

Summary of Aquaculture Projects

Nutraceutical, Spat and Biosecurity



Prepared for

Bay of Plenty Regional Council

Reports prepared by:



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1. Introduction

Aquaculture in New Zealand currently generates NZ\$350 - \$400 million of annual sales, with two-thirds of those sales coming from exports.

The aquaculture industry has set itself a goal of achieving \$1 billion in annual sales by 2025. This goal is supported by the Government's Aquaculture Strategy and a five-year action plan, released in 2012.

The Bay of Connections Aquaculture Strategy 2013 has a goal "to grow an integrated and sustainable aquaculture industry in the Bay of Plenty with export sales of \$250 million by 2025". Key focus areas for the Bay of Connections over the next three years include;

- Marine science, technology, education and training; including investigating bio-opportunities in the Bay of Plenty e.g. pharmaceuticals and nutraceuticals
- New opportunities; including supporting further analysis of viable aquaculture opportunities
- Leadership; including establishing planning policies and rules that enable aquaculture and provide essential infrastructure services

The information provided will be of value to new entrants into the aquaculture industry in the Bay of Plenty, in particular to prospective mussel farmers.

During 2014, the Bay of Connections initiated three aquaculture desk top studies. The desired outcome from these studies was to provide a better understanding on particular aspects of marine farming in the Bay of Plenty. These projects were;

Project No.	Project Description	Outcome
1	Comparative chemical and nutraceutical value of Greenshell Mussels (GSM) from the Bay of Plenty, the Hauraki Gulf and Marlborough.	A better understanding of the chemical and nutraceutical value of Greenshell mussels in the Bay of Plenty compared to other regions. This could be beneficial for the marketing and value of Bay of Plenty mussels.

2	A Report on the known occurrence and likely occurrence of Greenshell Mussel (GSM) Spatfalls in the Bay of Plenty region.	A better understanding of the opportunities and the availability and sourcing of locally caught spat.
3	A Report on the Biosecurity Risks to Aquaculture in the Bay of Plenty region.	A better understanding regarding any aquaculture biosecurity risks in the region. An aquaculture biosecurity management and response plan could be developed at sometime in the future. This will mitigate any biosecurity risks associated with aquaculture.

A summary of each of these reports is included on the following pages.

2. Project One

LIPID AND FATTY ACID COMPOSITION OF NEW ZEALAND GREENSHELL™ MUSSELS (GSM) FROM THREE FARMING SITES

Over the previous ten years freeze-dried mussel extract products have contributed between \$10 - \$14 million per annum to the Greenshell export market. The manufacturers of freeze dried mussel products and mussel oil believe their sector will continue to grow as long as efficacy standards are maintained and clinical research continues.

GSM are generally sold as food, but are also extracted to produce high-value nutraceuticals and dietary supplements; for example Lyprinol® and Seatone®. Several studies have demonstrated the health benefits of GSM lipids. The level of omega-3 PUFA is higher in GSM than in other fish (Miller *et al.*) and therefore are considered one of the most suitable sources of omega-3 oil for the continuously expanding market for marine oil supplements.

This report summarised the analysis of samples of Greenshell mussels (GSM) collected from three different aquaculture regions; Marlborough, Coromandel and the Bay of Plenty. The focus of this study was the lipid class profile, fatty acid (FA) profile and phospholipids (PL) content of the mussels collected from the different regions. A brief literature review on the possible health benefits of GSM lipids was also included. The results obtained show some minor differences in total lipid content between the regional samples. No major differences were noticed in the fatty acid (FA) profiles of samples.

2.1. Key Outcomes & Recommendations

- The samples obtained from the Bay of Plenty, Opotiki off shore site were not in prime condition due seasonal fluctuation. An arrangement has been made to obtain more samples and retest from the Opotiki site, when mussels are in peak condition.
- More samples would identify any consistent attributes that would make the mussel suitable for specific nutraceutical use; e.g. higher in-lipid composition.
- Significant value added opportunity for Opotiki due to increasing demand for nutraceutical products.



3. Project Two

REVIEW OF GREENSHELL MUSSEL™ (GSM), PERNAL CANALICULUS, SPAT FALLS IN THE BAY OF PLENTY REGION

Greenshell Mussel spat is predominately obtained from seaweed landed on Te Oneroa A Tohe (90 mile beach) in Northland (Kaitaia spat). The spat comes under the Quota Management System (QMS) and is moved to all the major growing areas around New Zealand. Alternative spat catching areas, using marine farms and ropes designed to attract wild spat in the water, include Golden and Tasman Bay and Marlborough Sounds. The wild caught spat is highly prized due to the different fattening cycles from Kaitaia originated spat. Spat caught in the Bay of Plenty will provide an excellent resource to help expand the local industry.

This report provides a review of known information on spat-fall occurrences and the likely factors leading to Greenshell Mussel (GSM) spat-fall in the Bay of Plenty.

Due to a lack of hard data on the occurrence of GSM spat in the Bay of Plenty, the focus was placed on oceanographic variables, including water currents, water temperature and chlorophyll-a, as

indicators of potential sites of increased spat concentration. Higher concentrations of GSM spat are often associated with large scale oceanographic eddies that form behind land masses, and in areas of higher food concentration.

Using oceanographic and environmental variables, three sites were identified as possible spat catching sites for further investigation (Figure 1 below).

These sites include; a site inshore of Mayor Island, an offshore site between Whakatane and Te Puke, and the corners of the existing Opotiki Offshore Marine Farm site. Further in-situ research on spat fall concentrations is recommended in the Bay to establish the distribution and seasonality of GSM spat fall.

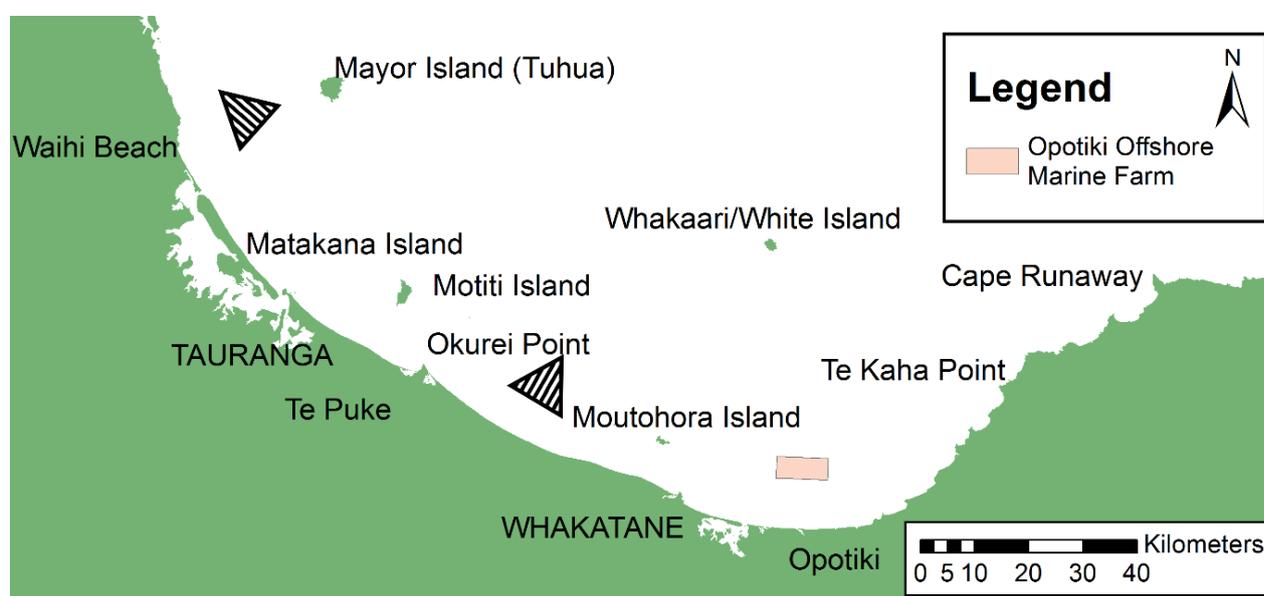


Figure 1: Suggested areas for investigating green shell mussel spat-fall (shaded triangles and the corners of the Opotiki Offshore Marine Farm) within the Bay of Plenty.

3.1. Key Outcomes and Recommendations

- Spat catching is an integral part of mussel farming
- Some spat catching has already occurred on the consented area over the previous three years but more trials are required to ensure a consistent supply
- Spat catch is largely trial and error and area specific; however there are similarities to Tasman and Golden Bay spat catching activities
- Spat retention on lines, although not addressed in the report, is important and is not well understood
- Hatchery produced spat is still sometime away but would add significant advantages to mussel production in Opotiki

- Spat catching is restricted to Opotiki consented area but alternative sites identified in the report could be investigated as soon as possible to provide more options



Spat under a microscope

4. Project Three

AQUACULTURE IN THE BAY OF PLENTY-BIOSECURITY RISK ASSESSMENT

This study reviewed known biosecurity risks and the likely occurrences of any biosecurity events in the Bay of Plenty region.

A number of occurrences of pest infestations of mussel farms have been recorded in New Zealand.

Most notably these include fouling by *Styela clava*, *Didemnum vexillum* and *Undaria pinnatifida*.

The effects of these infestations can be summarised as:

- Reduced growth, condition and health of stocks
- Increased handling associated with pest intervention leading to increased risk of stock loss/drop-offs, increased stress on stock and increased operational costs
- Increased waste production (mortalities), leading to land disposal and associated environmental effects, including disease transfer risk

4.1. Key Outcomes and Recommendations

- Biosecurity is an important part of all primary production industry and is one of the risks the aquaculture Industry is required to manage
- The industry has developed techniques and early warning systems to manage incursions
- There have been incursions by fouling organisms on marine farms in New Zealand but these are more of a nuisance value
- Improved farming techniques have reduced over settlement, reduced stress on mollusc and finfish and improves operational efficiency

5. CONCLUSION

The three projects have provided the Bay of Plenty Regional Council with a greater level of understanding of aquaculture and the opportunities the industry can bring to the region.

The reports regarding Nutraceutical and Spat Catching provide insight into the potential to develop a business case for the region. The report regarding Biosecurity Risks is comparable with other aquaculture regions of New Zealand. Experienced marine farmers are aware of the risk and understand how to manage any possible incursion.

These reports add to a wealth of marine knowledge being developed for the region and strongly support the opportunity to develop aquaculture and achieve the target of \$250 M /annum by 2025.