic Aquafarms for several months, the public information began only in early February. To vote on the zoning change in two months at best appears hurried. The apparent haste of the Belfast City officials to move this project forward, without requiring an environmental impact study, belie any recollection of Belfast's not so distant past. As a life-long Belfast area resident, I have witnessed first hand the negative impact of industry on the coastal bay waters, as well as the allocation of quality drinking water to industry over residential needs.

Having survived many years of industrial abuse; the Belfast waterfront is now a beautiful and financial asset to the community. Any use of Penobscot Bay should be thoroughly evaluated. And lastly, how confident can we be about the viability of Nordic Aquafarms? It is a relatively new company that has yet to receive permitting for its first European site. There is no track record to evaluate; yet this proposal offers a scale that is more than 10 times the size of their present site under construction in Europe. Before we embark on this venture that replaces a pristine recreational area with an industrial site many questions need to be answered.

Randy and Jackie Curtis
Belfast

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Fish farm considerations

2 messages

Erik L <erikmludwig@gmail.com> Mon, Apr 9, 2018 at 2:45 PM
To: wmarshall@cityofbelfast.org

Hello Mr.Marshall

I want to express concerns about the current proposal for a fish farm in Belfast.

Please make sure that the town takes time to consider all aspects of this project.

There are many environmental and water use concerns with large operations, such as the one proposed. I am no expert. I'm sure there are some monetary gains, but there are also many costs and potential hazards.

I am not saying I am for or against, I am just asking that the process be slowed down and the citizens of Belfast given time and information to make a decision whether this is the right business to encourage.

Thank you

:-)

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 5:21 PM
To: Erik L <erikmludwig@gmail.com>

Dear Mr. Ludwig:

Thank you for your comment. It is now part of the formal record for the upcoming April 17 public hearing and will be provided to the City Council in advance of the hearing.

Wayne
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--
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City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

letter from Conny Hatch to Belfast City Hall re: Nordic Aquafarms project

2 messages

Conny Hatch <connyhatch@icloud.com> Mon, Apr 9, 2018 at 12:01 PM
To: planner@cityofbelfast.org

April 9, 2018

To Belfast City Planner, Belfast City Councilors, Belfast Mayor, Belfast City Manager;

I'd like to add my voice to the concerned Belfast (and beyond) residents who question the viability of the proposed Nordic Aquafarms project to develop the largest land-based salmon farm in the world in Belfast. I attended the March 15th meeting (Water District) and the March 31 meeting with city council, I have read the NAF website, read articles and letters about this proposal, and have talked about the project with many friends and neighbors.

Dated in January 2018, the Nordic Aquafarms website states it has entered into "agreements" on a Belfast ME property for construction of the "...largest aquatank in the world..." and "Construction start is planned in 2019." I find this posting troubling as it would seem that this gigantic project is moving full-steam ahead.

I am not convinced that this project is in the best interest of Belfast. First, I believe it is too big a risk to the sustainability of the watershed and that the destruction of natural habitat along the beautiful Little River is simply untenable. Second, there is no guarantee that taxes will be reduced as a result of this Norwegian corporation establishing an as yet unprecedented (in size) fish farm in our city.

The 40 acres of land designated for this project is a quiet place filled with natural beauty that is irreplaceable. This land is presently inhabited and visited by a variety of wildlife and quite easily accessible by foot, bike or car from downtown Belfast. A beautiful river flowing into a magnificent ocean bay. A rare gem for hiking, bird-watching and quiet.

Considering the tremendous scope of this project, and the huge impact it will have on the land, on the bay, on our water sources and the lives of the people and animals who live in and around the area, I don't think the benefits come anywhere near outweighing the losses.

The increased number of large transport trucks entering and exiting the planned facility will increase traffic snags on Rt 1 and add to more noise and pollution (exhaust fumes) for the residents and businesses along this road. The outflow into the bay from this facility's product processing will add to an already high level of output from towns and cities in the midcoast. The estimates are 33,000 tons of product a year. How much

outflow does that mean pouring into our bay? (Add that to outflow from the planned fish farm in Bucksport). What about odor for neighboring residents? Will the salmon produced at this facility be an affordable addition to the diets of low to medium wage earners locally or will be shipped to high-end food markets and restaurants all over the country?

I understand the benefits of a potential 60 more jobs created and the tax revenue that such an enterprise MIGHT generate however Nordic Aquafarms has no proven track record of a facility of this size. The company is barely 4 years old and if the project fails, the land is forever compromised, then what are we left with?

Can Belfast work towards being a "world leader" and be put "on the map" as a center of vigorous land stewardship practices, as natural resource protectors and perhaps promote and establish more organic farming, time-tested sustainable agricultural and renewable energy endeavors? I think so.

Sincerely,
Conny Hatch
20 Bradbury Street
Belfast

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 5:36 PM
To: Conny Hatch <connyhatch@icloud.com>

Dear Ms. Hatch.

Thank you for submitting your comments. Your comments are part of the formal public record for the upcoming April 17 public hearing and will be provided to the Council in advance of the hearing.

Wayne
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--
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wmarshall@cityofbelfast.org

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Salmon Farm

2 messages

Talya Shomron-Atar <talyashomron@gmail.com> Sun, Apr 8, 2018 at 9:12 PM
To: wmarshall@cityofbelfast.org, mayor@cityofbelfast.org
Cc: Eilon Shomron-Atar <eilonshomronatar@gmail.com>

Dear Mr. Marshall and Mayor Paradis,

We are established professionals, a young family with plans to move from NYC to the area. We are writing to let you know that we are extremely concerned about the possibility of Belfast being the home of the largest salmon farm in the world. Belfast is appealing to us because of its long standing commitment to its community, its surrounding land and its peacefulness. We are moving away from a big city and its surrounding big industries to contribute and participate in a community of caring people. The salmon farm will create a complete change to the allure which Belfast holds for newcomers, young families and professionals. This will inevitably have a detrimental impact on the growth and prosperity of Belfast, putting an end to the recent wave of back to the landers and others. We know that we can no longer talk excitedly about Belfast to other people in our original communities because of the destructive impact that the salmon farm will have on the image, the nature and the calmness of the place. How can we tell our friends and colleagues to move to a place with a ginormous industrial complex at its doorstep? An otherwise small town with beautiful people and nature now turned to a never before seen experimental site with relatively low, but in no sense inconsequential, environmental impacts. We ourselves are having second thoughts about our move. Despite many years of being regular visitors to the area, and especially to Belfast, we are considering other towns.

We believe that the traffic to the area and the traffic along route 1 in the South direction will be a great discomfort and disrupt easy access to the town, even if Tesla trucks are used (no concrete promise of this was made). We believe that a vast network of 40 foot high mega structures will be a foreboding eye sore to anybody at the entrance of our town.

We believe that "less" pollution and "best way of raising salmon" is not a promise of accountability towards our bay or the surrounding land. Even if it is the best way to raise salmon Belfast does not have to be the home of this huge industrial construction risking damage to

fauna, flora, sea bed, soil, air, and beauty.

The benefits to Belfast may amount to a handful of jobs (the rest will be imported experts) and some influx of money to the city, but this will ultimately be for nothing if no one wants to come or live here. Such a salmon farm will inevitably lead to a reduction in the quality of living in Belfast, the collapse of real estate value and the reversal of Belfast's cultural and fiscal growth.

With great sincerity,

Talya and Eilon Shomron-Atar

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 8:42 AM
To: Talya Shomron-Atar <talyashomron@gmail.com>

Dear Talya and Eilon Shomron-Atar

Thank you for submitting your comment. Your comment will be included in the formal record for the April 17 public hearing and will be presented to the Council in advance of the hearing.

Wayne
[Quoted text hidden]
--
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City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

salmon farm

2 messages

M S <maryjosantiago@yahoo.com> Mon, Apr 9, 2018 at 7:49 AM
To: wmarshall@cityofbelfast.org

Hello Mr. Marshall,

I am writing to voice my concern regarding the salmon farm. It is always a red flag when an issue gets so little press, and then is sold to the public as being a done deal. When the Governor comes to town to endorse the project, the terms have obviously been in discussion for a quite some time.

Leading the town into the future should not be taken lightly. Being a guinea pig for such a large new technology should be reserved for desperate times. Belfast has many needs, but the community is not desperate! We need stable industry, that has roots in known success. The worlds largest salmon farm does not have data to pull from. I am not a tree hugger, but we do not know what the implications are down the road for the environment. We also do not know how many jobs they will really provide, how long they will stay, what their presence will contribute to the community, how long the tax benefits will last...so many unanswered questions.

Exactly what is the difference between hog confinements, chicken grower houses, and farmed fish? Are these confined creatures really as healthy as those raised in a natural environment? We could go in circles with a discussion on those topics, but I will say I avoid mass produced food sources as much as I can. At the end of the day, are these fish really a product that Belfast can be proud to claim as being the origin?

I am sure when the topic was first brought up to the water district members, it sounded like a very interesting idea. But, have we ever seriously questioned why they chose Belfast? There are many motives, many high powered lawyers, and an incredible amount of money behind this push. The advantage is all theirs! It would be naive to believe Nordic Aquafarms has the best interest of Belfast in mind. This is all about their investment and profit margin.

Is the city council really ready to risk the future of the community on this questionable venture? I hope they will listen to their common sense and know when to walk away. Belfast deserves better!

Sincerely,
Mary Santiago

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 8:50 AM
Draft To: M S <maryjosantiago@yahoo.com>

Dear Ms. Santiago.

Thank you for submitting your comment. Your comment will be part of the formal record for the upcoming April 17 public hearing and will be provided to the Council in advance of the hearing.

Wayne
[Quoted text hidden]
--
Wayne Marshall
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wmarshall@cityofbelfast.org

To: Belfast City Councilors

From: Joanne Moesswilde, April 9, 2018 Re: **NEW concerns** and information about NAF project

1. **I am concerned that if NAF builds in Belfast there is potential for high legal costs for the City of Belfast.** With a project of this magnitude, there is potential for Belfast to need to use legal council to manage its relationship with NAF. If, for example, NAF demanded more water than our aquifer can tolerate (see recent comments by Ellie Daniels regarding aquifers) they may bring legal action against the city to allow increased water use. They will need much more water than what the water district is contracted to sell them. In this type of situation, NAF would have the financial resources to manipulate the outcome in their favor and the city would use lots of money trying to defend the resource. We might not want to think about a possible conflict with NAF, but it really could happen. NAF and their investors have A LOT of money riding on this and they will protect their interests, not ours.
2. **The current political climate and the permitting infrastructure and knowledge base are not adequate to help us protect our natural resources, primarily land and water, with the permitting process.** I know that NAF cannot begin to apply for needed permits until the zone changes are made law by the Council. The Council should consider the possibility that these permitting agencies could permit activities that the City of Belfast might not agree with. Once the Council changes the zoning, we have relinquished much of our control over our land and water. Yes, we have our planning board, but all they can do is apply the law that the Council approves. Will this be enough to protect Belfast's interests?
3. **In my recent conversations with Belfast residents, I have learned that our community is not well informed about the NAF project**. Some say "I thought it was a done deal," while others have commented, "I just know they are coming but I don't know anything about it. " Still others have said, "Where do I sign a petition to stop this ?" People from Belfast and those who live in surrounding communities have expressed a variety of concerns, similar to the ones you have already heard. A person visiting here from Alaska told me that all types of fish farming is outlawed in Alaska. Our community needs more information and time to process it so we can all make the right decision for Belfast.
4. **I have learned that farmed fish are fed food pellets that contain dangerous chemicals.** The small fish that are caught and ground up to make salmon food can have detectable amounts of various toxic chemicals, such as **dioxin, PCB** from their polluted environment and these chemicals are thus in the manufactured fish food. Additionally, the chemical **ethoxyquine** is added in the process of making fish food and has been found in elevated / unhealthy levels in farmed salmon. I suspect these chemicals are found in the effluent proposed to be discharged into the Bay. Can toxic chemicals from the feed be filtered from the effluent or will they go into Penobscot Bay? Who will monitor this? For more info see: Fillet Oh Fish, link: Freedomdocumentaries.org/facts/fillet-oh-fish.
5. The NAF project is not just a Belfast issue, it's a regional issue. From pollution and water use to traffic congestion and industrialization, it will affect the entire midcoast region. This is also a global issue, anything that touches water, touches the whole planet. – thanks for reading.

City of Belfast

Wayne Marshall <planner@cityofbelfast.org>

Salmon Farm

2 messages

Jasmine Fowler <jazzpf@gmail.com> Mon, Apr 9, 2018 at 11:07 AM
To: wmarshall@cityofbelfast.org

Hi Mr. Marshall,

I am writing as a concerned citizen about the speed and magnitude of the proposed salmon farm project. I understand the company has done a nice job allaying environmental concerns and other questions at previous meetings. However, I still feel that a project of this scope requires a much longer term of consideration and research. Given that this company has yet to operate a project anywhere near this size is concerning--meaning all of their numbers/information are purely speculation, and that Norway has yet to approve a project of this size, is a cause for concern.

In addition, I am concerned with the amount of water such a project will consume. I have heard that it is several times more water than all of the Poland Springs plants combined and that Maine (along with Texas) is one of the states with the least restrictive water legislation. I think it would be a mistake to go into this project too quickly without having a real understanding of what would happen to our local water supply once this project is fully underway.

In the past, Belfast and its citizens and neighbors have placed an emphasis on small, local, and ecologically sound business. I see this project as an antithesis to these principles.

Please consider urging the city council to put a hold on approving this project for a much longer period of time until further research and understanding of all of the environmental, social, and neighborhood impacts can be obtained. I do not believe that the largest of anything in the world belongs in our small town.

Thank you for your consideration,

Jasmine Fowler

Wayne Marshall <planner@cityofbelfast.org> Mon, Apr 9, 2018 at 11:20 AM
To: Jasmine Fowler <jazzpf@gmail.com>

Dear Ms. Fowler:

Thank you for submitting your comment. Your comment is now part of the formal public record for the upcoming April 17 public hearing.

I do want to note that one of your comments is factually incorrect. The amount of water that the Nordic Aquafarm project would use from the Belfast Water District is about the same as the amount of water that is now used by the residential customer base in Belfast. And, the total volume of water that the Water District would be providing to the residential customer base and the Nordic project, combined, is less than the total volume of water that they regularly provided in the 1970's and 1980's to the residential customer base and the chicken processing plants that operated at the time. Keith Pooler, Belfast Water District, has indicated that the District has more than sufficient water to provide the volume of water that they have committed to Nordic Aquafarm. Lastly, this volume of water is considerably less than the Poland Spring operations in Maine.

Wayne

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Atlantic Sapphire's land-based salmon plant on track for 2020

By Jason Huffman

Feb. 5, 2018 16:58 BST

Johan Andreassen (back to camera), the founder and CEO of Atlantic Sapphire, answers investors' and potential investors' questions during a tour of his future land-based salmon aquaculture facility. Photo by Jason Huffman

HOMESTEAD, Florida, US -- Large-track construction vehicles roll over white sand on 80 acres of property that until recently was used to grow tomatoes.

Everything has been progressing here in a way that should allow Atlantic Sapphire to open what would be the US' first operational, large-scale commercial salmon farm and deliver an initial harvest of 800 metric tons by mid-2020 as planned, Johan Andreassen, the founder and CEO, assured a small group of investors during a tour late last month.

The plant's location, on the southern end of Florida, about 34 miles west of Miami, will enjoy a big advantage, he said.

While salmon produced by competitors with more traditional sea-based farms in Chile are still in the air, flying to Miami International Airport, where they will then be loaded into trucks for the next leg of their trip, Atlantic Sapphire's product, head-on and gutted, will already be on the road or at its final destination.

"We'll be able to harvest here in Miami on a Monday and deliver to New York on a Tuesday without using an airplane," he said, noting the longer shelf life this gives his fish.

The water filtration system going in at Atlantic Sapphire's land-based acquaculture facility near Miami, Florida. Photo by Jason Huffman.

Nordic Aquafarms, a Fredrikstad, Ostfold, Norway-based company, made big news in the aquaculture world last week when it announced its plans to build a 40-acre land-based salmon plant on the coast of Maine. Construction on the facility, which has a goal of ultimately producing 33,000 metric tons of salmon annually, is set to begin sometime in 2019.

But Nordic will be playing catch up with Atlantic Sapphire, which has a considerable head start and an even grander, long-term goal.

None of the walls have gone up around the 380,000-square-foot building that ultimately will hold Atlantic Sapphire's new recirculating aquaculture system (RAS) and its offices to be contained upstairs. The management team is working out of a temporary trailer. But some of the facility's 62 miles of pipe is in the ground and giant water filtration screens are being lifted into place.

The drilling of wells for both freshwater and saltwater is well underway, as is the creation of an injection well that will reach 3,000 or more feet down into the boulder zone to deposit the plant's wastewater. The permits for all three have been acquired, accomplishing one of the project's lengthiest and most critical steps.

Atlantic Sapphire has permission to pump, on a daily basis, 540,000 gallons of freshwater -- to be used in the hatching, smolt and pre-smolt tanks -- and 15 million gallons of saltwater -- to be used in grow-out tanks, Eric Meyer, the operations director, told *Undercurrent*.

"You have to have water and a way to get rid of your water," Meyer said. "And we're far along in our schedule on that."

By October of this year, Meyer said, Atlantic Sapphire will have the incubation part of its plant completed and eggs will have arrived from a company in Iceland.

Florida was picked by Atlantic Sapphire from a list of 13 states under consideration largely because of the water resources available, Andreassen told *Undercurrent*. The

Eric Meyer, Atlantic Sapphire's operations director, explains his company's plans for accessing water and removing waste to a group of investors. Photo by Jason Huffman.

business ultimately will bring Homestead, a community with a population of 68,000, at least 80 new jobs.

Today Atlantic Sapphire employs 15 in Florida, not counting the 60 to 80 construction workers who are here, working for a contracted firm, on a daily basis.

"People think that once you figure out the secret sauce of land base, you can do it all over the place, but I don't agree," he said. "Land-based requires certain given relationships and scale, and that's why I think certain areas are better than others. South Florida is the best area because of its unique aquifer, water relationship.'

Counting on Americans to eat salmon like Germans

It's not just the speed at which Atlantic Sapphire can get its fresh salmon to market that will give it an advantage.

It'll take the Florida plant 22 months to raise a fish to its desired four-to-five kilo size. By contrast, the salmon raised in the cold waters of Norway or southern Chile take 28 to 36 months, Andreassen said.

To complete the first phase of its construction, Atlantic Sapphire still needs to install 36 grow-out tanks, each of which will contain some 500,000 gallons of water and 40,000 to 50,000 fish. The water will come into the plant from aquifers at 79 degrees Fahrenheit and have to be reduced to 55 degrees, so a coolant system is needed, too.

At maximum capacity, the first set of tanks will allow the plant to deliver 10,000t of salmon per year. But, if all goes well, Atlantic Sapphire will add more structures, growing capacity to 30,000t per year by 2022 and 90,000t by 2026 -- almost three times the goal set by Nordic Aquafarms.

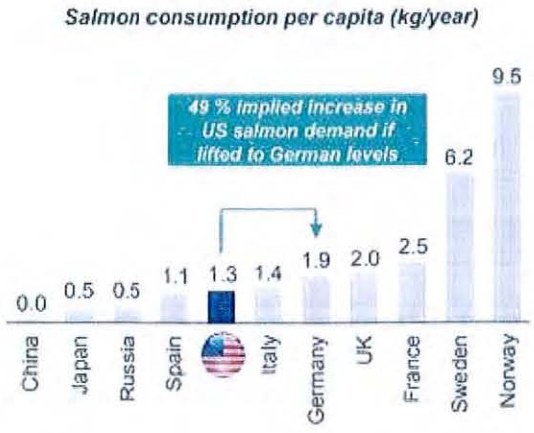
Atlantic Sapphire's expansion plans from a presentation given in London in November.

For now much of the land purchased by the company is being leased back to the original owner to continue growing tomatoes and other produce common to Florida. But given the future market demand that Andreassen projects, it's likely that Homestead will one day soon be just as well known for its salmon production.

The US consumes nearly 500,000 lbs of salmon each year – the most in the world -- and that number has been growing by 9% annually, on average, the company noted in a presentation recently given to prospective investors in London, quoting data from the Norwegian Seafood Council. Meanwhile, the per capita consumption rate in the US is only 2.9 lbs, while Germans, for example, eat salmon at a rate of 4.2 lbs per capita.

Just getting Americans to match the rate of consumption enjoyed by the Germans would increase salmon sales in the US by 49%, the presentation suggested.

It's been just the right note to hit with investors. Atlantic Sapphire has raised about $80m in equity from 150 shareholders on the Oslo, Norway, stock exchange, while borrowing $62.5m, and Andreassen told *Undercurrent* that he plans to raise another $60m in capital this year to fully fund the company.



If US consumers ate as much salmon as Germans, it would translate to a 49% increase in demand. A slide from Atlantic Sapphire's recent investor presentation in London.

'The most efficient way of using farmland'

Other more conventional sea-based producers of salmon rolled their eyes when apprised by *Undercurrent* of Atlantic Sapphire's plans to shake up their industry,

"Salmon farming already has a successful business model," one producer with operations in Chile said. "Why reinvent the wheel?"

Johan Andreassen, CEO of Atlantic Sapphire, standing on the property where he hopes to one day expand a land-based salmon aquaculture facility. Photo by Jason Huffman

But Andreassen, a Norwegian-born former commercial fisherman and 20-year veteran of the salmon industry, asserts that what he is attempting is not an untested approach.

Rather that might have been a more apt description of the effort undertaken by Langsand Laks, in Hvide Sande, Denmark, in 2011. When that facility was completed almost seven years ago, it was the world's first commercial salmon "bluehouse", the play-on greenhouse term used by Andreassen and others to describe land-based aquaculture.

Atlantic Sapphire was one of a group of companies to invest in Langsand Laks but it later bought the others out.

The Danish operation is now delivering about 800t of fish per year, roughly 40% to 50% of which is sent to the US, and is expected to complete an expansion in May that will enable it to reach its maximum permitted output of 3,000t per year, Andreassen told *Undercurrent*.

Langsand Laks' product has its fans among some American chefs, as it possesses a milder, less fishy taste than that of salmon raised in the ocean. Andreassen said it also has a somewhat firmer texture, like wild-caught sockeye, as the plant applies water pressure against the salmon to recreate the effect of swimming upstream.

More than a few other commercial land-based salmon farms exist around the world, including Danish Salmon, in Hirtshals, Denmark, and Kuterra, in British Columbia, Canada.

Jurassic Salmon, a land-based farm that opened in West Pomerania, Poland, in June 2015, says on its website that it is "delivering 22t [of salmon] per week", or 1,232t per year, and was reported to have a deal with Marine Harvest to supply it with 1,000t of product annually. The company says it took its name from the more than 150m year old, uncontaminated geothermal water it sources.

There are a few land-based salmon farms in the US and more in the works, too, like Nordic Aquafarms, though Atlantic Sapphire looks to be the first that will be ready to produce such large-scale commercial volumes.

The Freshwater Institute, a research organization sponsored by the Conservation Fund, has been raising salmon on land in Shepherdstown, West Virginia, for the past seven years as part of an effort to advance the practice, frequently selling its small 20,000 to 40,000 lb annual harvest to a Maryland dealer. The fish have, at least on one occasion, made their way to locations owned by the US grocery chain Wegmans.

The organization regularly offers seminars about land-based aquaculture and saw 165 people show up at a recent training event in British Columbia, Canada, said director Joe Hankins.

"It's not a zero-sum game," Hankins said. "Every fish grown in a tank on land doesn't mean one less fish grown in a net pen. This is about growing more seafood and providing better nutrition. It's not a competition."

Land-based salmon farms have yet a third advantage over sea-based farms in that conservation groups have deemed them better for the environment. The Freshwater Institute, Kuterra and Atlantic Sapphire were all awarded "best choice" or "green" ratings by the influential Monterey Bay Aquarium's Seafood Watch program in October 2014.

Any hole dug on the construction site of Atlantic Sapphire's future salmon farm quickly fills with water thanks to the area's high water table. Photo by Jason Huffman.

Also, unlike salmon farms off the coasts of Washington state and British Columbia, the Atlantic salmon being grown by Atlantic Sapphire won't antagonize First Nation and advocacy groups concerned about them escaping and contaminating any wild-caught species.

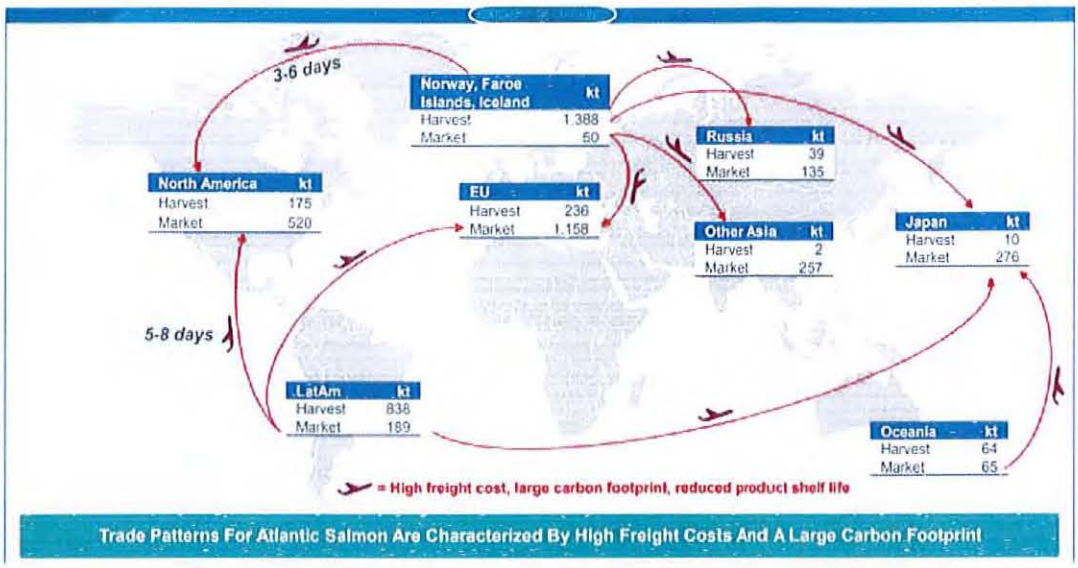
Andreassen said his plant is 15 miles from the closest ocean shore. Salmon can't survive in temperatures greater than 68 degrees F, and 72 degrees F is the coldest water gets in the Atlantic near the southern end of Florida, he added.

His property borders the Everglades, a 1.5m-acre area of wetlands that's often been compared to a slow-moving river, requiring the company's local head of security to keep an eye out for alligators and pythons.

One investor visiting the plant from Norway said he was in the oil and gas business but learned about the Atlantic Sapphire operation at a child's birthday party. It was initially a challenge to put money in a type of salmon that was not being caught or raised in a place as picturesque as his home country, surrounded by fjords and glaciers, he said.

But the investor, who requested anonymity, said he ultimately was drawn in by the cleanliness of the contained water system and its relatively small carbon footprint

as a supplier of protein. He takes pride in the company being of Norwegian origin.



A diagram from Atlantic Sapphire's presentation to investors, in London, makes the point about its ability to serve salmon to US consumers much faster and with less of a carbon footprint.

"Norwegians like new things," he said. "We really believe in being pioneers in business. And we know a lot about salmon."

Andreassen boasts that his Homestead operation will produce about 1,000t of protein per acre per year, a better rate than those offered by cattle, poultry or swine farms.

"It is the most efficient way of using farmland," he told *Undercurrent*.

What could go wrong?

Though the land-based salmon industry may not be entirely new, it still experiences the occasional growing pain.

Atlantic Sapphire's Denmark operation, in July 2017, reported "unexpected mortalities" of more than 250,000 fish, a quarter of its budgeted harvest. The company later determined the fish were exposed to high levels of hydrogen sulfide, a condition that can be caused in sea water by decomposing fish or other organic materials, such as sludge, when oxygen levels are low.

White sand covers the area where Atlantic Sapphire's hatchery will be installed. Photo by Jason Huffman.

"We have taken several measures to prevent that from being a problem in the future which includes design changes,

sensors and adjusted operational procedures," Andreassen told *Undercurrent*. "In addition to that, as a general measure to reduce any risk, we are designing our future expansions with multiple independent water systems."

In phase one of its construction, Atlantic Sapphire's Florida plant will have six independent grow-out systems and seven independent fresh-water systems, he noted.

Having contained, independent tanks is also a good guard against the biggest problem experienced at sea-based farms: sea lice. The parasite has previously decimated both Norwegian and Chilean stocks and can make fish more susceptible to other diseases.

Another concern that Andreassen has guarded against is sabotage. He's hired a full-time security force which is maintained 24 hours per day, seven days per week around the plant.

But his plant can only do so much to guard against mother nature.

Florida has seen 79 tropical or subtropical cyclones since 2000, and Homestead is famous as the location that experienced one of the state's most devastating storms, Hurricane Andrew. After causing major damage in the Bahamas and Louisiana, Andrew, in 1992, hit Homestead with Category 5-force winds – 165 miles per hour – killed 65, took power away from 1.4m, and damaged or destroyed 164,000 homes in Miami-Dade County.

Homestead, Florida, in 1992, after Hurricane Andrew rolled through. Photo courtesy of the National Oceanic and Atmospheric Administration.

Hurricane Irma was a Category 4 when it hit Florida's Monroe County, south of Homestead, in September with wind gusts of 150 to 160 mph. It knocked out power across the state and caused 6.5m people to evacuate their homes, including Andreassen.

Many in the Miami-area seafood business recount the event as one that cost them significant sales, due in part to the airport being shutdown for days.

Atlantic Sapphire's plant will maintain backup generators and enough fuel to keep operations going for six days in the event of a bad storm, Andreassen told *Undercurrent*. Its roofs will be able to absorb the direct hit of a Category 2 storm (96-110 mph).

He said he has insurance to cover hurricane damage, but couldn't reveal the details of his plan.

Regardless, Andreassen remains confident in the future success of his new Florida plant.

"Its not a question if this is going to work or not," he said in an email after *Undercurrent*'s visit. "It will work. The question is, as always, 'How well will we be able to manage the farm to get the best possible biological performance?' That's why why have a world class team that I am confident will manage to operate the bluehouse in the best possible way so we can provide Americans with healthy locally produced salmon with excellent flavor."

"Make salmon farming great again" is what Atlantic Sapphire hopes to do at its new land-based plant near Miami, Florida. Photo by Jason Huffman.

Contact the author jason.huffman@undercurrentnews.com

(part of Ridgely Fuller's comments)

THE EVOLUTION OF
LAND BASED ATLANTIC SALMON FARMS

INTERNATIONAL SALMON FARMERS ASSOCIATION

THE EVOLUTION OF LAND BASED ATLANTIC SALMON FARMS

There have been many conversations about the future of salmon farming, farming technologies and the role that land based facilities could and should play in that future. Some, the NGO community in particular, have been promoting a theory that all salmon farms could be taken out of the ocean and moved to land based tank farms.

To help facilitate the dialogue, the International Salmon Farmers Association has produced this document that reviews available reports from around the world, the current state of knowledge, technology and the challenges that would have to be overcome before Atlantic salmon could be grown for their entire life cycle in land based facilities. We have also incorporated international industry experience from salmon farmers, who are the experts in land based freshwater farming systems and are successfully using these systems for smolt production and a variety of broodstock programs.

We believe the resulting document: “The Evolution of Land Based Farms for Atlantic Salmon” provides a valuable tool for this discussion.

For our industry, the conversation is about growing healthy, nutritious seafood in an efficient and sustainable manner – both in our oceans and in land based facilities. Both play an important role today and will continue to do so in the future.

Although land based farming systems continue to evolve, there are still a number of challenges that must be overcome, including the real costs of energy, water and land usage, animal welfare and quality of the final product before all of the world’s commercial production of farmed salmon could move to land.

This report shows that farming Atlantic salmon in their natural environment - the ocean - is the responsible way to farm. Until that changes, we will do what we do best: use the marine and freshwater resources in the most efficient and considered way, in both marine and land based systems, to help feed the world.

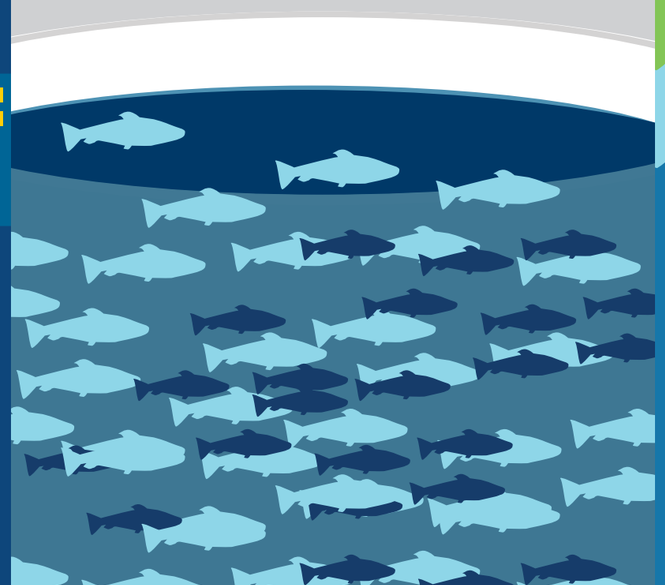
The salmon farming industry understands the value of land based salmon farming as well as its limitations. As such, we will continue to collaborate with researchers, governments and ENGOs to understand the socio-economic and environmental realities of land based fish farming systems, both the opportunities and limitations, to advance the technology and apply it on a case-by-case, species-by-species basis as technology advances.

Trond Davidsen
President ISFA

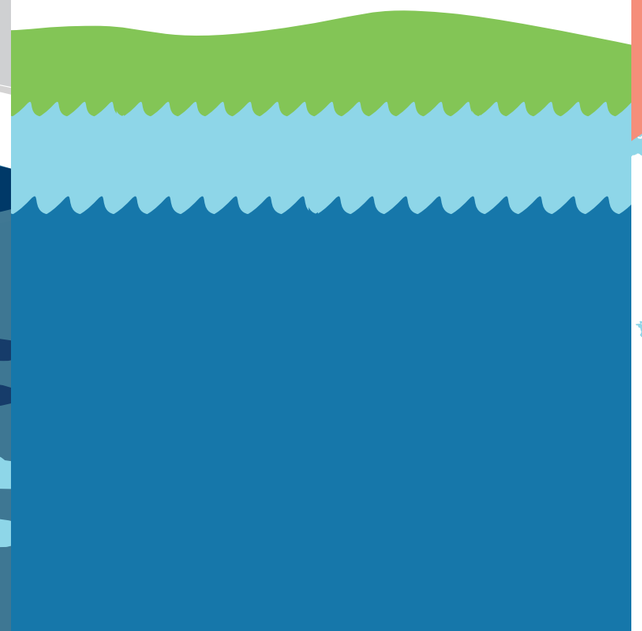
KEY CONSIDERATIONS OF LAND BASED FISH FARMS

ENERGY

FISH WELFARE



WATER & LAND USE



SOCIO-ECONOMIC REALITIES

EXECUTIVE SUMMARY

Salmon farmers around the world are the experts in land based freshwater farming systems. They have been using and evolving land based systems for more than 40 years, advancing the technology in an environmentally, socially and economically sustainable way. Literally billions of young fish have been hatched and raised on land. To date, the salmon farming industry successfully operates land based facilities for smolt production and a variety of broodstock programs. Experiments to grow salmon for their entire lives in freshwater land systems as well as ambitious projects addressing the question of recirculating saltwater have also been pursued for niche market, small-scale commercial production facilities.

Although land based farming systems continue to evolve, there are still a number of challenges that must be overcome, especially if, as some would advocate, we were to consider moving all post smolt marine based salmon farms onto land. These challenges include the real costs of energy, water and land usage, and considerations around animal welfare, not to mention the quality and acceptance of the product (and its inevitably high retail price) by the final consumer.

The salmon aquaculture industry continues to invest in technological improvements to land based salmon farming systems, recognizing that it is a proven technology and that it has a valuable role to play in the freshwater part of the life cycle of the salmon. However, the evidence provided to date strongly recommends that, at this time, land based fish farming systems are best suited to the early grow out phase of Atlantic salmon and not the best alternative for the commercial production of the entire grow-out of the species to meet the global food demands.

"The importance of aquaculture as an industry in the world, its growing weight in food security and growth potential are a reality" -

Fernando Garcia,
General Manager of the Mexican-based aquaculture company Sea Farmers

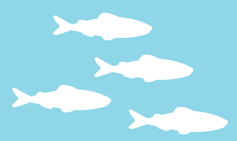
EGG TO HARVEST

EGGS

Farmed salmon start their lives in fresh water and then move to salt water just as they do in nature. Salmon start out as eggs, which are collected from adult salmon broodstock, and placed in a freshwater hatchery.

ALEVIN

After three months, the baby salmon, known as 'alevins' hatch. Alevins feed off their attached yolk sacs for about a month.



FRY

When the alevins have used their yolk sacs, they are ready to eat on their own. They are now called fry and are moved into tanks in the freshwater hatchery.

SMOLT

After about 18 months, the fry become smolts and are large enough to move to saltwater farms.

ADULT SALMON

The smolts stay in their ocean farms until they are large enough to be harvested (5-6 kg). This can take up to two years.

INTRODUCTION

Land based freshwater fish farming is a genuinely good option for the production of egg to plate output for a number of species including tilapia and trout. Economics and production control have been the main rationale for the development and adoption of this technology in most species. Globally, the Atlantic salmon farming industry has used this rationale in adopting recirculating aquaculture systems (RAS) in the early (freshwater) life stages of salmon (Gardner Pinfold, 2014).

Extending the use of land based recirculation to provide an environment for the growth of salmon to market size is a different challenge. As of 2007, over 40 trials with an initial capital investment estimated at more than $283 million, had been conducted on closed containment technology for the production of adult Atlantic salmon around the world (Canadian Science Advisory Secretariat, 2008). Trials and experiments with full grow-out of Atlantic salmon on land continue today with varying success rates that have been shown to be scale dependent (Appendix A). As a result, the technology is advancing at varying levels around the world. This is due to differences in regulatory support, access to resources and financial investment, including coastal land, water and energy.

So how, with the wild fish stocks being harvested to capacity, a growing human population and with it a global demand for seafood (FAO, 2014), do we provide good food to a growing population from our marine resources? Is it through using a tiny proportion, 0.0008% (ISFA, 2015) of the planet's ocean space to sustainably farm fish or is it by putting extra pressure on limited space and resources such as water, energy and coastal land?

To help answer those questions, this report references twelve papers (Appendix B) and information from Canada, Ireland, Norway, Scotland, and the United States to summarize the evolution of land based salmon farming. By providing a factual summary of the history and current knowledge, with an eye to the future, this paper provides an overview on how land based fish farming operations began and how they are contributing to world food needs.

"Clearly, [land based fish farming] has earned a place as a key technology for juvenile fish across a wide range of species. It enables salmon farmers with their smolt production."

Josh Goldman, Australis

BACKGROUND

Land based fish farming technology is a well-established method for producing a wide range of saltwater and freshwater fish species.

With a history that began in the mid-late 19th century, fish hatcheries and then fish culture facilities with a focus on genetics, originated in Canada, Norway and the United States around the same period and for the same reasons – to restock declining commercial and recreational fish stocks, specifically cod and Atlantic salmon. Today, aquaculture continues to use this original concept of land based systems during the freshwater stage of salmon development and for land based breeding programs.

The technology has advanced significantly in the 21st century, allowing for increased salmon smolt size and weight before transferring them to their natural marine environment. There are hundreds of land based fish farming systems operating in the world today (Gardner Pinfold, 2014). In Norway, there are approximately 190 land based fish farms in operation, primarily salmon smolt farms and smaller facilities with various other species. The largest operation has a capacity to produce more than 3000 metric tonnes of smolt per annum but that has never been met.[1]

However, for land based farming from egg to harvest to become a leading form of production for a commodity product like Atlantic salmon, a number of crucial questions still remain unanswered about the economics of land based farming and its radically different challenges of energy, land and water use, and fish welfare. This paper presents an overview of these four challenges.

[1]http://niri.com/fish-farming/facts-about-land-based-farming/

THE HISTORY OF LAND BASED SYSTEMS

1800's

Land based fish farms (hatcheries) in North America and Europe – government run to address declining salmon and cod stocks; smolt were regularly transported between North America and Europe.

1900's

New fish production demands, hundreds of hatcheries for smolt production and enhancement around the world. Private and government ownership. Aquaculture becomes commercialized in Norway and then in North America.

2000's

Ongoing collapse of fisheries, additional increase in global demand for seafood, land based systems continue to advance to meet aquaculture demands.

"One of the most consistent of all realities is that no matter who you are, or where you are, you need safe, nutritious, affordable food—every day."

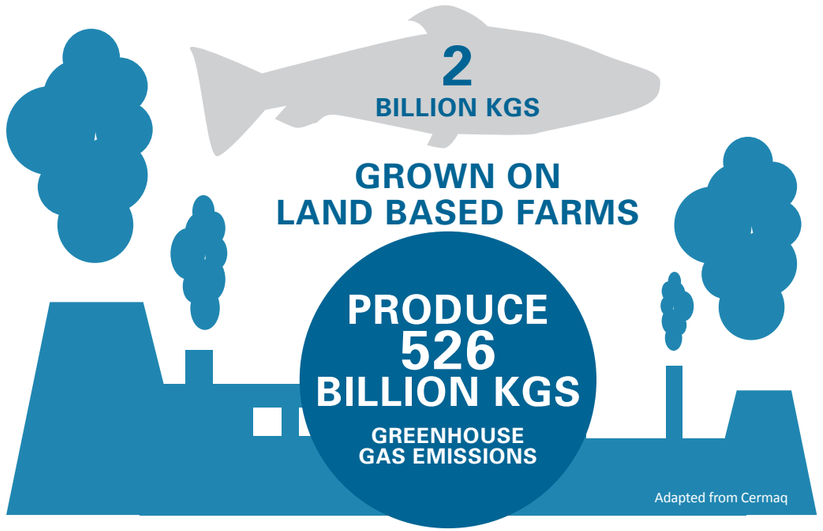
Jeff Simmons, Elanco President

ENERGY

For approximately half of their life cycle, farmed salmon are raised in an enclosed environment in freshwater hatcheries.

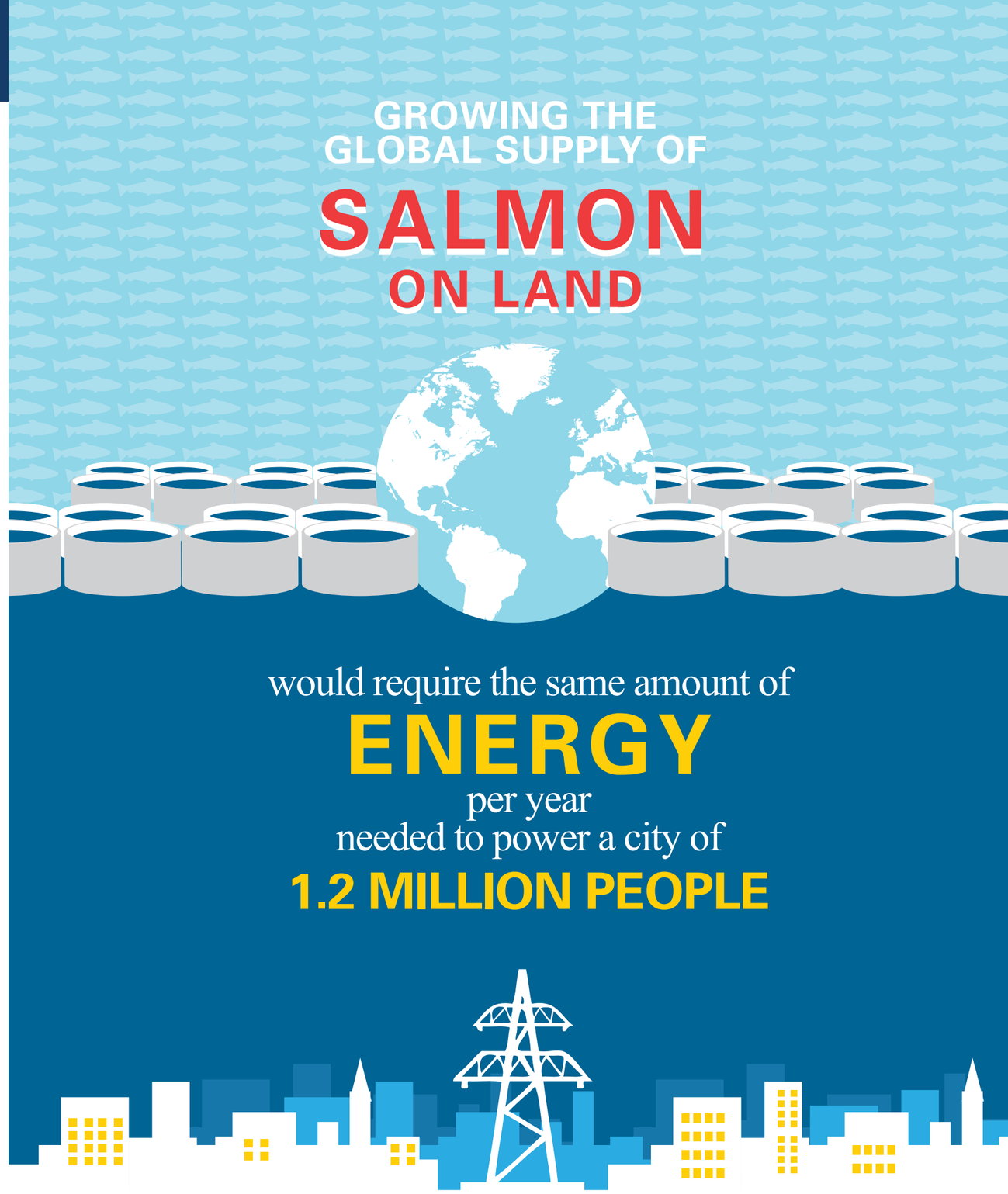
For the remaining half of the fish's life cycle, marine pens utilize ocean tides to move water and provide fresh oxygen to the fish. By comparison, land based farms compensate for that natural environment (i.e., flow, temperature and oxygen) by pumping water, heating/cooling water, and injecting oxygen - requiring consistent and significant amounts of energy to do so and increasing the risk of loss in the event of a power failure. A brief period without power will kill all fish in a short time because of the high density of fish in these land based systems that require continual access to oxygen pumps and filtering to replicate grow-out environments.

It has been suggested that farming Atlantic salmon on land has potential if you can select sites with cheap power in close proximity to key markets (Summerfelt, et al., 2012). However, the Government of Canada recognized that closed containment aquaculture carries its own set of environmental effects and the carbon footprint generated by closed containment facilities drawing electricity may be significant (2013). A recent report by the Scottish Salmon Producers Organisation (SSPO) considered land based RAS for full production on land of all grow out stages not financially viable, with the high-energy use and carbon footprint making it an environmentally unfriendly option[2].



Energy use and emission of carbon dioxide is one of the major global challenges society is facing as it seeks to feed a growing population with higher expectations with respect to standards of living. Future food production methods must seek to reduce the environmental impacts associated with food production not increase them. The development of the aquaculture industry should not convert to production methods which are less energy effective and have a higher contribution to CO^2 emissions.

[2] available from enquiries@scottishsalmon.co.uk



FISH WELFARE

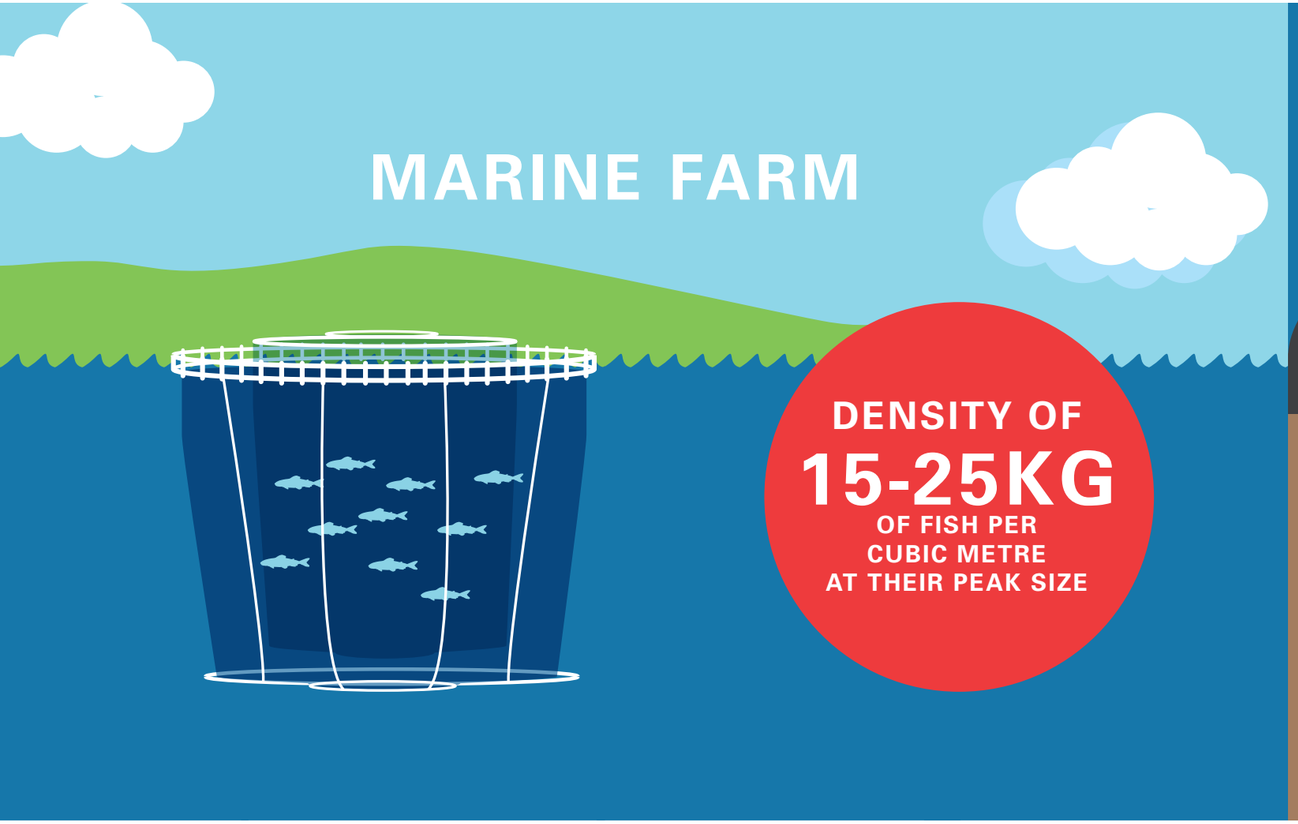
Farmers have a stewardship responsibility for their animals. Fish are in their care and rely on the farmer to provide conditions that are as close to natural as possible and in which the fish will thrive. Two of the key indicators that salmon in land based systems may not be thriving are precocious maturation and decreased or subnormal growth rates. An additional challenge is that once a pathogen gets into a land based system it is virtually impossible to remove unless the system is depopulated and all the biological filters are disinfected. There have been a number of documented cases of fish health problems that have caused a complete loss of the fish due to pathogens in closed containment systems.

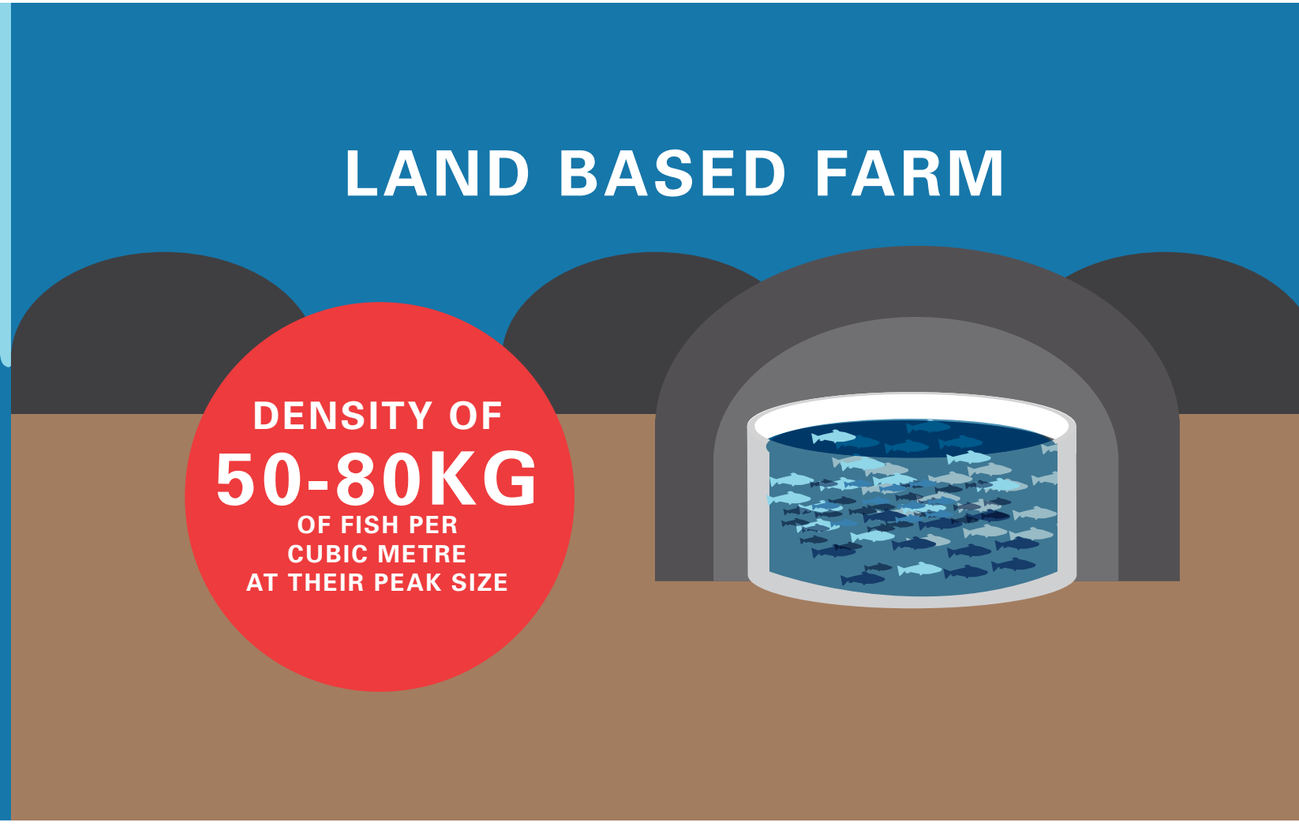
The papers reviewed agree that in order for land based Atlantic salmon farms to be profitable, farmers have to raise fish at much higher densities than in marine systems.

Conventional marine systems raise fish at a density of about 25 kilograms of fish per cubic metre at their peak size. In order for a land based farm to be profitable, Summerfelt (2012) suggested it would have to farm fish at densities of 80kg /m^3 or higher while the CSAS (2008) report used an average stocking density of 50kg/m^3 at peak size.

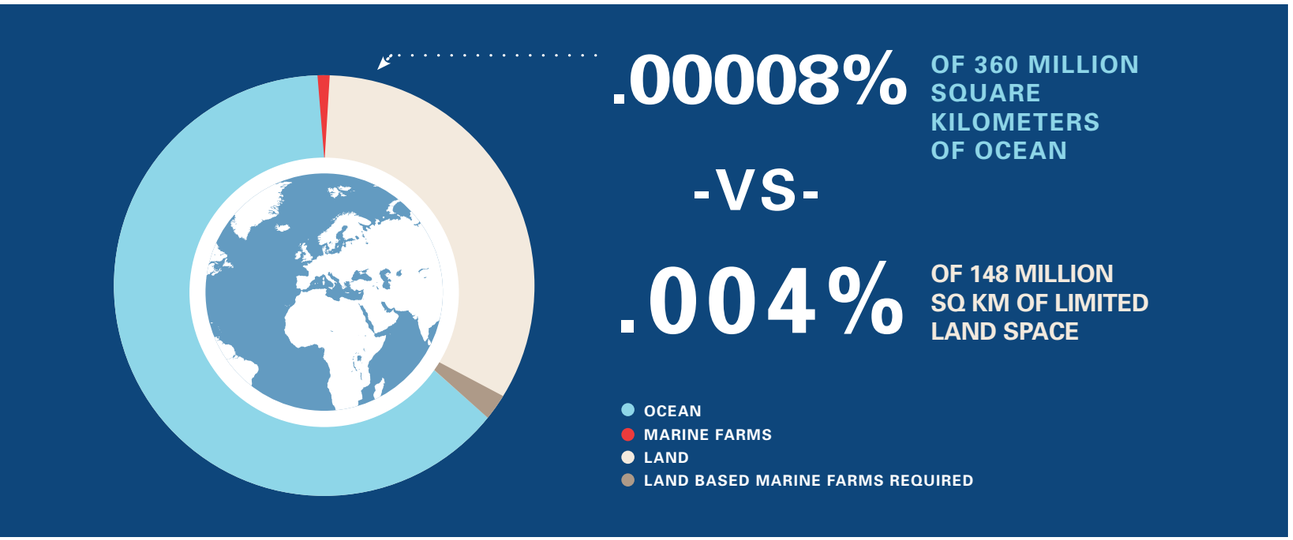
Raising adult salmon in the marine environment where they are stocked at densities that use less than four per cent of the pen space allowing for natural schooling activity versus prolonged exposure to technically created environments produces less stress and consequently a better fish.

The Nofima study (2013) supported the case that land based facilities do not eliminate environmental or disease concerns, noting that in a 20-year period a number of land based production systems were tested, and were not successful for a variety of reasons including incidents of winter-ulcer disease in the fish.



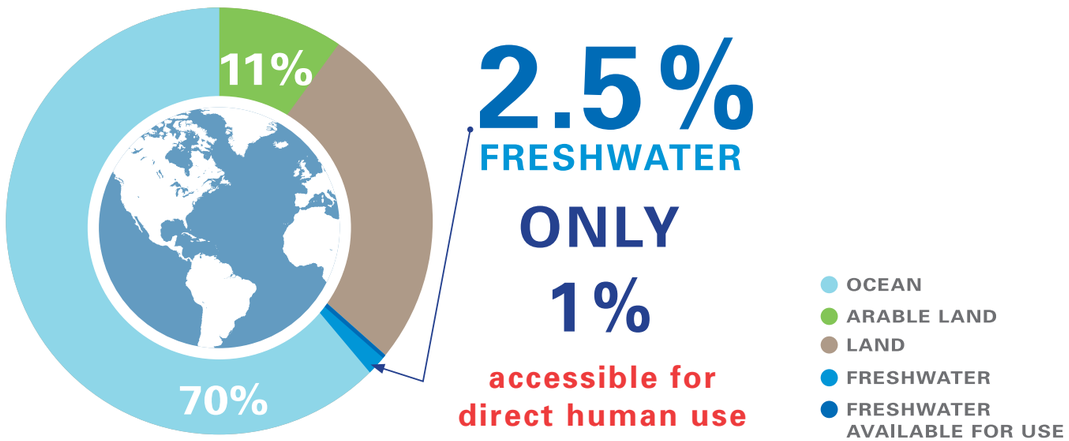


WATER AND LAND USE

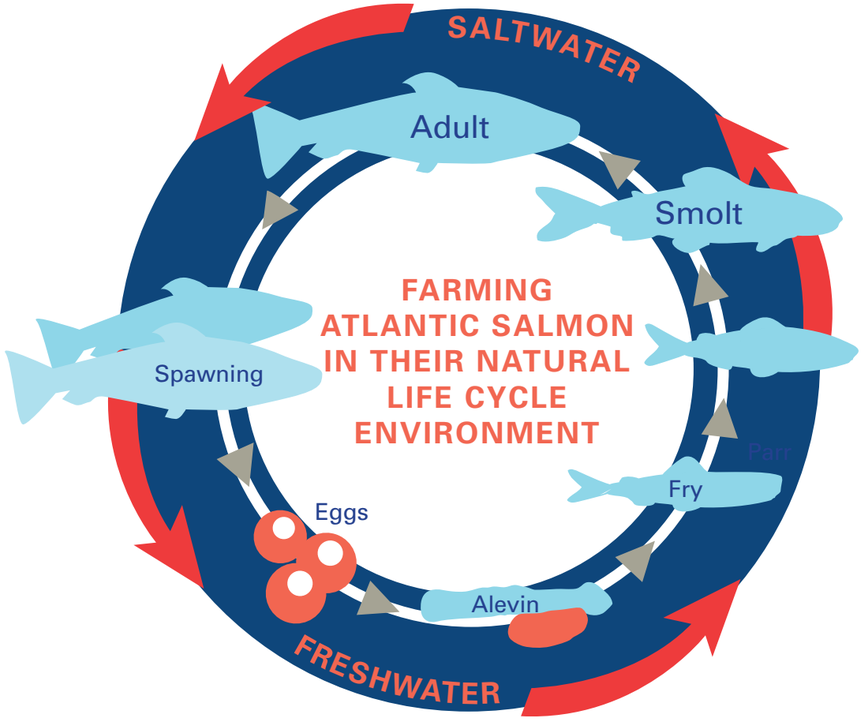


Water resources are decreasing while global demand for fresh water is increasing.

Although over 70 per cent of the earth's surface is covered by water, only 2.5 per cent is fresh water; the remaining 97.5 per cent is ocean. Of the 2.5 per cent, only one per cent is accessible for direct human use. This is the water found in lakes, rivers, reservoirs and underground sources[3]. Moving all marine Atlantic salmon operations to land based farms may place additional pressure on freshwater resources for food production. Freshwater is in some cases used partly or wholly during the final growing phase because of a lack of access to seawater or because of the necessity to run the production with a lower salinity for physiological reasons.



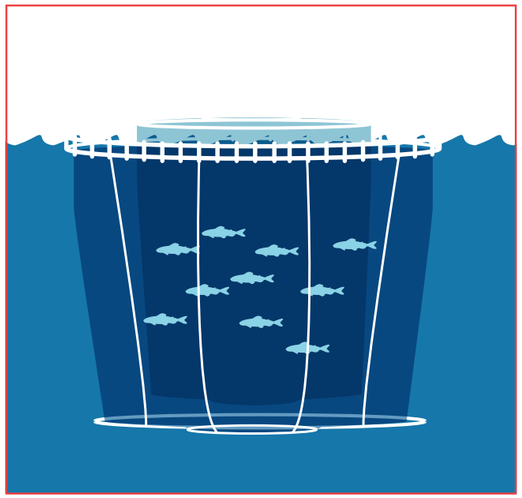
[3] http://www.globalchange.umich.edu/globalchange2/current/lectures/freshwater_supply/freshwater.html
[4] http://www.fao.org/docrep/003/t0800e/t0800e0a.htm

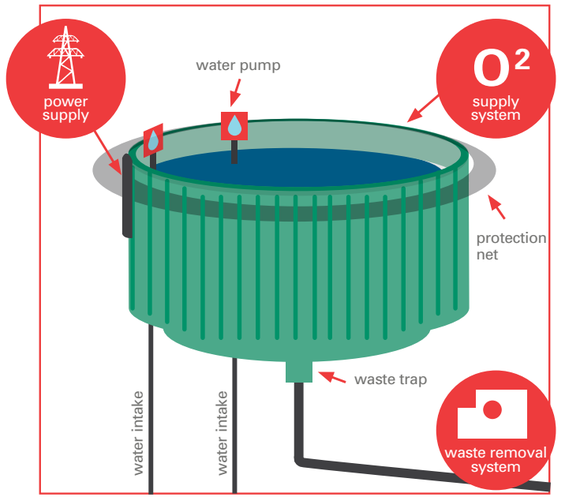


Every wild and farmed newly hatched salmon takes its first breath in freshwater. The clear un-salty surroundings of a river, stream, pond or tank are home for the first important juvenile stage of the salmon's life, putting it among a small elite club of species that move from pools and streams out to sea as adults and eventually back to spawn in later years and begin the cycle all over again. Freshwater is essential for the early life stage of salmon, just as it is for us and for all the main terrestrial plant and animal life on the planet. That is why it is so important to conserve it and to use it wisely, putting technology to work to provide the very best start for the young fish to grow. In current aquaculture practices, during the smolt stage of a salmon life, fish are returned to their natural environment, the ocean. This provides the fish with appropriate density to swim and school naturally while providing a healthy valuable product for consumers. Whether growing salmon in freshwater or saltwater land based farms, accessing water and replicating the natural environment of the ocean (i.e., salinity, temperature, oxygen, nitrogen, etc.) is essential for the adult stage of Atlantic salmon. Fluctuations in water quality can have detrimental effects on fish and create challenges for farmers, making it critical that these fluctuations are well managed. Even if it were technically and economically feasible, and if enough coastal land and water were available, the current production in Canada alone would require 28,000 football fields, 33,719 acres, or 136 square kilometers of land to grow fish in appropriate densities and water depths in land based systems. This number could multiply by tens in Norway where plans were announced to produce 20,000 tonnes of salmon in land based systems by 2018[5].

[5] http://www.intrafish.com/news/article1429100.ece

LAND BASED VS NET PEN SYSTEMS





Depending on location and the land based system used, water (fresh and salt) may or may not be an immediate issue. For example, a freshwater grow out recirculating aquaculture system (RAS) can reuse 99 per cent of the water given the appropriate conditions while a flow through system will not. For every 75,000 MT of salmon grown at the stocking density[6] recommended for 4kg adult salmon, 4.16 billion litres (BL) of water is needed just to fill the tanks to grow the fish. In addition, another one to two per cent daily addition of make-up water is needed. Then, when the fish are ready for harvest, a 10 day depuration period is needed to rid the fish of the musty growing water taste. Depuration should be a total tank replacement with clean water every hour (i.e., 4.16 BL/h); for each 24 hours, 99.8 BL of water is needed, so for a 10 day depuration period, 998 BL of water would be needed.

This also highlights the fact that there are a number of variables that need to be considered for each system that are unique to the local environment (Standing Committee on Fisheries and Oceans, 2013). In addition, a full production grow out system using saltwater would require that land based marine salmon farms be built close to the seawater. This could create conflict with other users of the coastal lands and ocean waters and could generate another set of challenges related to fish health, energy use and waste management in these typical flow through systems.

As noted by the Canadian Geographic[7] these saltwater flow-through processes must pump water from nearby sources and then back out, which with filtering may break down the waste, but does not contain it. Even if new systems are designed to fully collect any waste that may be created, the pumping of saltwater to land based farms will increase energy use, and subsequently greenhouse gases.

[6] http://www.dfo-mpo.gc.ca/CSAS/Csas/DocREC/1998/98_151_e.pdf [7] http://www.canadiangeographic.ca/magazine/so04/indepth/portrait.asp

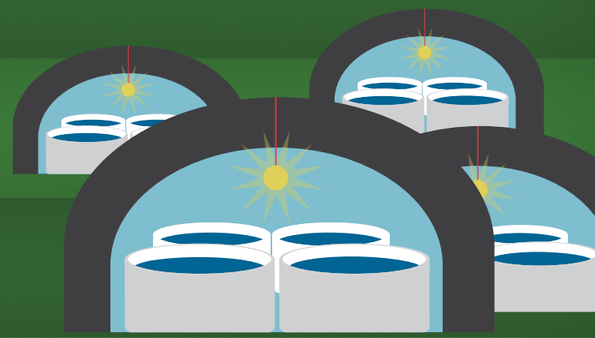
TO MOVE CANADA'S CURRENT SALMON PRODUCTION TO LAND BASED SYSTEMS WOULD REQUIRE

28,000

CANADIAN FOOTBALL FIELDS

33,719 ACRES, OR 136 SQUARE KILOMETERS OF LAND

TO GROW FISH IN APPROPRIATE DENSITIES



GROWING

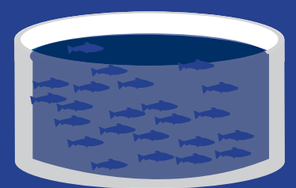
75,000

METRIC TONNES OF SALMON AT 18KG/M³

COMPARABLE TO THE AMOUNT OF SALMON GROWN IN CANADA'S WEST COAST

IN A

99%



RAS SYSTEM WOULD REQUIRE

4.16 BILLION LITRES

WATER JUST TO FILL THE TANKS

FRESHWATER SYSTEM WOULD BE EQUAL TO **1/3** OF THE DAILY DOMESTIC USAGE FOR THE ENTIRE UNITED STATES.[8]

[8] http://water.usgs.gov/edu/wateruse-total.html

SOCIO-ECONOMIC REALITIES

This report has focused on the common challenges of land based fish farming found within the papers referenced. However, it is important that we acknowledge the socio-economic challenges of land based fish farming systems. Although many communications in the media have suggested industry has not moved to land based systems due to increased capital investment (i.e., design and engineering, land acquisition, water and power installation, and buildings) requirements, it is the overall operational feasibility that has not yet been developed for scales of more than 1000 tonnes.

Table 1 provides one example adapted from a Government of Canada study (Boulet, Struthers, & Gilbert, 2010) which outlines the cost and return on investment (pre-tax) on the full production grow out of 2500MT of Atlantic salmon in the British Columbia environment and regulatory regime.

Table 1: Technology Comparison: Capital, Operational Costs, and Return on Equity - ROE (3 year)

Technology	Initial Investment	Third-Year Income	ROE
Net Pen	$ 5,000,716	$ 2,641,147	52%
Rigid–with aeration	$ 23,284,470	-$2,125,885	10%
Rigid–pure oxygen	$ 24,004,470	-$ 253,079	-2%
Flexible–pure oxygen	$ 29,332,086	-$ 2,041,169	-9%
Land based grade	$ 72,352,066	-$ 17,417,907	20%
Land based below grade	$ 67,748,173	-$ 13,496,265	19%
Land based liquid oxygen injection	$ 19,628,900	-$ 403,142	-4%
Land based LOX Mechanical filtration	$ 18,858,685	-$ 260,773	-2%
Recirculating aquaculture system	$ 22,622,885	$ 381,467	4%

This significantly reduced ROE, which assumes zero technology-related production problems and no fish health issues, would, as reinforced in the research review, have a negative socio-economic effect because of the reduced number of service industries throughout the entire supply chain and subsequently fewer job opportunities in both Canada (Boulet, Struthers, & Gilbert, 2010) and Norway (Nofima, 2013). The 2013 study by the Freshwater Institute and Norwegian research organization SINTEF (2011) found that a land based indoor salmon farm was more than three times as expensive to operate as a traditional ocean salmon farm. This could ultimately have a negative effect on the sector's contribution to the global economy as well as tax contributions in respective countries, provinces and communities.

From a broader perspective, this approach undermines the vital socio-economic role which salmon farming provides in coastal communities. There is also a potentially significant issue of devaluing the retail price of the final product by removing (a) the cachet associated with "country of origin" labelling, (b) the question of whether consumers are prepared to pay a high price for an "urban" salmon, and (c) the fact that it is illegal to label fish grown for their entire life in a recirculation unit as "organic", regardless of stocking density, feed etc.[9]

The reports also recognize that a reorganization of the salmon industry with increased use of land based farms would encourage a relocation of the production closer to the main markets. This would have major socio-economic impact on economically fragile peripheral coastal communities around the world.

[9] COMMISSION REGULATION (EC) No 710/2009 of 5 August 2009 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007, as regards laying down detailed rules on organic aquaculture animal and seaweed production. (Article 25g Specific rules for aquatic containment systems 1. Closed recirculation aquaculture animal production facilities are prohibited, with the exception of hatcheries and nurseries or for the production of species used for organic feed organisms.)

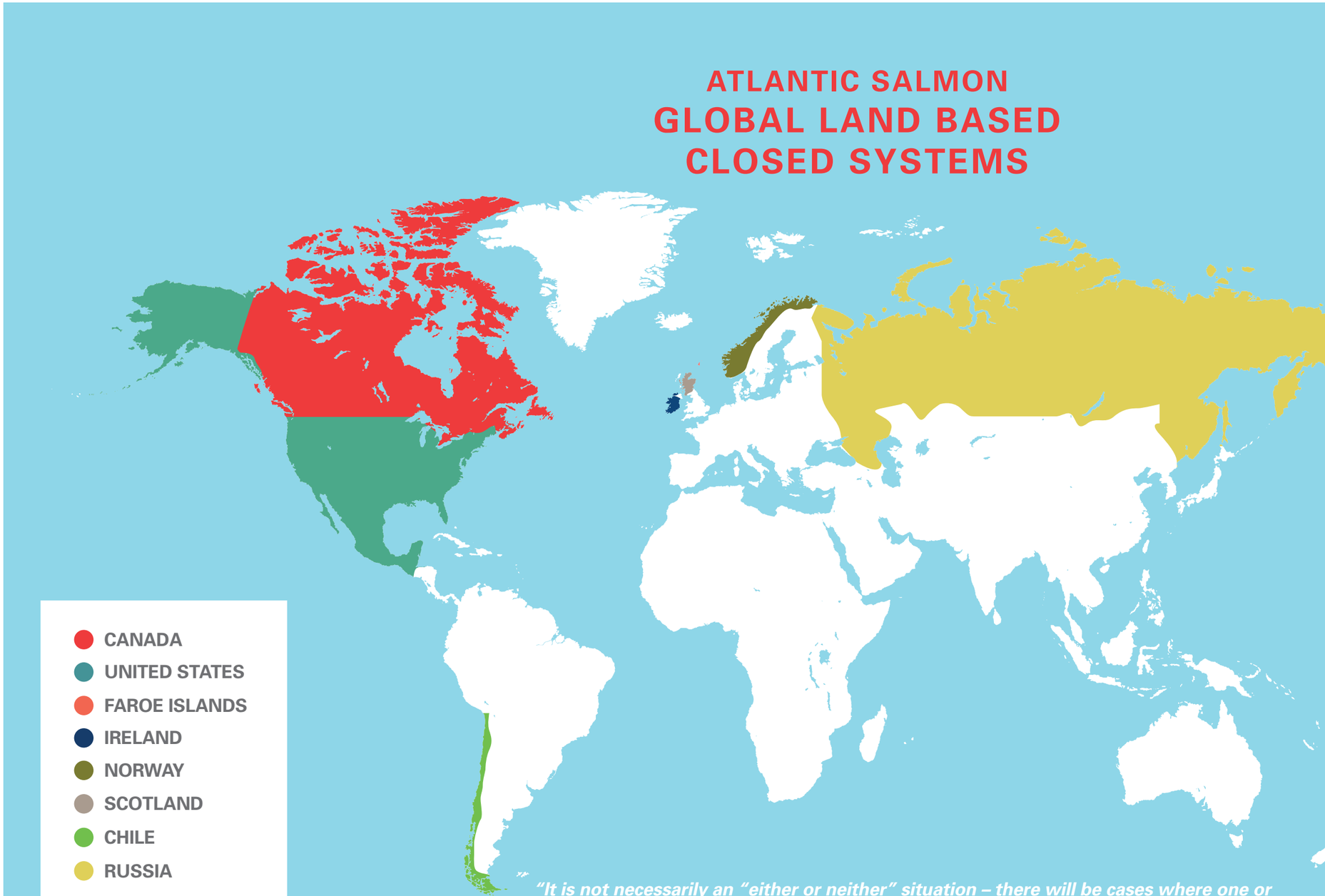
CONCLUSIONS

This report has provided a short overview of the evolution of land based fish farming systems. As this report has shown, growing fish on land is not a new concept. Its origin and current application, remains based on the reality that wild fish stocks have continued to decline while the human population is increasing, and with it the demand for food. Although land based salmon farming technology continues to advance around the world, since its inception to conduct wild stock enhancements in the 19th century, its success to date remains both scale and location dependent. Canada, the United States, Norway and Scotland have seen some recent advancement; in relatively small-scale full cycle grow out of between 300 - 1000 tonnes. However, the industry in all countries continues to invest heavily in research and technology to be feasible at a commercial scale that can meet the global market demands.

Salmon farmers know land based salmon farming must be conducted in a way that recognizes the unique conditions, purpose and needs of each application. These include the responsible use of limited freshwater supplies, electricity and land demands already witnessing tremendous stress for food production, as well as ensuring an appropriate environment to meet each species' life cycle requirements, to produce a quality fish for consumers. Although some may suggest land based fish farming will eliminate the risk of escapes, experience and research have shown there is no guarantee of that, as has been shown since the early days of smolt production for the enhancement of wild salmon stocks.

Finally, the reports reviewed agree – land based fish farms have a quantifiable ecological impact in contrast to the many vague unfounded impacts attributed to traditional net pen production. It is also a documented fact that in such systems fish health challenges can and do occur, that escapes due to handling and human error do occur, and that not 100 per cent of farming waste will be eliminated or contained. The authorities define the acceptable impacts from food production; however, the industry itself has the experience and knowledge necessary to choose the best technology for each farm that will meet the authorities' expectations of the industry.

The salmon farming industry understands the value of land based salmon farming as well as its limitations. As such, it will continue to collaborate with researchers, governments and ENGOs to understand the socio-economic and environmental realities of land based fish farming systems, both the opportunities and limitations, to advance the technology and apply it on a case-by-case, species-by-species basis as technology advances.



"It is not necessarily an "either or neither" situation – there will be cases where one or the other [land based and net pen] will be the most appropriate choice depending on size of operation, location and traditions, etc."

Ivar Warrer-Hansen, Head of Business Developments, Inter Aqua Advance A/S.

APPENDIX A:
EXAMPLES AND STATUS OF LAND BASED AND CLOSED SYSTEMS

Adapted from Warrer-Hansen, Technologies for viable salmon aquaculture: An examination of land based closed containment aquaculture, 2015

COMPANY	COUNTRY	PLANNED PRODUCTION	STATUS
Namgis/Kuterra	**Canada**	**300MT/annum**	Heavily subsidized project. Capital cost estimated at $7.5M but reached $9.7M. Estimated cost is ~$30 million when stocked compared with a Fisheries and Oceans Canada (DFO) estimate of $5 million to install and stock a net-pen operation.[10] Achieving a level of production equivalent to ~250 metric tonnes/year. If this level of production cannot be increased, capital costs would be roughly 12 times higher than the norm in the net pen industry. [11]
BDV SAS	**France**	**100MT/annum**	System operating for 3 years. Simplistic design with two tanks. Design not suitable for up-scaling. Fish grown in 20 ppt salinity.
Freshwater Institute	**United States**	**Cohorts @ 5.4MT**	Research facility; fish sold in local markets. This initiative is providing data on growth rate, survival, fish density, and early maturation of male salmon within a freshwater commercial-scale closed containment system.
Danish Salmon	**Denmark**	**2,000MT/annum**	Began operation April 2015; no conclusion on performance yet.
Shandong Oriental Ocean Co.	**China**	**300MT/annum**	Difficulty in meeting projections (Seafood Source Feb 12/14)
Little Cedar Falls	**Canada**	**100MT/annum Steelhead Salmon**	Report a harvest of 2MT weekly
Bell Aquaculture	**United States**	**100MT/annum Coho**	Media sources report in spring/summer 2015 and again in February 2016 business is being sued by creditors.
Sustainable Blue	**Canada**	**100MT/annum Coho**	Electricity failure caused it to close. Restarted in 2015 and now marketing fish.
Langsand Laks AS	**Denmark**	**1,000MT/annum**	755MT achieved. Problems with disease due to inadequate sterilization of water in-take. System closed for reconstruction.
Swift Aquaculture	**Canada**	**1000MT/annum Coho**	Raises eight to ten tonnes of coho salmon per year and using waste water from the tanks to grow watercress and wasabi.
AgriMarine Holdings Inc.	**Canada, China and Norway**	**Licensed for 1200MT/annum**	In development

[10] http://www.vancouversun.com/news/metro/salmon+farming+comes+ashore+land+based+aquaculture/7562924/story.html [11] http://aquaculturenorthamerica.com/Finfish/land-based-salmon-still-not-investor-ready_1/#sthash.M0kqs7wZ.dpuf

COMPANY	COUNTRY	PLANNED PRODUCTION	STATUS
PLANNED OR UNDER CONSTRUCTION			
Xinjiang E'he Construction & Investment Co.	**China**	**1,000MT/annum**	Announced but no information
Salmo Scania	**Sweden**	**6,000MT/annum**	Planned construction
Swiss Alpine Salmon	**Switzerland**	**600MT/annum**	Planned for 2015
Hansholm	**Denmark**	**2,500MT/annum**	Planned for 2015
Namgis	**Canada**	**2,000MT/annum**	Planned expansion for 2016
Hudson Valley Farms	**United States**	**1,000MT/annum Steelhead trout**	Planned for 2016; building cost roughly $10-$15US per kg
FishFrom	**Scotland**	**3,000MT/annum**	Seeking investment of $31.7 million US since 2013
LAND BASED SYSTEMS & OCEAN BASED SOLID WALL SYSTEMS TRIALED/BUT NOW CLOSED			
Aqua Seed Corp/ Sweet Springs	**United States**	**100MT/annum Coho**	Growth under expected/closed down
Teton Fisheries /Miller Colony	**United States**	**100MT/annum Coho**	Opened in 2010; closed 2012
Middle Bay/ AgriMarine	**Canada**	**Chinook**	Solid wall ocean tank installed 2011. Storm in March 2012 resulted in structural damage; fish that did not escape were harvested. Planned installation of new tanks did not take place.

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APPENDIX B:
A SUMMARY OF THE REFERENCED PAPERS

Warrer-Hansen, I., Potential for Land Based Salmon Growout in Recirculating Aquaculture Systems (RAS) in Ireland. Ireland. 2015.

This report, commissioned by the Irish Salmon Growers' Association, assessed the viability of land based salmon production in recirculation aquaculture systems (RAS) under Irish conditions. The report included detailed information on capital expenditure and operational costs as well as the market situation for salmon in 2014/2015. The report did not make comparisons with respect to economics between land based production and conventional production. This was due to in part to the lack of comparison data available because the bulk of Irish salmon production is organic and land based salmon production in RAS would not be eligible for EU organic status. The report described in detail all technical aspects of RAS production and system design and operations as well as important biological aspects of land based salmon production. It concluded that RAS is a proven technology and that it has a valuable role to play in the freshwater part of the life cycle of the salmon. The authors noted that the Irish industry could gain efficiencies by using RAS to increase smolt size/weight prior to transfer to sea, which would enhance productivity with a faster turnover of stock, reduced disease risk (including parasites such as sea lice) and improve overall efficiency of marine site use. The study noted that it was possible to produce a market-size salmon in RAS and that some pilot-scale units have managed to place approximately 1,000 tonnes in the marketplace over the last few years.

http://www.ifa.ie/wp-content/uploads/2015/09/Land-based-report-IWH-final-Aug-2015.pdf

Gardner Pinfold; Feasibility of Land Based Closed-Containment Atlantic Salmon Operations in Nova Scotia. Canada. 2014.

This study incorporated accepted design parameters and operating assumptions and used current (at the time) capital and operating costs for Nova Scotia conditions. The authors cautioned readers that some assumptions had not been confirmed in actual commercial operating conditions, particularly in larger scale systems. The authors pointed out that there are concerns with land based systems regarding water use (use of groundwater, harmful metals and depurating water source) and energy costs. Critical biological factors were noted as feed conversion, thermal growth coefficient and mortality, and technical factors included temperature, stocking density, energy requirements and labour. Financial analysis suggested that land based closed containment systems operate at an economic disadvantage because much of their cost goes toward creating the growing conditions that occur naturally within the ocean (water chemical properties and temperature, current and tidal action). The report challenged the notion that economic viability can be improved because land based product can demand a higher price in the market place. They argued that as competitors enter the market with the same product or close substitutes, that the premium price would be eroded and cautioned that consumer tastes and preferences may also change.

http://novascotia.ca/fish/documents/Closed-Containment-FINAL.pdf

Government of Canada; Closed Containment Salmon Aquaculture: Report of the Standing Committee on Fisheries and Ocean. Canada. 2013.

In October 2011, the Canadian Parliament Standing Committee on Fisheries and Oceans undertook a study on closed containment salmon aquaculture. The final report was developed following 18 meetings with scientists and academics, the aquaculture industry, consultants, Aboriginal groups, environmental organizations, coastal communities, retailers, recreational and traditional fishermen. Committee members recognized that closed containment aquaculture carries its own set of environmental effects and the carbon footprint generated by closed containment facilities drawing electricity, pumping in water, filtering waste, may be significant. The report concluded that closed containment technologies are well developed and have been used for decades for a number of different species of fish when proven feasible.

http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=5994887&File=66

Nofima; Oppdrettsteknologi Og Konkurranseposisjon (Translated: Farming Technology And Competitive Position). Norway. 2013.

This report noted that several onshore production systems were tested from 1970 through 1990 and the experiences were shared via Braaten et al 2010. Overall, these systems were not successful for a variety of reasons including that flow through systems experienced incidents of winter-ulcer disease in the fish. Recirculating aquaculture systems provided good control of conditions and can be beneficial for smolt production if the facility is designed and operated properly; however, they were not successful for full grow-out. Energy costs were significant associated with pumping water and would not be eliminated even in a facility where 99 per cent of the water flow is recirculated. Energy is also used to pump water ashore or from freshwater sources and to heat or cool water. The report discusses challenges in optimizing fish health management parameters including biosecurity, water quality, salinity levels and tolerance to high fish densities.

The report questioned the extent of feed-based pollution from marine farms and suggested that the increase in material resources and energy negate any value in collecting feed and solid waste. The report challenged the extent to which onshore systems provide a solution to sea lice, spread of disease and fish escapes due to the limited experience and knowledge from the full-scale operation of farms on land.

The authors noted that the potential exists for technical solutions to be found that would eliminate farm fish escapes and reduce problems of lice. They noted that this was the better option than the environmental impact from increased material, resource and energy consumption of land based operations – which would be less irreversible. The report also challenged the notion that the topography and/or access to suitable land are available to support the infrastructure necessary to develop land based operations. The report questioned the impact that relocating production on land and the subsequent shift to highly skilled labour would have on socio economic conditions within coastal communities. A move to land based operations would also affect the entire supply chain associated with the industry including processing facilities and the service and supply sector.

APPENDIX B:
A SUMMARY OF THE REFERENCED PAPERS

Summerfelt, et al.; Freshwater Grow Out Trial 0f St. John River Strain Atlantic Salmon in a Commercial-Scale, Land Based Closed Containment. Canada. 2012.

This report summarized the results of an Atlantic salmon grow-out trial in a freshwater closed-containment system at The Conservation Fund's Freshwater Institute (TCFFA) (West Virginia, USA), with grant support provided by the Atlantic Salmon Federation (New Brunswick, Canada). The initiative provided data on growth rate, survival, fish densities, feed conversion, primary variable costs, waste loads, fish health, pesticide/antibiotic use and other key parameters for Atlantic salmon production to food-size over 12 months within the Institute's freshwater closed containment system. The findings of this study were intended to assist future decision-making by the North American salmon farming industry, government regulators, funders, and conservation advocates, resulting in better-informed decisions as the industry continues to grow.

The report noted that the majority (approximately 80 per cent) of male salmon observed reached sexual maturity within the 24-month grow-out trial. The fillet color and yield of maturing males was found to be lower than for non-mature fish, a serious constraint to production in land based closed-containment systems. The Conservation Fund Freshwater Institute suggested that based on previous research at the Institute an all-female strain (the Gaspe strain) could be produced to eliminate early maturing male salmon, as done in other species such as trout and Arctic char. They also noted that the Atlantic salmon egg source should provide eyed eggs at least once every six months to maximize the production capacity within land based closed-containment systems. Assuming that all female-eyed eggs were available four times annually, the capital cost for this egg to plate facility would be estimated at approximately $31 million; production cost was estimated at $3.90-$4.00 per kg of head on gutted salmon.

http://0101.nccdn.net/1_5/05c/2da/0c0/summerfelt2013growoutatl-salm.pdf

SINTEF; Oppdrett Av Laks Og Orret I Lukkede Anlegg Forprosjekt (Translated: Salmon and Trout in Closed Containment Pilot Project). Norway. 2011.

This report summarized the status of knowledge of closed farms and a number of proposals for new designs and materials; to date there were few systems that had been tested with fish or that had reported results in a scientific verifiable format. The report provided an overview of the various closed systems but concluded that closed aquaculture facilities could not currently be regarded as commercialized and that considerable effort was needed to understand the technological, biological and economic factors required to succeed in making full life cycle salmon farming viable. The authors raised concerns that considerably more space is required along the coast if closed systems were to be used. While there may be some possibilities available for closed systems, the authors concluded that there may be increased opportunities to expand technological development to reduce the environmental impact of ocean based farms. The project group concluded increased knowledge was required in the fields of biology, construction, management and economics, before any consideration in the development of closed construction technology for full grow out of salmon. A research pilot project was recommended that would be subject to scientific criteria in terms of method descriptions, reproducibly, expressive power and peer review. They recommended the development, design and large-scale testing of future closed plant types should occur in open collaboration with key equipment manufacturers.

https://www.sintef.no/en/projects/salmon-farming-in-closed-systems-preliminary-proje/

Boulet, Struthers, & Gilbert; Feasibility Study of Closed Containment Options for the British Columbia Aquaculture Industry. Canada. 2010.

This study used financial analysis tools to conduct an analysis of two technologies warranting a more in-depth financial and sensitivity analysis, net pens and recirculation aquaculture systems (RAS). This study considered financial elements only. The results of the analysis showed that while RAS technology is marginally viable from a financial perspective, returns were significantly higher for net pen. RAS technologies were projected to be considerably more sensitive to market forces (e.g., exchange rate and market price) and may likely prove non-profitable within a range of variability that has actually been experienced by the Canadian salmon aquaculture industry. These sensitivities are due largely to the high initial capital investment and subsequent costs associated with it. Although RAS production showed efficiencies in biological feed conversion ratio (FCR), temperature stability, and improved environmental control, the presence of higher capital costs, energy costs and labour requirements significantly affected its overall profitability. The report concluded that the findings need to be assessed, and their assumptions validated in a real-life scenario. Potential next steps included a pilot scale or demonstration system capable of producing salmon at commercially viable levels to demonstrate the technical and financial feasibility of closed-containment rearing of salmon under real world conditions. The study authors also suggest that a life-cycle analysis of such a demonstration facility should also be undertaken and compared with that of net pen production as outcomes of such further analyses would be required in order to determine next steps and to guide government policy direction as it relates to closed-containment for salmon aquaculture.

http://www.dfo-mpo.gc.ca/aquaculture/programs-programmes/BC-aquaculture-CB-eng.pdf

Wright, A. S., and Arianpoo, N.; An Examination of Land Based Closed Containment Aquaculture (Draft). Canada. 2010.

Prepared for the SOS Solutions Advisory Committee, established to provide advice to the SOS Marine Conservation Fund's Save our Salmon Initiative, this report documented an investigation into the feasibility of land based closed containment technology for utilization in the British Columbia aquaculture industry. The report concluded that land based closed containment are economically and technically viable using commercial off-the-shelf components. They presented a design that, if refined, would allow for substantial reductions in both capital and operating expenses. The economics associated with the report allowed an investment of approximately $12 million to operate a farm that yielded 1000MT of 5kg fish and 750MT of fillet and plate-size fish per annum. That harvest allowed revenue streams of between $10 million and $20 million per annum depending upon the harvest and supplementary crop production strategies that were adopted. Final annual income after costs ranged between $5 million and $13 million, depending on harvest and supplementary harvest strategies. The authors noted that the report did not claim to contain all of the information that may be required and advised that individual investors should conduct their own independent analysis of the opportunities and the data contained or referred to in the report.

http://www.farmedanddangerous.org/wp-content/uploads/2011/01/technologies-viable-salmon-aquaculture-draft-2010.pdf

APPENDIX B:
A SUMMARY OF THE REFERENCED PAPERS

Grant, A. and Muir, J., Closed Containment Systems for Farmed Atlantic Salmon in Scotland - An Appraisal. Scotland. 2009.

This assessment, commissioned by the Scottish Salmon Producers Organization, focused on four categories of closed containment systems: simple flexible or semi-constrained impermeable bags suspended from appropriate structures, using established mooring and platform technologies, solid floating structures, land based tank or raceway systems and land based recycle systems. The report examined evidence for the ability of current and emerging closed system aquaculture technologies to replace net-pens in both fresh and seawater for Atlantic salmon production in Scotland. This assessment discussed system issues including preliminary design (i.e. concepts and materials, control systems, disinfection, waste management), scalability, robustness and resilience, performance standards, site criteria, biological interactions and failure protection. It also considered operational issues such as husbandry and management, water quality, fish health and welfare. Performance measures included the economics (capital and operating costs, life cycle analysis and footprint, key sensitivities, insurance and other costs), consumer perception and competition. The results of the study recognized that work is ongoing but for the marine growing stage, current closed containment environmental footprints are much higher with respect to energy (which also implies carbon and global warming impacts) and availability of sites for onshore systems is problematic, and there are no commercially scalable systems currently available for realistic production alternatives. The authors concluded that while closed containment systems for the freshwater production stage have merit, as currently proposed or developed these systems do not offer adequate advantages, and that the many disadvantages are insufficient to balance against the proposed merits for full grow-out of salmon.

EcoPlan International Inc. (EPI); Global Assessment of Closed System Aquaculture. Canada. 2008.

The David Suzuki Foundation and the Georgia Strait Alliance retained EPI to provide a review of commercial closed system aquaculture (CSA) technologies throughout the world, emphasizing those technologies and species most relevant to British Columbia. Commissioned to provide information to aid in assessing the economic and technical growth potential of aquaculture in the CSA sector, it examined a variety of technologies and methods used in commercial production as well as several emerging technologies, highlighting advantages and disadvantages of each. The report concluded that aquaculture will remain important in providing fish for the global food supply and new technologies, trade, consumer demands and regulatory changes will influence the development of CSA. It noted that technological advancements (i.e., energy efficiencies), regulatory developments and the selection of species would need to recognize the local variables such as climate, water availability, alternative energies, access, and socio-economic conditions, amongst others, to determine local suitability of CSA.

http://www.farmedanddangerous.org/wp-content/uploads/2011/01/ClosedSystemAqua-FINAL.pdf

Canadian Science Advisory Secretariat, Fisheries and Oceans Canada; Assessing Potential Technologies for Closed Containment Saltwater Salmon Aquaculture. Canada. 2008.

The Canadian Science Advisory Secretariat (CSAS) of Fisheries and Oceans Canada facilitated a scientific review of potential closed containment technologies that engaged international experts, academia, industry and conservations organizations. This review took a methodical approach to examining five types of production systems: conventional net pen; floating, closed-confinement systems with rigid walls; floating, closed-confinement systems with flexible walls; land based flow-through system; and, a land based reuse system. The CSAS review was based on information from over 40 case studies of various types of closed containment technologies attempted for the commercial scale production of finfish, including Atlantic salmon and peer-reviewed expert technical papers. At the time of the review, no commercial-scale closed-containment systems for the exclusive full life cycle production of Atlantic salmon were operating. Land based recirculating systems were generally producing less than 1,000 metric tonnes per year and scaling up was expected to create technical and operation challenges, as RAS had not been proven for adult salmon. The study noted additional attention should be given to the development of closed-containment technology in floating, in-water installations. Any work that had been done was focused primarily on developing vessels for containing the fish waste and feed. The report recommended research focused in the areas of economics, technology, fish health and welfare and waste input/outputs to gain the knowledge required to evaluate the overall performance of any closed-containment system on a commercial production scale.

http://www.dfo-mpo.gc.ca/csas-sccs/publications/SAR-AS/2008/SAR-AS2008_001_e.pdf

Pacific Salmon Forum Final Report and Recommendations to the Government of British Columbia. Canada. 2009.

The Forum's report to government concluded that while several British Columbia groups as well as the Special Committee on Sustainable Aquaculture had called for the imposition of water-based or land based closed containment technology for salmon farming, due to the high degree of public misinformation on closed containment, many questions needed to be answered before it could be considered viable. To resolve these questions the Forum recommended that the Province establish an independent technical committee to develop the specifications for a closed containment pilot project. This project would provide the information necessary to confirm the profitability of closed systems for salmon production.

Additional information can be found at https://www.leg.bc.ca/content/legacy/Web/cmt/38thParl/session-3/aquaculture/reports/PDF/Rpt-AQUACULTURE-38-3-Volume1-2007-MAY-16.pdf#search=special%20committee%20on%20sustainable%20aquaculture%20final%20report

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The following organizations contributed to the development of this report:

NORWEGIAN SEAFOOD FEDERATION

SALMON CHILE

SCOTTISH SALMON PRODUCERS ORGANIZATION

CANADIAN AQUACULTURE INDUSTRY ALLIANCE

ATLANTIC CANADA FISH FARMERS ASSOCIATION

NEWFOUNDLAND AQUACULTURE INDUSTRY ASSOCIATION

BRITISH COLUMBIA SALMON FARMERS ASSOCIATION

FAROE ISLAND SALMON FARMERS

TASMANIAN SALMONID GROWERS ASSOCIATION LTD (TSGA)

MAINE AQUACULTURE ASSOCIATION /USA

IRISH SALMON GROWERS ASSOCIATION

NEW ZEALAND SALMON FARMERS ASSOCIATION INC.

ICELANDIC AQUACULTURE ASSOCIATION

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