Registration Submission for the New Brunswick Department of Environment: Environmental Impact Assessment

Land Based Proposal for Indoor Shrimp Recirculating Facility

Prepared and Submitted by: A.Bonney & G.Leavitt (Reel Shrimp Inc., June 2016)

Submission Contents

Land Based Proposal for Indoor Shrimp Recirculating Facility

Proponent

Reel Shrimp Inc.
200 Main St.
Blacks Harbour, New Brunswick

E5H 1A7

Contact Person for purposes of EIA

Griffin Leavitt, Director of Operations
Griffin.leavitt@icloud.com
506-754-6533

The Undertaking

Project Overview

The project is based on a land-based intensive recirculating enclosed facility, for production of White Pacific Shrimp in Blacks Harbour, New Brunswick.

White Pacific Shrimp (*Litopenaeus vannamei)*
Initial Origin: Post Larvae produced at Shrimp Improvement Systems facility at Islamarda, Flordia USA.

**No genetically modified species to be reared*

Purpose and Rationale for Undertaking

Background Information

The White Pacific shrimp is native to the Western Pacific Coast of Latin America, from Peru to Mexico where the water temperatures are 70F degrees. It is a large species that can only be caught in the Pacific Ocean White Pacific Shrimp is a *Litopenaeus vannamei* indigenous species that grows to a maximum length of 230 millimeters (9.1 in), with a carapace length of 90 mm (3.5 in). Adults live in the ocean, at depths of up to 72 meters (236 ft.), while juveniles live in estuaries. The rostrum is moderately long, with 7–10 teeth on the dorsal side and 2–4 teeth on the ventral side. Like most other species of Shrimp, White Pacific Shrimp can be cultured in artificial recirculating environments.
Shrimp are considered to be a staple food source. As Canada diversifies as a nation and becomes a melting pot a market is born that supports all different types of international food; this is why the demand in Canada is growing for local fresh shrimp.
The number one imported seafood into North America is shrimp, China along with other Asian countries such as Thailand and Vietnam make up the greatest percentage of Shrimp exporters feeding over 90% of imported shrimp in North America.
Shrimp has a 15% share of the total seafood consumption globally and is the second most important seafood in the world behind salmon. Shrimp has been the most traded species for decades.

Project Objective

Reel Shrimp Inc. will be located in Blacks Harbour, New Brunswick. As the main component of this operation, an intensive commercial scale recirculation system will be constructed for the specific purposes of White Pacific Shrimp production. The system is

comprised of twelve tanks 18ft in diameter 4ft deep. A heating system will be used to maintain water temperature between 24 – 26 degrees Celsius, which is required to complete a shrimp production cycle.

Project Location

The project is to be located on Industrial Lane in Blacks Harbour, New Brunswick. The Service New Brunswick (PID) parcel identification number is 15051444. An aerial photograph of the site is included in the submission (Appendix 1). The proposed site is approximately 0.6 kilometers away from any residential areas. There are no other inland aquaculture fish farms in the municipality.

Site Considerations

The proposed shrimp production facility is 100 meters from the Blacks Harbour well municipal wastewater treatment facility (Appendix 1). The proposed shrimp production facility will receive all water from the Blacks Harbour municipal well supply. That water source is tested on a daily basis by the municipality; an analysis of water samples for inorganic parameters and organic parameters is attached (Appendix 2).

Public Consultation

CAO of Blacks Harbour Heather Chase has conducted a counsel meeting with the Village of Blacks Harbour council members, all attendees have approved the proposed land based shrimp facility. Two letters will be sent to local MLA Rick Doucet and the adjacent landowner of the proposed facility site informing them of the EIA being conducted.

Physical Components and Dimensions of the Project

The project objective is to construct one large 125ft x 50ft building that will incorporate a heating and recirculation system for the sole purpose to produce White Pacific Shrimp.

Total dimensions of the building 125ft x 50ft x 12ft.

- The total area of the purposed site including the building is1 acre.

Proposed Recirculation Facility:

The proposal for a new construction (planned location shown on aerial photograph, Appendix 1) will include a12-tank production system housed in an insulated building that will also cover the recirculation infrastructure for those tanks. The building will be cathedral roof type structure “125 x 50 x 12” which encloses 12, 18ft diameter tanks configured in two linear rows of 6 tanks each. Total tank volume for the two rows is approximately 259 cubic meters.

Recirculation System Design

The tanks are initially filled from the municipal water supply (Appendix 2) that will be dechlorinated onsite through a charcoal filtration system. The culture environment is full salinity marine. To achieve this salt is added at an optimal ratio of 780 pounds per tank water volume. During continual operation a minimal amount of water is added to the tanks, which is just enough to replenish the amount of water lost to evaporation. The water is continuously being recirculated by pumps through PVC pipe on the inside of the tanks that are spaced apart; each has an air stone configured to move water in to move water in a circular motion within the tank. A central airlift system brings waste and feed from the bottom of the tank for removal. Two 1.5 hp. regenerative blowers are used to supply aeration for the system.

The water demand for the initial start up is 68,817.60 US Gallons. The only water needed to be replaced will be that lost through evaporation.

Biofloc System Requirements

Biofloc bacteria will be introduced to the system acting as a filter and a secondary feed source for the shrimp.

Biofloc shrimp farming replaces the algae of outdoor shrimp ponds, with beneficial bacteria and protozoans. Like algae in outdoor shrimp ponds, the microorganisms in the Biofloc are a feed source. These microorganisms not only act as a midnight snack for the shrimp, but also provide biological filtration for the shrimp by metabolizing nitrogen waste products. Think of them as the trees in our environment, but instead of recycling harmful carbon dioxide to the oxygen we breath, the Biofloc recycles a harmful form of nitrogen to a neutral form of nitrogen. Many studies have shown that shrimp grow better in Biofloc systems. Scientists also hypothesize that the Biofloc bacteria outcompete harmful, pathogenic bacteria that can cause shrimp and human diseases, similar to probiotics.

Construction Details (Recirculation facility)

Anticipated duration of project construction (on approval to construct NB-DOE):

Stage 1) Site Preparation: September 2016 (clearing of purposed lot, excavation of existing grounds, proper fill materials to be brought to site.

Stage 2) Ground work and concrete slabs poured October 2016.

Stage 3) Building Construction October/November 2016, pre-engineered building installation.

Stage 4) Installation of electrical/plumbing etc. November 2016.

Stage 5) Installation of tanks and recirculation infrastructure December 2016. (All drains and above ground piping, recirculation equipment.

Stage 6) Initialization of culture systems; validate system operational efficiency January.

Hours of construction September 2016– January 2017- 7am to 5pm

Details of Anticipated Effluent Treatment

It is predicted that this closed recirculating system will pose minimal environmental impact due the minimal amount of effluent that will leave this facility.

Any effluent leaving the building is miniscule, originating from drippings from harvesting and washing of floors, which would then be treated at the municipal wastewater treatment facility, which is located 100 yards from the proposed site. The Bacteria found in the recirculation system water are both autotrophic and heterotrophic; they convert ammonia to nitrites and nitrites to nitrates.

The only chemicals used in the facility are for water testing; ammonia/nitrates/nitrites.

Waste Disposal:

The liquid waste from the facility will enter the municipal sewage system. Any solid waste will go to a recognized landfill.

Chemical Disposal:

We do not anticipate any significant use of chemicals for treating shrimp or cleaning tanks or culture infrastructure. The only chemicals being used are strictly for water testing, the same chemicals are used by the village of Blacks Harbour to conduct municipal water testing.

Disposal of shrimp due to stock loss:

Given adequate culture conditions, shrimp at the site will not suffer large mortality rates given the 90% consulting survival rate. However should an event such as this occur the shrimp would be sent to a recognized composting facility.

Proposed Rearing Plan

The proposed production of White Pacific shrimp is premised on introduction of shrimp that have been reared at the Shrimp Improvements facilities in Florida. These will have a proper health certificate documentation as required by Environment Canada. This is the same process that the facility that First Ontario Shrimp in Ontario receives their stock from.

The shrimp will be received from the Florida facility at the post-larvae stage and will be grown for three months or 12 weeks to reach market weight of twenty grams. The total of shrimp larvae received each year will total 381,000 individuals. This equates to approximately 7000 shrimp in each tank at any given time.

Food Ration and Feeding Strategy

All the shrimp in the tanks in the recirculating facility will be fed to satiation each day. The amounts of food introduced into the various tanks will be routinely recorded. For the recirculation system, food will be introduced three times each day (every 8 hours from 6am to 10pm daily). The average food ration (based on feeding to satiation) for each individual shrimp is an average of 9 grams for a single production cycle. (From introduction to tank to harvest.)

Mitigating disease

Indoor shrimp farming is an inland marine production system that is highly controlled by using a Recirculation Aquaculture System (RAS) to produce high quality shrimp. The RAS is considered to be an extremely environmentally friendly, disease controlled, contaminant free and bio secure operation. The use of a RAS system for shrimp production has become the standard for safe aquatic food production and poses no harmful discharge to the environment. Therefore, the following diseases identified are most prevalent in pond shrimp farming.

White Spot Syndrome Virus (WSSV)

White spot syndrome is a viral infection of penaeid shrimp. This virus was one of the first economically significant diseases in shrimp production. The disease is highly lethal and contagious, killing shrimp quickly.

According to Fisheries and Oceans Canada, 2011 WSSV is considered a category one and not reported in Canada.

Outbreaks of this disease have wiped out within a few days the entire population of many pond raised shrimp farms throughout the world. All life stages are potentially susceptible, from eggs to brood stock. Vertical transmission occurs from infected brood stock and the horizontal transmission of disease is usually via cannibalism of sick or dying prawns, or directly through contaminated water. Birds can also transmit the disease from pond to pond by releasing caught prawns over neighbouring ponds.

WSSV can persist and retain infectivity in seawater at 30ºC for at least 30 days (under laboratory conditions) and for at least four days in ponds. Viral multiplication and disease appears to be induced by environmental and handling stress such as eye-stalk ablation, spawning, moulting, and changes in salinity, temperature and pH and during plankton

blooms. Imposing such stressors on suspect populations can be a useful method to increase the probability of detecting the virus.

The vast majority of these diseased shrimp are accounted for in pond growing shrimp farms in result of such uncontrolled environments.

Taura Syndrome Virus

Taura Syndrome Virus (TSV) caused serious infections and high mortalities (cumulative losses of 80 to 95%) in cultured post larvae and juvenile P. vannamei. It is best known as a disease of nursery phase P. vannamei and usually occurs within about 14 to 40 days of stocking post larvae into grow-out ponds or tanks.

TSV causes death in juvenile and adult crustaceans. In 75 to 95 percent of cases, death occurs within one week of the appearance of disease. It is spread between crustaceans by cannibalism, and water contaminated with the virus. People can also spread the disease by moving any of the following; infected live or dead crustaceans, contaminated equipment, or contaminated water.

Diagnosing TSV requires laboratory testing. Not all infected crustaceans will show signs of disease. There are no treatment options currently available for TSV.

Necrotizing Hepatopancreatitis

Determined to be a new genus and new species of bacterium in the alpha Proteobacteria that is apparently obligate intracellular in hepatopancreatic epithelial cells.

This bacterial infection is also demonstrated in pond-raised shrimp mainly cultured in Peru, Ecuador, Venezuela, Brazil, Panama, Costa Rica and Mexico.

This is a gram-negative bacterium that shows clinical signs of reduced feed intake, softened shells, flaccid muscle tissue, darkened gills and atrophy of the hepatopancreas organ. Elevated mortality rates may approach more than 90% within 30 days of the onset of clinical signs if left untreated.

Methods of control are best reached by avoiding high water temperatures (more than 29 - 31 °C) and elevated salinities (more than 20 - 38 ppt) for periods of several weeks. These methods have been shown to precede the development of this disease.

Disease Prevention and Control

Due to the potential for losses associated with disease outbreaks, we have developed various control strategies. The most important being stock control. This method uses captive or domesticated stocks, cultured under controlled conditions, and which have been subject to an active disease surveillance and control program. Once a controlled culture system with disease free stocks is in place, other disease control practices focus largely on pathogen exclusion by stocking specific pathogen free (SPF) larvae or post larvae, decontamination and filtration of water to prevent pathogen vectors, or wild shrimp introduction, and strict biosecurity at the hatchery.

Water Use

The water (new/makeup water) available at the proposed site is from three wells owned by the village of Blacks Harbour. We will use minimal amounts of well water after the tanks are initially filled; the water in the tanks recirculates, makeup water will only be added due to evaporation. Recent water testing of the municipal source is included in (Appendix 2).

Predicted Water Volume Requirements

The water demand for the initial start up is 68,817.60 US Gallons. The water for this facility during continual operation will all be municipal well water origin. Dechlorination of the water source will take place inside the shrimp facility using charcoal filtration system.

Physical and Natural Features

Reel Shrimp Inc. has applied for an aquaculture license with NB-DOE for fish culture. Current Information as related to the physical and natural features:

-Site topography is shown on the topographic map of the site enclosed in (Appendix 1).

- There are no geological or hydrogeological features that will be impacted by construction or operation of the proposed culture production.

- There are no predicted adverse environmental conditions that are anticipated as a result of the construction or operation of the proposed facilities.

- There are no residential wells in the municipality of Blacks Harbour and the village wells are located outside of the village limits.

Existing Environment

The purposed facility site in Blacks Harbour is partially cleared as shown in (Appendix 1b). The one-acre site has approximately 50ft x 50ft of treed area that will be cleared and hauled out of the area. The clearing will occur in September after the migratory bird-nesting season concludes.

Design of proposed effluent treatment and its relationship to environmental impacts on adjacent receiving waters

All effluent leaving the building will be directed to the Blacks Harbour municipal wastewater facility.

Locations of other aquaculture or fishery activities

There are no land based aquaculture facilities within a distance of 10 kilometers from the village of Blacks Harbour.

Summary of Environmental Impacts

Effects of environmental impacts (construction mode)

The construction phase involves clearing of land and bringing in fill as required completing the recirculation building. There will be one sanitary sewer main installed connecting to the municipal sewage system. We do not anticipate any negative environmental impacts during the construction phase of the project.

Impact on adjacent activities:

There should be no impact to the local fishery sector. There are no effects to any established businesses in the provincial region.

Summary of Proposed Mitigation

The objective of the proposed effluent treatment strategy is to limit any environmental impacts on the receiving waters; the minimal amount of water that leaves the proposed facility will be treated through the municipal sewage system before being discharged into the Bay of Fundy.

Monitoring of water quality

Recirculation system water quality parameters (oxygen, pH, Ammonia, carbon dioxide, salinity, nitrite, nitrate, temperature, particulate loading, bacteria biomass) will be monitored routinely to ensure production success.

Literature Cited

http://www.thefishsite.com/diseaseinfo/42/white-spot-syndrome-virus/

http://www.dfo-mpo.gc.ca/science/aah-saa/diseases-maladies/wssbcsp-eng.html

http://www.agriculture.gov.au/SiteCollectionDocuments/animal-plant/aquatic/field-guide/4th-edition/crustaceans/white-spot-disease.doc

http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1350&context=etd

Appendices

Appendix 1a. Photographs and Maps showing the location and culture infrastructure of the proposed Reel Shrimp Inc. site. Aerial photograph

1b. Aerial photograph with proposed building outline.

Appendix 2. Schematic Diagram of Purposed Facility

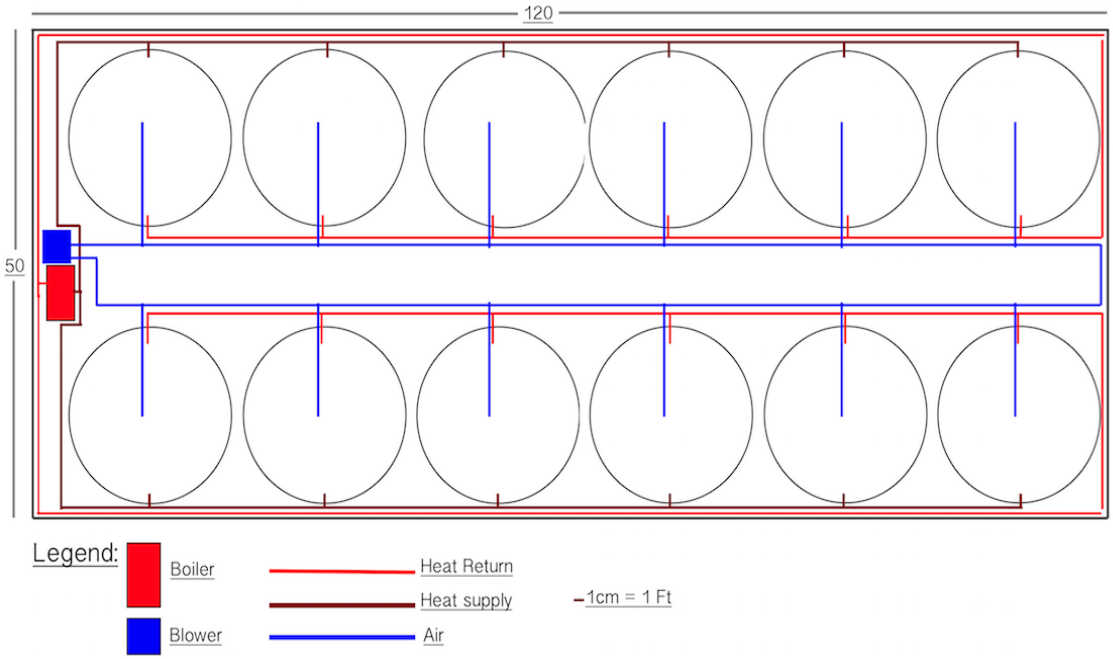
Appendix 3. Sample Building Plan

Appendix 1a: Purposed Site PID #15051444 will be subdivided, please refer to appendix 1b.

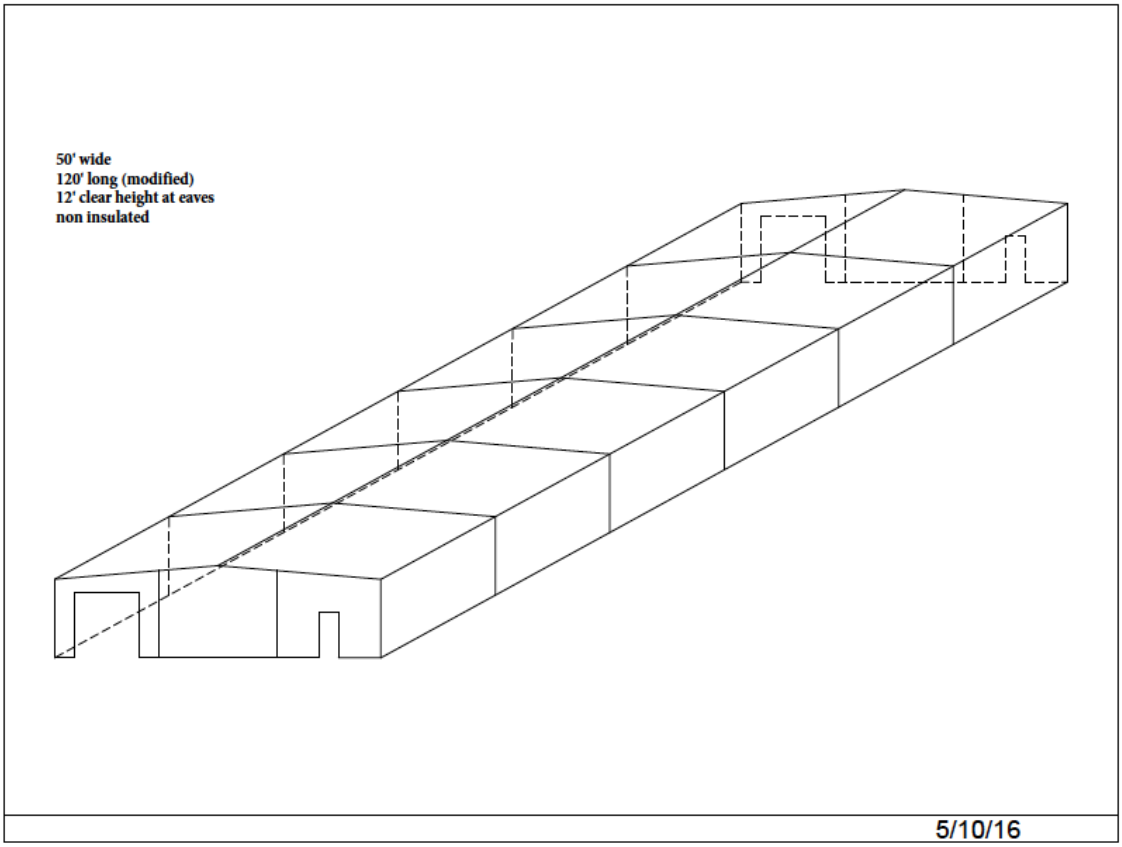

Title: Development 10052016
Scale/Échelle: 1:7,407
Date: 5/10/2016
Printed by/Imprimé par:
While this map may not be free from error or omission, care has been taken to ensure the best possible quality. This map is a graphical representation of natural and man made features which appproximates the size, configuration and location of the features. This map is not intended to be used for legal descriptions or to calculate exact dimensions or area. SNB makes no representations or warranties, either expressed or implied, as to the accuracy of the information and the client assumes the entire risk as to the use of any or all information.
Même si cette carte n'est peut-être pas libre de toute erreur ou omission, toutes les précautions ont été prises pour en assurer la meilleure qualité possible. Cette carte est une représentation graphique d'éléments naturels ou artificiels et donne seulement une approximation de la taille, de la configuration et de l'endroi de ces éléments. Elle n'a pas pour but d'être utilisée pour les descriptions juridiques ou le calcul des dimensions ou de la superficie exacte. SNB n'offre aucune garantie explicite ou implicite quant à l'exactitude de l'information présentée; les clients acceptent pleinement les risques liés à l'utilisation d'une partie ou de l'ensemble de cette information.

Appendix 1b.

Appendix 2:


120
50
Legend:
Boiler
Blower
Heat Return
Heat supply
Air
1cm = 1 Ft

Appendix 3:


50' wide
120' long (modified)
12' clear height at eaves
non insulated
5/10/16