Te Huata Marine Farm Application

Ecological Effects Assessment Review

Review by: C N Battershill September 2023

Executive Summary

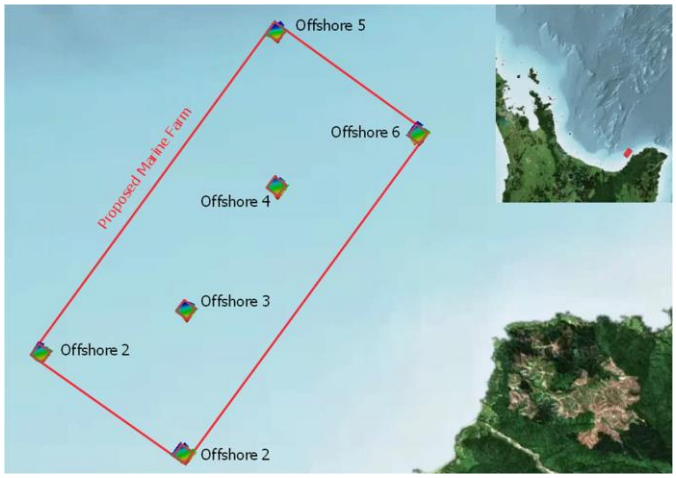
On review of relevant literature acquired to support the application of aquaculture proposals in the eastern Bay of Plenty by Te Huata International Limited, and based on personal experience over many decades of ecological examinations of aquaculture operations in Aotearoa and Western Australia (specifically mussel and fin fish aquaculture), the proposed aquaculture initiatives are likely to have minimal impact on the regions' benthic and pelagic environment. There will undoubtedly be some effects immediately under and down current from any mussel or fin fish aquaculture, but from experience and on review of published material, the effects are negligible when considering the extensive uniform habitat in this region. Seaweed aquaculture will have minimal deleterious effect on the environment.

Specific Comments

In the process of assessing whether the Te Huata marine farming proposal is likely to have a deleterious effect on the existing ecosystem within the proposed farming location and also across the wider (ecologically relevant) vicinity; also to assess whether the specific areas (sites) proposed are suitable for such a marine farm purpose (both now and into the foreseeable future), a number of considerations have been requested by the Bay of Plenty Regional Council. These are addressed below.

1. Summarised findings from previous ecological investigations describing the benthic ecological values and water column characteristics within the Te Huata site

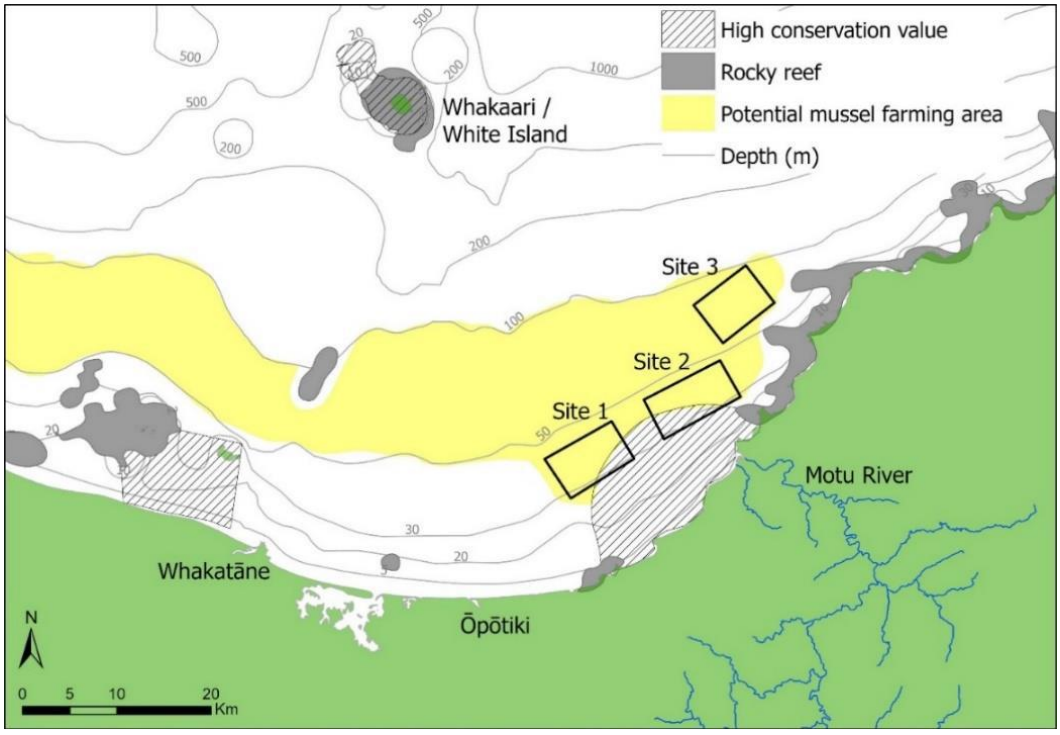
The proposed marine initial farm site and sampling stations are identified by DML as follows (DML, 2022):



Sample	Location	Northing	Easting	Water Depth	Comment
THDW1	Offshore1	5824962.86	552657.67	70m	Mud
THDW2	Offshore2	-	-	100m	Three attempts, Sampler did not successfully deploy
THDW3	Offshore3	5830177.62	552810.36	100m	Mud
THDW4	Offshore4	5834790.10	556095.64	130	Mud
THDW5	Offshore5	-	-	220m	No successful sample
THDW6	Offshore6	5836575.70	561136.62	130m	Mud

Table of sampling stations within Site 3 as below.

Site 3 is identified as the first proposed site for potential aquaculture as indicated by Cawthron (2021):



Contour map of the Eastern Bay of Plenty including areas identified by McGrath & Bennett (2019) as potentially suitable for mussel farming. Known areas of significant conservation value (including marine reserves) are shown (adapted from Environment Bay of Plenty coastal values map). Cawthron 2021

Examining the available information as reported by DML (2022) and Cawthron (McGrath 2021 and McGrath et al 2021), it is possible to obtain both a larger scale perspective of the biophysical environment in the eastern Bay of Plenty region, together with a finer scale focus of the initial site proposed for aquaculture development. The Cawthron reports can in turn be 'nested' within a whole of region review by Knight et al (2017), and Longdill et al (2006). Given the focus of the information, the following review is based only on these locations for which data is available.

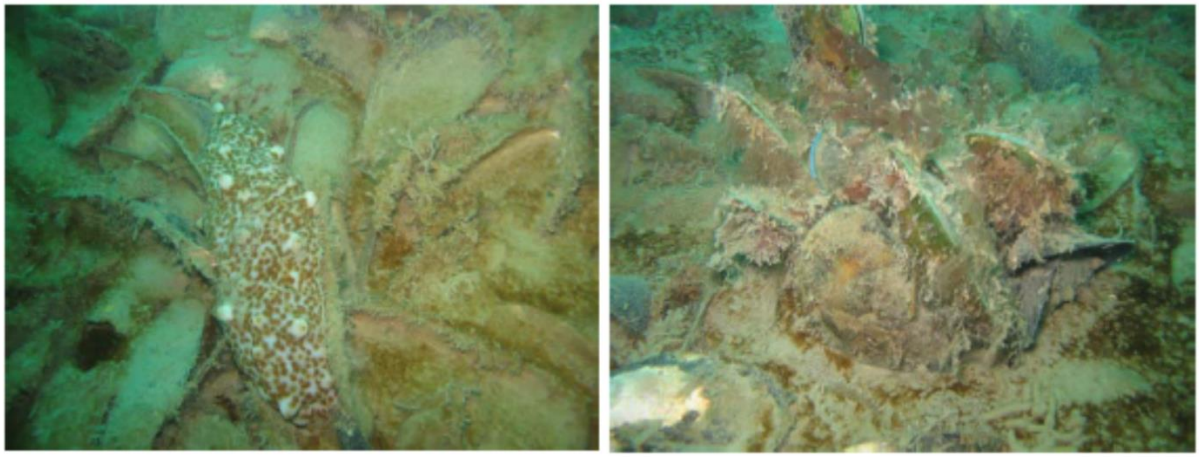
Bay of Plenty oceanography, primary productivity and aquaculture potential has been examined by Longdill 2007, who carried out an exhaustive eco-physical assessment. This includes assessments of seasonal current dynamics, phytoplankton dynamics and

sedimentary considerations. Overall, he concluded that the combined conditions in the area of interest would be conducive to aquaculture (mussels) mindful that during some seasonal episodes the carrying capacity may be reduced/growth rate of mussels reduced. Of relevance to this review is that the water quality (sedimentary levels) in the region of interest are relatively low, however benthic sedimentary profiles indicate a build-up of fine sediments and mud. Overall, current regimes appear to be relatively mild with counterclockwise gyres in the offshore Te Kaha region. Longdill and Black (2006) elaborated this work in a numerical model for aquaculture management areas, also providing primary production algorithms (Longdill et al 2006). Note that the assessments were made with bi-valve and possibly fish aquaculture in mind, not marine macrophytes. Of further relevance arguably, is that coupled aquaculture of bivalves and macroalgae may well mitigate any depletion of primary productivity in the vicinity of marine farms (for mussels), and also mitigate any ocean acidification issues into the future.

Seabed assessments carried out by the Cawthron Institute (McGrath, 2021) are consistent with the general benthic domains as reported by Longdill 2007, as characterised by sedimentary ecological character. All three sites examined were defined by a homogenous silt/clay sediment, strongly oxidative, with no visible redox potential discontinuity's with increasing sedimentary depth (to the limit examined). They concluded there were no sensitive or high value habitats (in terms of unusual or special biodiversity assemblages) in any of the three sites surveyed. Video of benthic samples indicated a well bioturbated sedimentary regime with infaunal assemblages typical for the region. No epifauna were found (backscatter profiles indicate mostly a uniform sedimentary regime, with evidence of some comparatively courser material at site 2). The authors of this survey also noted relatively low current flow (mindful of the advent of wind driven surface current and upwelling/downwelling events during the likely increasing frequency and duration of storm events). Overall, Sites 1&2 are similar with Site 3 exhibiting slightly different sedimentary and infaunal regimes that are argued (correctly) to be due to the significant increase in depth of this site.
Also consistent with Longdills' 2006 and 2007 findings, Cawthron researchers found that water column regimes would be suitable for aquaculture (mussels), but with periods of possible primary production depletion due to relatively slow water movement (McGrath et al 2021). Again, Site 3 was identified as being slightly more suitable for aquaculture (especially mussels and fin fish) as it was in deeper water and experienced slightly higher frequencies of weather driven water circulation. Seaweed aquaculture was identified as being suitable at all three sites.
Primary productivity assessments in terms of Chl*a* concentrations and phytoplankton species assemblages suggested reasonable conditions through the year for mussel aquaculture with Site 3 arguably not as productive as Sites 1&2. Potentially toxic species were found at Sites 1&2 with fewer toxin producing species at Site 3; however it should be noted that the information was derived from a relatively short seasonal time period.

2. Based on available information, is the marine farm site likely to contain benthic habitats or species that would be significantly affected by marine farming activities.

On review of the literature identified below, the proposed marine farm site is not likely to contain benthic habitats or species that would be significantly affected by marine farming activities (mussels, fin fish or algae). Even in the shallower Sites (1&2), there would be enough depth and current movement to dilute any local scale enrichment of pseudo faeces (mussels) or fish excreta (mindful of farm management practices), that the surrounding area would not be significantly affected. Under mussel farms, there is likely to be a build-up of 'culch' over time as dead and living mussels fall to the sea floor. As evidenced in other mussel farms, even those in closed embayment's in the Marlborough Sounds, the effects (in terms of habitat change) are not noticeable on the seafloor within 50 m away from the farm location. In most cases, the enhanced biodiversity directly under farms can be beneficial to encouraging a localised highly productive benthic ecosystem (Keely et al 2009, pers observation/ NIWA Client Report, 1998).



Cawthron Report No 1476 2009

3. The suitability of an adaptive management approach involving a site-specific ecological survey prior to commencing farming activities for each stage of the development as a means of providing assurance to address any uncertainty regarding benthic habitat values within the site and the ecological effects of the proposal.

The concept of an adaptive management approach linked to a site-specific ecological survey and monitoring regime is a novel and desirable concept. The detail of this would need to be developed and if based on the monitoring site array (as in Figure 1, Read 2022), this would result in a comprehensive surveillance regime of benefit to the whole eastern Bay of Plenty region, as aquaculture initiatives develop there. Given this, co-investment of such a program would be desirable. As aquaculture initiatives develop and mature, a stepwise monitoring program could be instigated in keeping with the scale of developments. As discussed above, it is unlikely that the planned aquaculture programs would have any significant impact of the relatively homogenous and expansive nature of the soft sediment habitat lying adjacent to much of this coastline hence a monitoring program initially focused on the benthic regime in addition to the usual monitoring of biotoxin loads in shellfish would be sufficient. Growth dynamics of bivalve stock in themselves acts as a highly relevant monitoring tool for primary productivity dynamics and evidences any issues in depletion of plankton locally.

References

DML 2022. Report of Survey. Te Huata Proposed Marine Farm Bathymetric Survey. 6pp.

Keeley N, Forrest B, Hopkins G, Gillespie P, Clement D, Webb S, Knight B, Garder J. 2009. Sustainable aquaculture in New Zealand: Review of the ecological effects of farming shellfish and other non-fish species. Prepared for Ministry of Fisheries. Cawthron Report No 1476. 150p. plus appendices.

Knight B, Forrest B, Taylor D, MacKenzie L, Vennell R 2017. Potential aquaculture expansion in the eastern Bay of Plenty - A high-level scoping study of environmental issues. Prepared for Bay of Plenty Regional Council. Cawthron Report No. 3056. 65 p. plus appendices.

Longdill PC 2007. Environmentally sustainable aquaculture" an eco-physical perspective. PhD Thesis University of Waikato. 291pp.

Longdill PC, Black K, Haggitt T, Mead S 2006. Bay of Plenty primary production modelling: Aquaculture Management Areas, ASR Client Report prepared for Bay of Plenty Regional Council. 60 p.

McGrath E 2021. Eastern Bay of Plenty ecological assessment: Part 1. Seabed characteristics. Prepared for Fisheries New Zealand. Cawthron Report No. 3599. 37 p. plus appendices.

McGrath E, Smeaton M, Scheel M, Major R 2021. Eastern Bay of Plenty Ecological Assessment: Part 2. Water column characteristics. Prepared for Fisheries New Zealand. Cawthron Report No. 3604. 47p. plus appendices.

MPI 2013. Overview Ecological Effects of Aquaculture. 81pp. ISBN 978-0-478-40536-1 (online).

Read H. 2022 Monitoring Strategy – Te Whānau-ā-Apanui. MACA Sewater Space. 5pp.

Unknown Author. Biophysical Site Descriptions Te Huata. 7pp.