



Bay of Plenty Aquaculture Group Inc.

A Stocktake of Strategic Aquaculture Opportunities in the Bay of Plenty

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Executive Summary

Aquaculture has long been recognised for its potential to contribute positively to the economic, social, and cultural wellbeing of Bay of Plenty (Te-Moana-a-Toi) communities, while maintaining, and in some respects enhancing the environmental health of its ecosystems. Numerous initiatives from iwi, industry, councils, Government, and the research community have been progressed since the early 2000s towards a vision for the region to realise this potential.

The recently formed Bay of Plenty Aquaculture Group Incorporated (BOPAG) is now seeking to assess and address opportunities and gaps in these initiatives, to provide pathways to the growth and development of an integrated and sustainable aquaculture industry in the Bay of Plenty.

The first step is to undertake a stocktake of all the aquaculture related initiatives and strategies to date across the range of stakeholders, including industry, iwi, council, Government, and research/education providers.

The driving force behind the long-term multi-stakeholder approach to realising aquaculture's potential in the region is enthusiasm for the multitude of opportunities and benefits that aquaculture presents. In addition, building an aquaculture industry means development of existing and new opportunities, both in the marine space, rivers, lakes and on land, using existing and new technologies and requiring considerable collaboration. Mapping the range of strategies could become a complex exercise with each strand weaving between the others. However, the overall and repeating theme is 'wellbeing through aquaculture'.

Wellbeing

The guiding principle for aquaculture development in the region is to achieve wellbeing for **iwi/Māori**, the **community**, and the **environment**. These include a well-trained and engaged workforce.

Aquaculture

Broadly this will be achieved through developments in **marine based aquaculture**, **land-based aquaculture**, and **land-based infrastructure**. All these activities will be underpinned by strategic and collaborative **research and technology**.

This report summarises the way these strands have progressed over time and finds that the case for continued aquaculture development in the Bay of Plenty region is compelling both because of the significant need for improvements in wellbeing for iwi/Māori, the community, and the environment, and because the region itself is well suited to a range of new initiatives.

It notes that future aquaculture development in the region will be predominately iwi led, both through continuation of the strategies of iwi already invested such as Whakatōhea and Te Whānau ā Apanui, and through the upcoming iwi settlement processes.

It provides a 'spatial' representation of programmed future development showing 'snapshots' of development in the region now, in the short term, the medium term and beyond. 2025 sees those developments that are currently in the pipeline having progressed. 2035 then includes the outcomes of settlement processes. 2050 provides a picture of the overarching aspiration – a Te Ao Māori based, integrated, world leading, efficient, high value, sustainable and profitable aquaculture ecosystem.

Iwi aspirations, being intergenerational, will extend well beyond 2050 and these will likely be drivers informing settlement decisions along the way.

The review highlights a range of gaps in the overarching picture, which may signal gaps in what is required to enable realisation of the anticipated benefits. Opportunities to work more collaboratively and to enable clear signalling of priorities for investor and funding support are identified.

The report notes that future aspirations in the region will require significant investment in planning, infrastructure, technologies, and workforce development. Strategic alignment across the region will be important to maximise the wellbeing benefits. A clear 'pathway' showing whether/how each of the initiatives will best support the overarching vision will be important to inform commercial decision making and funding decisions.

A key recommendation for aquaculture in the Bay of Plenty region is to continue to focus on and support those initiatives already in place, such as development of the existing space, the Opotiki marine precinct, the WMOL workforce development programme, the Te Huata spat hatchery and the research and education programmes undertaken by Toi Ohomai and the University of Waikato.

The Smart Māori Aquaculture programme, while running in parallel with the existing aquaculture initiatives and developments, will be a significant factor in the way that aquaculture develops in the future. Its aligned research and technology roadmap and workforce development strategy will be equally important. A priority for agencies wishing to enable the overarching benefits, Iwi/Māori wellbeing, social wellbeing, and environmental wellbeing, will be ensuring connectivity and collaboration between existing stakeholders and the iwi stakeholders as the aquaculture settlement decisions are made.

Government, council, and advocacy agencies, such as the Bay of Plenty Aquaculture Group should foster and enable information sharing, potentially creating a 'hub' for information, hosting the range of strategies and reports identified in this stocktake and keeping this up to date and available to interested parties. The 'spatial' representation could be refined and updated to give stakeholders an 'at a glance' idea of what is programmed where and how they interrelate. Research and technology providers could be asked to input into the hub to provide clear information about which specific programmes are aligned with the overall strategy for the region. These can also inform the regional spatial planning requirements signalled in the upcoming RMA reform.

Above all, continued communications both within the sector and in the broader community will be vital to ensure the long-term vision is realised. While each stakeholder will have their own communications

strategies, there is a need for shared messaging expressing shared values and building knowledge about the industry and its benefits. Resourcing to support collaboration and communication will be essential.

Suggested next steps are to:

1. Develop a broad strategy for aquaculture in the region, encompassing an overarching vision for the wellbeing outcomes anticipated and the aquaculture requirements to achieve those outcomes, but focussed on identifying specific actions to address priority gaps and opportunities. Identify how the region's strategy aligns with Government's strategy.
2. Catalyse an over-arching spatial plan for aquaculture in the Bay of Plenty. This will help ensure harmonisation and leverage of the past, current and future investments made in aquaculture in order we capture the outcomes sought for all.
3. Develop a 'connectivity hub' to encourage collaboration where appropriate and enable a collective overview of how (and if) the various stakeholders' individual plans and strategies will fit together within the overarching strategy.
4. Identify key priorities for investor and funding support in the short, medium and longer term.

Introduction

Background

Aquaculture has long been recognised for its potential to contribute positively to the economic, social, and cultural wellbeing of Bay of Plenty (Te-Moana-a-Toi) communities, while maintaining, and in some respects enhancing the environmental health of its ecosystems. Numerous initiatives from iwi, industry, councils, Government, and the research community have been progressed since the early 2000s towards a vision for the region to realise this potential.

The recently formed Bay of Plenty Aquaculture Group Incorporated (BOPAG) is now seeking to assess and address opportunities and gaps in these initiatives, to provide pathways to the growth and development of an integrated and sustainable aquaculture industry in the Bay of Plenty. A 50-year horizon is being adopted, with a clear intention to facilitate immediate opportunities to meet the longer-term goals.

The BOPAG has commissioned Aquaculture Direct Limited¹ (ADL) to carry out a review of all current work programmes/commercial activities and associated strategies across the Bay of Plenty and prepare a report collating what is planned in the short, medium and long term to inform identification of gaps and opportunities for council/Government/investor initiatives to support the region's goals.

Scope

The scope of the review includes all published, and where available, unpublished aquaculture related business cases/plans, reports, strategies, proposals, and publications. The review also includes selected conversations with key stakeholders.

The review seeks to categorise the range of 'strategies' in the context of the relationships between the various stakeholders in the region. Further context for these relationships is provided below.

The three 'terms' in which programmed outcomes are identified are as follows:

Short term	2022 – 2025
Medium term	2025 – 2035
Long term	2035 – 2050

The intention of the review is to identify key focal areas, gaps, overlaps in the current programmes and strategies, and any new/current initiatives that stakeholders have identified but which are not contained within the existing strategies. It will inform a second piece (Phase 2) intended to set up framework to track and assess the intended outcomes and track how these align with, and contribute to, the broader outcomes for the New Zealand Aquaculture Strategy².

Method

ADL carried out the stocktake in three phases.

The first phase was to take a step back and understand the key stakeholders and relationships pertaining to aquaculture in the region. This was helpful to 'group' the various initiatives and inform further analysis. This also informed the identification of a set of key stakeholders for engagement during the stocktake. A description of the relationships is provided below.

The 'stocktake' itself involved collecting all relevant documentation and creating a 'strategy register'. The register enables the various strategies to be grouped by date, stakeholder relationship and key themes, which also assists broader analysis. The register can be used and updated by the BOPAG as strategies develop into the future. The register is included in Appendix 1 and attached separately.

Some 'strategies' are still in the pipeline and not yet documented, while others may have been amended in the interim due to a range of external and/or internal factors. For that reason, a range of key stakeholders were followed up in person to check in on whether their most recent 'strategy' still reflected their most current plans and aspirations.

Once all the strategies had been collected, a summary document was produced which identified at a high level the applicable scope, stakeholders, objectives, recommendations, and timeframes. This is included as the Strategy Stocktake in Appendix 2 which helped inform a 'strategy mapping exercise' to enable identification of key themes, focal areas, gaps and overlaps across the short, medium and longer term.

Finally, a Future Timeline was created showing key aspirations/activities across the range of stakeholders/initiatives, included as Appendix 3. This in turn has informed a summary of potential gaps and opportunities to begin to inform funder and investor decisions going forward.

These have all been folded into the resulting report.

Bay of Plenty Aquaculture Relationships

The BOPAG funding application to Toi EDA notes that ‘representation for aquaculture in Te-Moana-a-Toi has undergone significant transformation over the past decade’ and that ‘there are many aquaculture-focused organisations acting in isolation³’. Each in its own way, recognises the huge potential in aquaculture for the region and a key function of the newly formed BOPAG is ‘bring together industry, iwi, regulatory bodies, central government, science providers, and the public to grow an integrated and sustainable aquaculture industry in Te-Moana-a-Toi’.

As a starting point it is helpful to understand the strands of stakeholders and how they and their strategies interrelate.

For the purposes of this stocktake ADL has categorised the stakeholders at a high level as either primarily iwi, industry, council, research/education, or Government. Note that there are crossovers amongst each. The BOPAG, with an inclusive mandate, fits across this range of stakeholders.

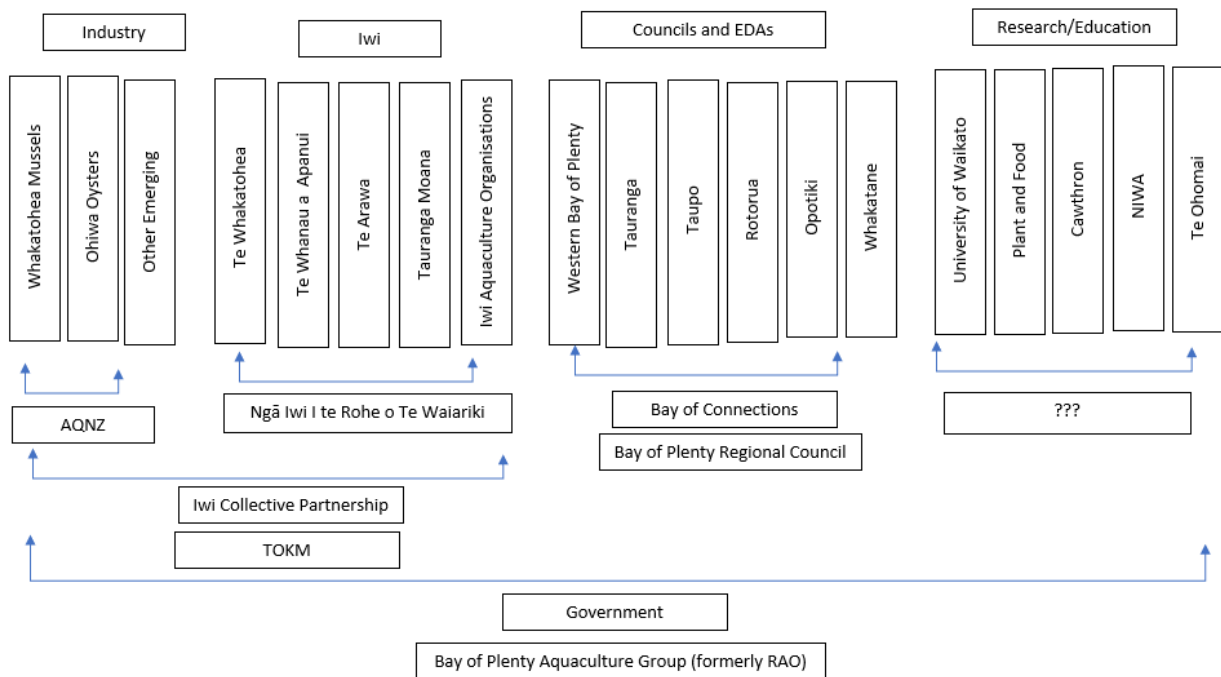


Figure 1. Overview of stakeholder relationships

Note that there are many interrelationships among these, for example Te Whānau-ā-Apanui and Whakatōhea as iwi are also key industry participants and have their own education/workforce strategy which intersects with research/education, council, and Government stakeholders.

Strategy Mapping

To start to understand the various strands of aspirations and actions a strategy register has been created which enables filtering by stakeholder 'category' and strategy 'type'. Some of the initiatives have not been strategies per se but were broadly categorised as reports, business cases/plans, or research/development plans. Stakeholder updates are also included, and each document has been given a unique file reference to facilitate tracking.

As noted above, the overarching summary document provides a snapshot of all the various strategies, grouped by stakeholder category, and sorted by year.

The driving force behind the long-term multi-stakeholder approach to realising aquaculture's potential in the region is enthusiasm for the multitude of opportunities and benefits that aquaculture presents. In addition, building an aquaculture industry means development of existing and new opportunities, both in the marine space, rivers, lakes and on land, using existing and new technologies and requiring considerable collaboration. Mapping the range of strategies could become a complex exercise with each strand weaving between the others. However, some overarching themes emerge as outlined in the next section.

Both the strategy register, and the summary document include identification of one or more of the overarching themes. These tools enable the BOPAG to hold a 'database' of strategy documents and update the register and summary document as activities progress.

Strategy Themes

The overall and repeating theme is ‘wellbeing through aquaculture’.

Wellbeing

The guiding principle for aquaculture development in the region is to achieve wellbeing for **iwi/Māori**, the **community**, and the **environment**. These include a well-trained and engaged workforce.

Aquaculture

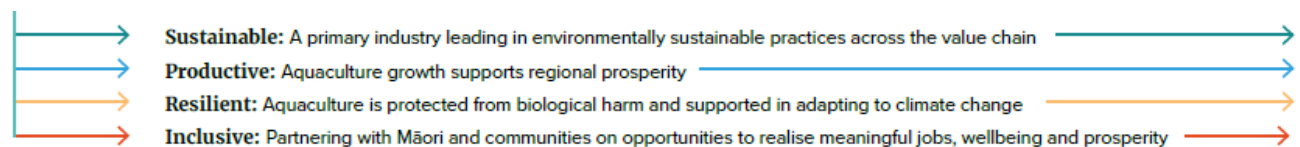
Broadly this will be achieved through developments in **marine based aquaculture**, **land-based aquaculture**, and **land-based infrastructure**. All these activities will be underpinned by strategic and collaborative **research and technology**.

These themes echo the strategic goals and aspirations of the Regional Council, Government and Aquaculture New Zealand.

The Government’s Living Standards Framework⁴ entrenches the priority for New Zealand to achieve more than just economic growth, but a better standard of living for all communities and their environment.

The themes of resilience, productivity and sustainability are core to the Ministry for Primary Industries’ activities, particularly in their COVID-19 response ‘Fit for a Better World’⁵. ‘*As we restore our society and economy, we have an opportunity to rebuild better, in partnership with iwi/Māori and industry*’.

The Government has identified aquaculture as a transformative industry, with the potential to contribute positively to the range of wellbeings and a substantial work programme directed towards enabling the development of the industry. The Government’s Aquaculture Strategy, which was developed in response to the New Zealand Aquaculture Industry Strategy⁶ sets out a vision that ‘*New Zealand is globally recognised as a world-leader in sustainable and innovative aquaculture management across the value chain*’. Focussing on both open ocean and land-based aquaculture, it seeks to drive four outcomes:



The living standards set out goals for iwi/Māori, community and environmental wellbeing and the aquaculture strategy sets out how aquaculture, through marine based aquaculture, land-based aquaculture, land-based infrastructure and research and technology can help achieve those wellbeings.

Each of the themes are inextricably linked so there are many threads weaving between them, the following sections track their respective pathways.

Wellbeings

Iwi/Māori Wellbeing

Community Wellbeing

Environmental Wellbeing

Iwi/Māori Wellbeing

‘Māori have a broad and deep relationship with the coastal and marine area and therefore in aquaculture and marine farming. The mana whenua status of the iwi and Hapu in the region can be traced in part from their arrival to the shores of Te-Moana-a-Toi upon their respective waka’⁷.



Figure 2. Te-Moana-a-Toi waka

Iwi/Māori wellbeing is strongly driven by a sense of belonging; connectedness to the land and the sea, the lifeforce (mauri) of place, the ability to express Māoritanga including collection of seafood (kaimoana), and the ability to tell their stories in their own way and in their own language.

Te Whakatōhea, which has a strong connection to the sea, began their formal aquaculture journey in the late 1990s. ‘The kaumatua shared a vision of rebuilding a vibrant local economy and wellbeing from activities in the sea. Layered over this was Ōpōtiki harbour which had been developed in European settlement times for whaling and coastal trading, and was once a busy, thriving harbour – a connection to both European and Māori heritage’.

Te Whakatōhea identified aquaculture as a perfect fit to enable the step-change in wellbeing. They commenced a long journey of collaboration with ‘the community, iwi, multiple central and local government layers, scientist, researchers, investors and a wide range of businesses’ to develop a mussel farm, build a local mussel factory and develop the Ōpōtiki harbour. ‘We had to ask our Ōpōtiki community to invest. I genuinely believe that those who invested wanted the best for Ōpōtiki. They wanted to provide jobs for the local people and to see the town thrive again’.

Whakatōhea Mussels Opotiki, as an intergenerational business, is one of Te Whakatōhea's pillars to bring transformational change to its people and their community. The investment over time extends well beyond just the financial.

Te Arawa share the strong connection to the sea "the Te Arawa canoe was one of the first of the great migration to land in Aotearoa. Te Arawa has been defined by this voyage for generations since then, and today we continue to embody not only the pioneering spirit of our ancestors, but their connection to the moana (the ocean) and kai moana"

"Māori and kai moana have been entwined for generations. On the journey from Hawaiki to Aotearoa, our ancestors were gifted kai moana by Tangaroa, the god of the sea, to sustain them. Generations later, that connection and sense of kaitiakitanga (guardianship) of te moana (the sea) and kai moana (seafood) persists and makes us the ideal people to bring this product to the world."

Te Arawa have recently launched Hi Mussels, a new brand of mussels that embody the best parts of Māori innovation and tradition'. Profit from this new business venture will remain in the New Zealand economy and will be invested back into initiatives that benefit iwi Māori.

Te Whānau-ā-Apanui are progressing further developments on several aquaculture fronts. They include,

- A programme of works to develop a mussel hatchery and research hub near Te Kaha. Rikirangi Gage, CEO of Te Rūnanga o Te Whānau has commented that *"the hatchery concept is a perfect fit with a burgeoning mussel industry in New Zealand, particularly within the Eastern Bay of Plenty. Our focus will be on delivering sustainable, high-quality spat in partnership with iwi which will open up New Zealand's growth in the aquaculture industry. We'll be creating employment and wealth in the local community and becoming a centre for excellence in the field. The hatchery will be a big win for Te Whānau ā Apanui and for New Zealand aquaculture."*⁸
- Part of the Te Whānau-ā-Apanui strategy recognises international partners are part of the future success for aquaculture in Aotearoa New Zealand. Of significant interest to Te Whānau-ā-Apanui is a seaweed industry. Strategic alliances are being explored for this relatively new sector in the Eastern Bay of Plenty with this opportunity and the international experience required to enable this 'high tech' element of the sector.
- An application for the largest single seawater consent for aquaculture activities in Aotearoa is in progress (10,000 hectares). A new agile adaptive aquaculture management planning approach is being developed within this proposal, with key collaboration partners – including government, iwi, universities, and research institutes.
- A platform for aquaculture data to be shared with the sector to collate data and information for the benefit of the sector more generally. This platform will facilitate opportunities for multiple agencies to share data, analyse data and visualise data for insights into the marine environment we seek to develop.

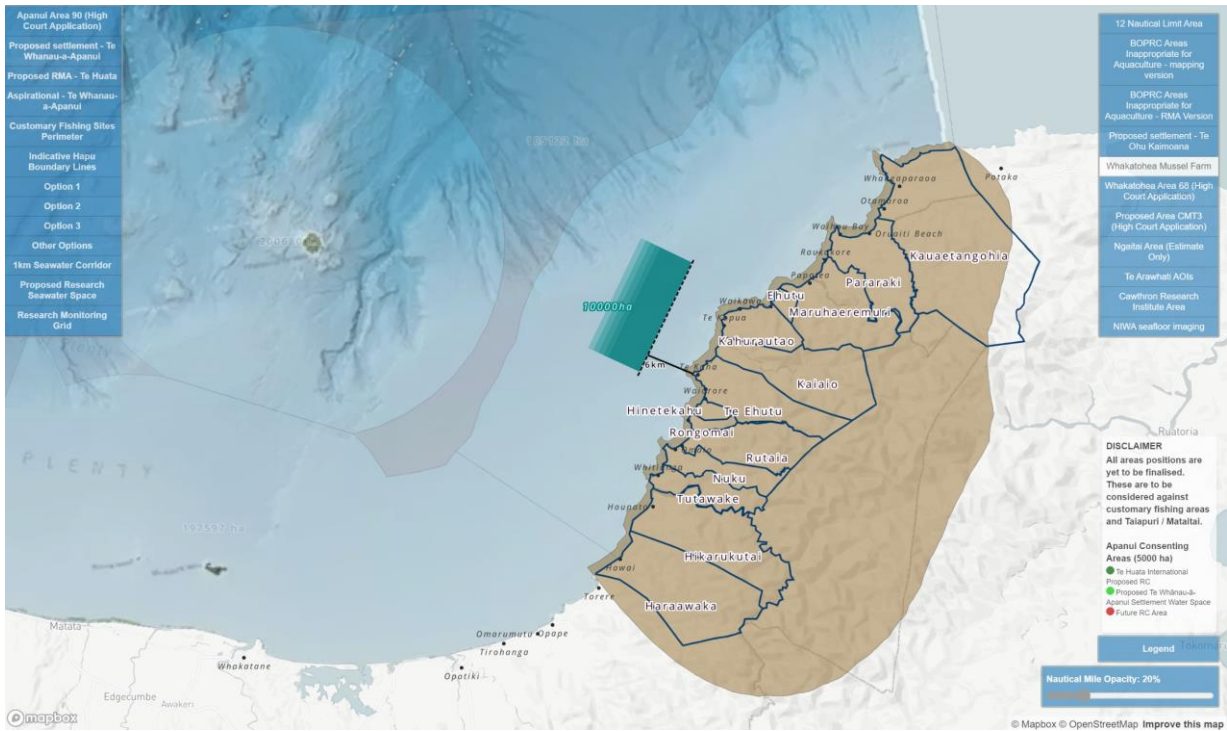


Figure 3. Te Whānau-ā-Apanui consent application

More recently, Nga Iwi i te Rohe o Te Waiariki, in partnership with the Ministry of Primary Industries and Te Ohu Kaimoana, have been exploring pathways to a ‘sustainable, resilient and world-class Māori aquaculture industry in the Bay of Plenty’ through the ‘Smart Māori Aquaculture’ programme⁹. This programme is a way to support Iwi/hapu to make decisions in the upcoming Māori commercial aquaculture settlement claims process¹⁰.

The settlement process is facilitated through Te Ohu Kaimoana (TOKM) and provides Iwi Aquaculture Organisations (IAOs) with:

- New space authorisations (the first option to apply for a consent for a specific space) plus cash support to apply for develop that space, or
- The financial equivalent, or
- A combination of space and cash, and/or
- Any other benefit agreed to under the process

The ‘aquaculture settlement’ is in addition to other settlement processes in the region such as Treaty settlements and applications for customary marine title under the Marine and Coastal Area Act (MACAA). The Bay of Plenty IAO agreements are required to be in place by mid-2023 and settlement details will become clearer once they have been agreed.

The Smart Māori Aquaculture programme is a comprehensive set of initiatives underpinned by Te Ao Māori principles, growing people through job creation, training, career pathways, and research and leadership opportunities and empowering and exercising kaitiakitanga, maintaining and enhancing the mauri of the Bay of Plenty environment. It has produced detailed business cases for four ‘aquaculture opportunities’ to support IAO decision-making.

The vision for success is as follows:



Figure 4. Smart Māori Aquaculture programme vision for success

The opportunities that have the best potential to realise this vision are offshore Greenshell mussels, offshore Ecklonia seaweed, offshore Yellowtail Kingfish and land-based recirculating aquaculture system (RAS) Yellowtail Kingfish. More detail about this programme is provided in the following sections.

The cultural impact assessment that forms part of the project highlighted the complex association between Te Ao Māori and modern aquaculture. Specific elements of that assessment are interwoven in the following sections.

Community Wellbeing

A strong focus for the communities of the Bay of Plenty region is the need to lift the overall economic and social wellbeing of its people. The 2009 Aquaculture Strategy recognised aquaculture as an opportunity for *'raising income levels, employment opportunities and standards of living across the Bay, encouraging new entrants and those who have previously left to return^{11'}*. It identified the vision for aquaculture in the region to develop export sales of \$250 million by 2025.

The Opotiki Harbour Transformation Project^{12,13} identified that the ripple effect of the harbour development would create local and regional job opportunities and an increased quality of life. Its caveat was that the harbour development and the marine farms developments go hand in hand *'for commercial viability in the long-term, a vertically integrated business, with marine farm servicing and processing facilities located as closely as possible is vital^{14'}*. It noted that *'in 2006 the district unemployment rate was*

6%, compared with 3% for New Zealand. In the past year, Work and Income expenditure excluding NZ superannuation was well over \$20 million, for a total district population of fewer than 10,000 people. In recent years, however, the progression of the aquaculture and harbour access projects have generated a sense of optimism in the community and excitement at the potential for substantial improvements in terms of jobs, income and well-being’.

Social and economic benefits of the integrated approach were identified as follows:

- Employment of 936 people
- Provision of \$27.3 million in household income
- Contribution of \$34.6 million to Opotiki’s GDP
- An increase of \$44.9 million in output

Figure 5. Social and economic benefits of Opotiki Harbour Transformation Project

Follow on social benefits included a reduction in crime by 10% in Opotiki and considerably improved deprivation levels and reduction in ‘some of the social problems experienced in the district’.

The wraparound environment that Whakatōhea Mussels (Opotiki) Limited (WMOL) provide their employees, goes beyond just jobs and income. Programmes include literacy and numeracy support, management and team building skills, financial advice, regular health checks, support groups, as well as cooked lunches in the factory every day. This programme receives vital support from the Ministries of Education and Social Development as well as the broader community.

The potential economic benefits of the development of the two marine farms identified (combined area of 7,500 hectares) in conjunction with the processing factory and harbour were as follows:

Annual impact	Farming	Processing	Total
Output (expenditure)	\$266m	\$164m	\$430m
GDP (value-added)	\$162m	\$66m	\$228m
Employment (FTEs)	1,632	1,513	3,145

Figure 6. Potential economic benefits of WMOL combined mussel farms and processing factory

Following from this, the Bay of Plenty Polytechnic (now Toi Ohomai) identified the range of workforce, education and career opportunities related to aquaculture, from vocational training (skippers, deckhands, processing workers) through to undergraduate and post graduate qualifications and ‘careers’. It identified vocation and academic gaps and posed a vision for a Bay of Plenty ‘centre of expertise¹⁵’ clustering together the polytechnic and University of Waikato (UoW) and including a ‘sister coastal facility’ alongside

the existing aquaculture centre. The proposed model was as follows:

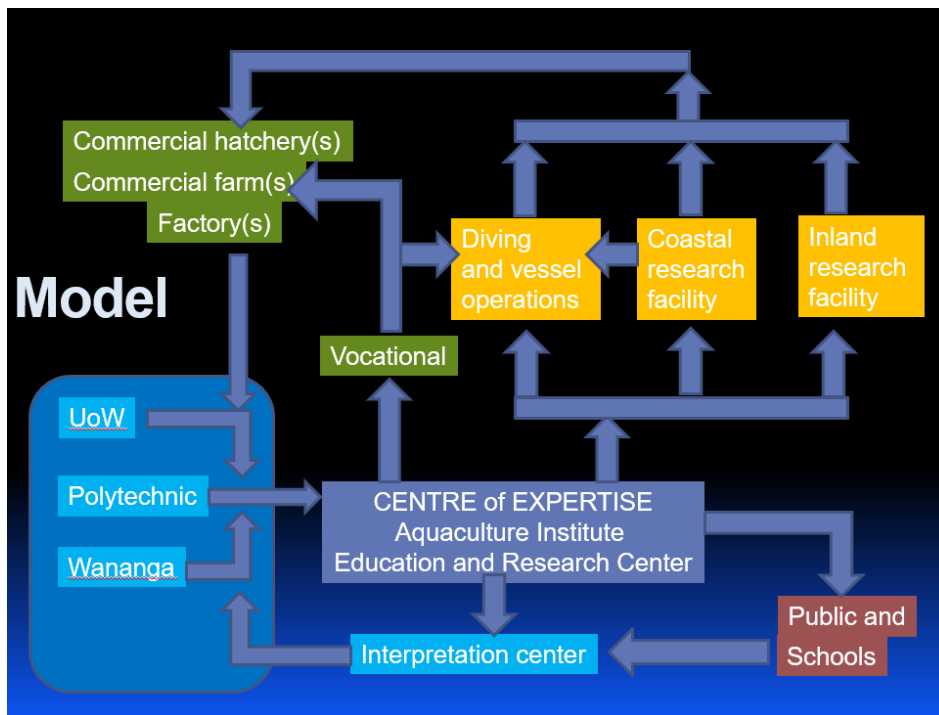


Figure 7. Proposed centre of expertise for Bay of Plenty

The 2013 update of the regional aquaculture strategy included an action to ‘continue to assess education and training requests to deliver a skilled workforce to satisfy the needs of the regional industry¹⁶’. At the same time the Te-Moana-a-Toi Bay of Plenty Growth Study identified that median incomes in Bay of Plenty were 85% of the New Zealand average and that the region ‘has a lower labour force participation rate and higher unemployment rates than nationally¹⁷’. It also noted that Eastern Bay of Plenty had markedly lower workforce participation rates than the other subregions.

The intervening years were focussed on securing the required investment and funding to realise the key pillars of the marine farm, processing factory and harbour development while echoing the potential contribution to economic and social wellbeing.

More recently, jobs have begun to increase since the commissioning of the WMOL processing factory. The business case for Provincial Growth Fund support for the processing factory, noted that ‘it delivers benefit to the community through jobs¹⁸’. At commencement, 42 had been employed with a further 66 planned and a target of 230 by 2025.

Similarly, the Te Whānau-ā-Apanui mussel spat hatchery development in Te Kaha is forecast to generate 80-100 jobs during construction, 20 -30 jobs ongoing locally – with a focus on trained employees with L6 – L10 qualifications. The business case also forecasts 900+ jobs for ‘rural New Zealand’ (in mussel farming, harvesting, and processing), with a significant potential for many of those jobs to be in the Bay of Plenty in the investments being considered in aquaculture farming and processing opportunities.

Aligned with this WMOL and the Whakatōhea Māori Trust Board (WMTB) have created an overarching

workforce training and education programme (Te Pou Oranga o Whakatōhea) which provides people with the entry level skills required to carry out tasks across the seafood industry and then on the job further training and career development. This has enabled the community’s young people prepare for and obtain employment, enhancing their sense of self-worth and enabling future opportunities. The positive effects on the employees and their families are significant.

The strategic intention for the Bay of Plenty is these workforce training programmes will be further developed with new aquaculture activities still in the early stages of development. This includes, but is not limited to, mussel spat (and other shellfish), seaweed (including hatchery, farming, harvesting, and processing) – akin to the work already being developed in the mussel industry by Whakatōhea and more recently Te Whānau-ā-Apanui.

The Smart Māori Aquaculture programme repeats the themes of economic and social development. In particular the Bay of Plenty Aquaculture Economic Assessment¹⁹ for the four selected ‘aquaculture opportunities’ used both Economic Impact Assessment (EIA) and Cost Benefit Analysis (CBA) to present direct and indirect economic benefits including value added (like GDP) and employment (Modified Employee Count or MEC).

Highlights

		Aquaculture Opportunity				
		Offshore Finfish	RAS Finfish	Offshore Shellfish	Offshore Seaweed	
CBA	@ 4% discount rate	Benefits	\$544 m	\$673m	\$171m	\$66m
		Costs	\$526m	\$646m	\$173m	\$82m
		Net Benefits	\$19m	\$27m	-\$2m	-\$16m
		CBR	1.04	1.04	0.99	0.81
	0% discount rate	Benefits	\$1220m	\$1415m	\$369m	\$136m
		Costs	\$1089m	\$1244m	\$332m	\$142m
		Net Benefits	\$131m	\$171m	\$37m	-\$6m
		CBR	1.12	1.14	1.11	0.96
EIA	Direct and Indirect Impacts	One-offs Value Added	\$63m	\$60m	\$19m	\$14m
		One-offs MECs at peak	584	590	261	147
		Ongoing Value Added	\$299m	\$369m	\$77m	\$50m
		Ongoing MECs per year	647	566	169	224
	Total Impacts	One-offs Value Added	\$99m	\$94m	\$30m	\$22m
		One-offs MECs at peak	827	840	348	193
		Ongoing Value Added	\$435m	\$538m	\$112m	\$72m
		Ongoing MECs per year	924	801	240	297

Figure 8. Potential economic benefits of Iwi aquaculture opportunities

Key points were as follows:

- All opportunities provide a lift in local activity, benefitting the community by way of job (and job security), new employment and salaries and wages
- The larger local economy will be more competitive and more successful in attracting and retaining investment which will support local households
- There may be recreational fishing benefits which would support further rounds of economic impacts, creating local benefits
- The flow on effects will also sustain jobs in other industries and locations.

- The income effects provide social impacts, increasing the standard of living
- The total employment impact of ongoing activity is estimated to be between 66 and 145 jobs for Māori
- The one-off activity (developing the infrastructure) shows significant demand for technicians and trades workers, followed by managers, professionals, and labourers.
- The ongoing activity shows greater distribution across occupations which aligns with the employment creating characteristics across the economy, and the linkages to primary sectors.

In recognition of the need to align training and education initiatives with the projected jobs and careers, the 'Smart Aquaculture Workforce Development Strategy'²⁰ was created. This:

- Describes the vocations and jobs that will be created through the Smart Aquaculture Strategy (aquaculture and seafood processing, transport and logistics, engineering and aquaculture supply chain)
- Outlines educational pathways to employment from specific starting points to these jobs
- Provides a programme map identifying what and where education programmes can and should be provided for and where gaps or opportunities may lie
- Does not include jobs for contractors or seasonal workers or university educational pathways
- Outlines a Workforce Development Strategy framework with broad actions to assess and promote the aquaculture industry as a career choice then to develop the comprehensive work development programme
- Notes that 'there is already building demand' with the WMOL processing factory up and running
- Makes recommendations as a transition to implementing the strategy, which in theory could be implemented in parallel with the ongoing Smart Māori Aquaculture programme.

Environmental Wellbeing

The Smart Māori Aquaculture cultural impact assessment expresses the importance of environmental wellbeing:

'Kaitiakitanga is a fundamental principle guiding Māori. Our whakapapa is derived from Ranginui and Paptūānuku and descends to ourselves, and beyond to our mokopuna (grandchildren) and mokopuna tuarua (great grandchildren). Kaitiakitanga is the reciprocal responsibility of care between tuakana and teina, and is the privilege of tangata whenua. This principle can assist in our decision-making regarding aquaculture development. Aquaculture activities must be chosen through a lens which considers its impact on Te Mauri o ngā Ātua, first and foremost. In particular Te Mauri o Tangaroa in this case. What this looks like in practice, is choosing business practices which are most likely to improve the environment or have a minimal impact.'

Aquaculture has a range of effects on the environment and the environment has a range of effects on aquaculture. Both can be positive or negative. The industry and the community are invested in ensuring that the impacts are as light as possible and that the direction of aquaculture into the future is one which enhances the life force of the environment as well as its people.

Development of the mussel marine farming space in the region has been underpinned by environmental assessments and industry best practices. Consenting of the first farm took many years and its effects have been well researched. Since then, a significant amount of resource has been invested in ensuring that any new space in the region is well located. Biosecurity²¹, effects on the water column²², and effects on fisheries resources²³ have been the primary focus. Marine farm debris, effects on wildlife and effects from vessel activity are also a consideration. The differing levels of potential effects between differing kinds of aquaculture, ie marine based or land based, and seaweed, shellfish or finfish are also recognised.

Aquaculture in the region has also been recognised for its potential to contribute to a circular economy, minimising waste and maximising the use of resources by growing species in a complementary manner and creating value from by-products and waste streams. New technologies will add to these opportunities. A project²⁴ is underway in the region to explore circular economy opportunities for aquaculture and WMOL are a key contributor, including a partnership to incorporate shell waste into fertilisers and composting products and looking for opportunities to eliminate or circulate plastic waste.

WMOL are guided by the principle of kaitiakitanga in all elements of their operation. This informs a range of initiatives including careful stocking and pest management strategies and forward investment in low emissions infrastructure. The processing factory has its own water intake and treatment system including a series of wetlands. They also have a programme with Callaghan Innovation to explore further initiatives.

A fundamental and growing consideration is climate change. Climate change is recognised across all stakeholders for its collective potential impacts and for its need to be addressed in a collective manner.

Aquaculture

Marine Based Aquaculture Development

Land Based Aquaculture Development

Land Based Infrastructure Development

Research and Technology

Marine Based Aquaculture Development

Currently, there are three oyster farms leases in Ohiwa Harbour (covering 9.6 ha and farmed by Ohiwa Oyster Farm), and a small undeveloped mussel farm site in Factory Bay, Te Kaha²⁵. The oyster operation is being marketed for sale²⁶.

The 3,800 hectare marine farm operated by WMOL was first applied for in 2001 and was granted consent in 2009. The farm was a partnership, Eastern Seafarms Limited (ESFL), between Te Whakatōhea and Sealord. The Te Whakatōhea strategy has been to focus first and foremost on mussels, but also to develop opportunities and enhance value, including through new species and a collaborative approach to research and commercial trials.

In recognition of the unique 'offshore' nature of the site the original partnership began with 3 mussel farming lines in a small-scale commercial trial. The mussel spat catch and subsequent '*clean and unique bright green*²⁷' mussels showed that the site had promise. However, challenges were encountered developing reliable cost-effective structures which could withstand the rugged conditions of an offshore environment and Primary Growth Partnership (PGP) funding was sought for research/innovation projects towards '*ensuring the commercial viability of this venture*²⁸'.

Specific requirements identified were to:

- Develop and engineer efficient, reliable and cost effective structures for growing shellfish (the primary criteria for further development)
- Develop and implement a regular biotoxin and water quality monitoring programme at the site
- Determine potential of the site for catching and holding spat, the growth and conditioning cycles and any unique properties of the mussel flesh
- Investigate the potential of the site for growing other shellfish species
- Determine potential extract value of any biofouling species

In parallel the Bay of Plenty Regional Council (BOPRC) was carrying out a constraints mapping exercise to support identification of potential marine areas for new aquaculture. Further work was undertaken to investigate finfish and shellfish species which may be suited to the Bay of Plenty marine environment. A 'Region Wide Knowledge Base²⁹' provided a high-level reference document to assist new entrants to the industry to understand the range of capital, investment, infrastructure, operating, skill base, and training requirements associated with potential new marine farming ventures in the region.

Through the Regional Aquaculture Organisation (RAO), the BOPRC contracted a range of supporting material^{30,31} to better understand the marine farming context including comparative nutraceutical value of Bay of Plenty mussels, analysis of mussel spat availability in the region, and aquaculture biosecurity risks. A selection of potential new farming areas was then assessed for their appropriateness with regard to harmful algal blooms (HAB), phytoplankton depletion, spat and biosecurity issues and a total area of up to 16,000 ha was identified as potential new marine space (subject to detailed assessments and staging).

An 'innovation' workstream identified geoduck, pacific oysters and flat oysters as potential new species³².

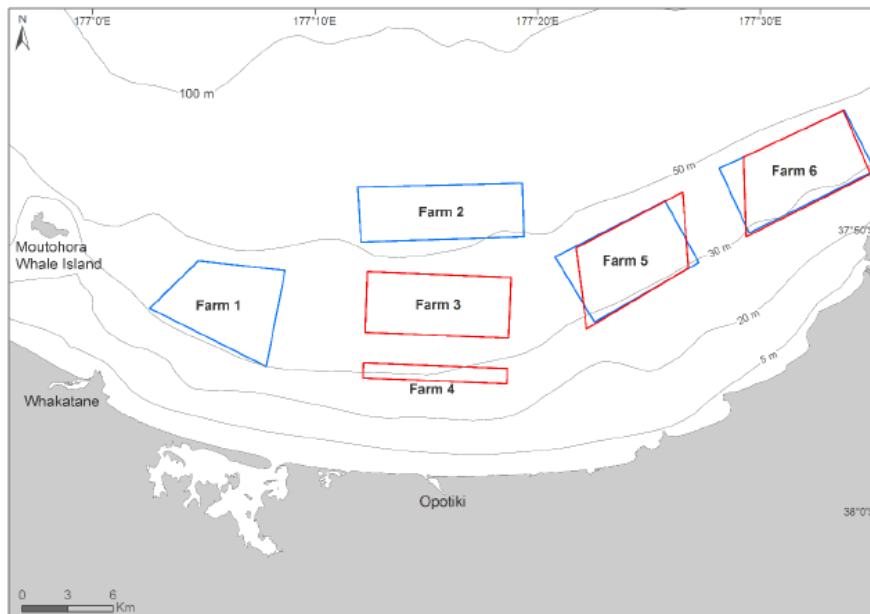


Figure 9. Potential new farming areas (Farm 3 existing)

In recognition of the technology challenges, a work programme then commenced with Cawthron to design novel farming systems enabling multiple shellfish species culture in open ocean sites.

An analysis of the potential increases in mussel production from the existing farm (Farm 3) and two potential new sites totalling 8,793 ha of water space concluded that:

- The key constraints to staging increases were operational logistics and investment capacity
- Market constraints may be a consideration
- Conservative projections were that a realistic staging increase was in the order of 50 lines per year or around 700 greenweight tonnes (GWT) of mussels

Development of the farm has progressed in a staged manner over the intervening years. Whakatōhea now have consents for 4,757 hectares of space (Farm 3 and Farm 4) and an application for a further 4,500 hectares (Farm 1).

More recently, the Smart Māori Aquaculture programme has included detailed assessment of potential marine space and use of that space for new aquaculture in the region. With respect to marine aquaculture, the programme:

- Assesses potential for Crown resourcing to assist two iwi to apply for 10,000 ha of new marine space in the region (recognising the potential for more iwi/more space)
- Provides information on international and New Zealand trends in production and markets and translates these to the Bay of Plenty region.
- Summarises opportunities for the Bay of Plenty and carries out a high level assessment of a range of species using a species feasibility matrix.
- Notes opportunities for regenerative aquaculture and climate change adaptation.
- Outlines technology and collaboration opportunities.
- Summarises the opportunity, costs, revenue, jobs and potential economic impact for; offshore

Greenshell mussels, offshore Ecklonia seaweed, and offshore Yellowtail Kingfish.

- Proposes an aligned scallop farming pilot to further inform that opportunity.

In recognition of the complexity of developing marine aquaculture, as well as the potentially comprehensive potential benefits for Māori and the region, the Government, particularly through MPI are providing a ‘wrap-around’ support programme for the Iwi settlements. Most recently this has included:

- A gazette notice³³ preserving three marine areas, totalling 7,500 hectares, for Iwi to have first rights to apply for that space
- Contracting a stocktake of all relevant science which is already available and identifying additional science needed to support applications for that space
- Consideration of staged development of those areas including carrying capacity for the range of aquaculture opportunities
- Close collaboration to support potential resource consenting processes including with TOKM, the Bay of Plenty Regional Council and the Department of Conservation

Te Whānau-ā-Apanui have recently made an application for 10,000 hectares of marine space in the Eastern Bay of Plenty.

Land Based Aquaculture Development

At a high level, the potential to build a land-based aquaculture (both natural water-body based and tank based) in the region has been long recognised, particularly in light of the region’s geothermal resources. Early potential species identified were kingfish, paua, sea cucumber, mussels, oysters, freshwater eels, trout and koura. In 2012, Enterprise Lake Taupo commissioned a review of opportunities and challenges relating to land-based aquaculture and identified trout, eel, algae, koura and carp as those which would be most viable.³⁴

Table 1. Potentially viable land-based species for the Lake Taupo district

POTENTIALLY VIABLE SPECIES	Value chain	World Market Value	Local Market Value	Capital Costs	Operating costs
TROUT		High	Potentially high.	Moderate	Moderate
FRESHWATER EEL		Asia Europe North America Glass eels worth in excess of \$2000/kg	<1kg = \$5 Larger eels = \$8kg	Funding research into breeding cycle.	Large costs In manipulating breeding cycle.
ALGAE		High	Moderate, potentially high	Low	Low especially with integrated aquaculture
KŌURA		Low	Moderate	Low	Moderate – Geothermal will help decrease.
CARP		Moderate/ low	Moderate/ low	Low	Low (Geothermal)

Collaborative work through the BOPRC and RAO repeatedly recognised the potential for these species, particularly eel and trout, but generally concentrated on natural water-body aquaculture using geothermal

energy and generally as a concept rather than detailed investigations. Trout has consistently been recognised as the species with the most potential despite the prohibition on commercial trout farming. The Te Moana Bay of Plenty Growth Study detailed the potential opportunity and recommended a Government review of the legislation.

The 2017 innovation workstream (Workstream 15) also identified potential for High Rate Algal Pond (HRAP) aquaculture, initially, sea lettuce (*Ulva*) and based at Opotiki.

Growing recognition of the need for a local mussel hatchery, to support the intended development of the marine farms, led to a review of considerations in developing a tank-based facility on land using a seawater source. Primarily this review was to assist in progressing a hatchery but also recognised the potential to provide opportunities to research and develop tank-based aquaculture of other species.

In 2019 the Primary Production Select Committee considered whether it was appropriate to recommend a review of the commercial trout farming prohibition. Strong support from the RAO and related stakeholders was not sufficient to prompt the review and MPI had recommended that further analysis of the risks and opportunities was required³⁵.

By the time the Smart Māori Aquaculture programme was being progressed, international technologies for land-based aquaculture had also progressed considerably. A number of research agencies, including NIWA, Plant and Food, Cawthron and UoW had well advanced programmes investigating a range of considerations.

As a consequence, the following land-based opportunities were identified in the Stage Two 'options refinement'³⁶:

- Develop land-based hatcheries and nurseries
- Explore production of hapuku via recirculating aquaculture systems
- Trout farming is currently prohibited, but presents a key opportunity (land-based with geothermal integration potential)
- Explore Inanga and freshwater koura

Land-based Yellowtail Kingfish was developed into a 'high-level business case' as one of the key new aquaculture opportunities for Bay of Plenty iwi.

Table 2. Potential land-based kingfish opportunity

<ul style="list-style-type: none"> Opportunity is: <ul style="list-style-type: none"> Land-based farm likely located near Ōpōtiki. Farm will utilise Recirculating Aquaculture System (RAS) technology and will produce 4,000 greenweight tonnes of yellowtail kingfish per annum (year-round supply, ~48 weeks). RAS hatchery located onsite will supply juveniles (~1.5 million per annum). Kingfish product will be processed into gilled and gutted whole fish (head on) at the Te Whakatōhea factory in Ōpōtiki (toll of \$2,875 per gross tonne). 																			
<ul style="list-style-type: none"> Costs are: <table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">Scenario:</td> <td style="width: 30%; text-align: right;">4,000t</td> <td colspan="2"></td> </tr> <tr> <td>• Capex:</td> <td style="text-align: right;">\$90.1m</td> <td colspan="2"></td> </tr> <tr> <td>• Hatchery & Growout Opex (p.a.):</td> <td style="text-align: right;">\$34m</td> <td colspan="2"></td> </tr> <tr> <td>• Sales/processing Opex (p.a.):</td> <td style="text-align: right;">\$14.8m</td> <td colspan="2"></td> </tr> </table> 				Scenario:	4,000t			• Capex:	\$90.1m			• Hatchery & Growout Opex (p.a.):	\$34m			• Sales/processing Opex (p.a.):	\$14.8m		
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<ul style="list-style-type: none"> Jobs created*: <ul style="list-style-type: none"> During establishment (one offs) = 840 On-going employment supported = 801. 																			
<ul style="list-style-type: none"> Potential economic impact**: <table border="0" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 30%;">• 4,000t scenario:</td> <td style="width: 30%; text-align: right;">Total = \$633m</td> <td style="width: 30%; text-align: right;">Establishment = \$94m</td> <td style="width: 10%; text-align: right;">Ongoing = \$538m</td> </tr> </table> 				• 4,000t scenario:	Total = \$633m	Establishment = \$94m	Ongoing = \$538m												
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In parallel, as noted earlier, Te Whānau-ā-Apanui & Aotearoa Mussel Limited have entered into a joint venture as Te Huata International to set up a much-needed mussel hatchery at Te Kaha³⁷. This venture aligns with the New Zealand Greenshell Mussel Industry Spat Strategy Goal 3 ‘increasing hatchery production – to enable greater spat supply, productivity, value and resilience³⁸’. The venture has Callaghan research funding for work with Cawthron to set up a breeding programme and establish a centre of excellence in the Te Whānau-ā-Apanui rohe. Investment from the Government’s Regional Strategic Partnership Fund (RSPF) will enable construction and operation of the hatchery and research hub. Te Whānau-ā-Apanui expect to roll out other hatcheries in the future.

Whakatōhea may develop a second hatchery for the region in future years.

UoW, through its Facility for Aquaculture Research of Macroalgae (FARM) at Sulphur Point in Tauranga, is progressing a range of algae aquaculture opportunities³⁹. These will be further developed through its commercial arm WaikatoLink. Those closest to commercialisation are *Ulva* for a range of bioproducts, *Ecklonia* as an agricultural supplement, *Asparagopsis* for methane reduction in ruminants and *Oedogonium* for bioremediation⁴⁰.

The bioremediation project is in partnership with Aqua Curo Limited (ACL) which is a subsidiary of Quayside Holdings, the investment arm of BOPRC. ACL has been incorporated to pursue opportunities in the aquaculture sector, primarily, the use of macroalgae for bioremediation purposes. The key priorities for ACL are advancing its research through the establishment of a pilot plant at Te Puke to test commercialisation of its findings with a view to delivering future financial returns and sustainable wastewater treatment alternatives.

Land Based Infrastructure Development

The original (2009) Bay of Plenty Aquaculture Strategy expressly recognised that ‘without supporting infrastructure, the viability of existing space in the region becomes questionable. In that sense, infrastructure is both a facilitator and an enabler of growth’. At the time it was recommended that a needs assessment, then region-wide business case and funding plan, for aquaculture infrastructure be progressed.

Soon after, Whakatōhea Māori Trust Board and the Opotiki District Council shared their joint vision for the Opotiki Harbour Transformation Project, an *‘inextricably linked’* programme to develop the Eastern Seafarms mussel farm and create a navigable harbour entrance at Opotiki. It was noted that *‘in addition to servicing offshore marine farming developments, an improved harbour entrance will promote a variety of marine industry developments and marine-based tourism and recreational activities’*.

This strategy has been reiterated through the range of strategies, reports, funding proposals and business plans over the intervening years.

The challenge in achieving funding was related to the interdependence of the range of developments. Wharves require income and the primary income was to come from the marine farm, but the marine farm’s development was hampered by the absence of a wharf. Supporting infrastructure such as a public wharf, associated marine-related land-based infrastructure and activities and a mussel processing factory were identified as integral to the overall vision, but the upfront investment required was substantial.

The business case submitted to Government by the Opotiki District Council in 2017 highlighted the interdependence of the related elements.

Business cases for both the harbour and the mussel processing factory progressed over the intervening years and in July 2020 a full package of funding was announced⁴¹:

Table 3. Opotiki Harbour Transformation Project funding

Opotiki Harbour development	\$76.4 million
Whakatōhea mussel processing factory and farm development	\$24.85 million
Opotiki marina	\$8.8 million
Opotiki wharf	\$4.32 million

The harbour development is progressing according to schedule and is due for completion by mid 2023. The development project also includes a boat ramp on the eastern side which will support recreational use and host the ongoing dredging operations as well as a 2 hectare area for carparking.

Opotiki District Council has recently consulted on options for a ‘masterplan’ for the harbour and wharf area which will ‘maximise the benefits of the harbour development project, for both recreational and commercial users of the new harbour. The masterplan will identify how we can improve linkages to the CBD, enhance the recreational amenity offered along the river area at the existing wharf, and provide an additional boat ramp to further encourage local economic activity⁴²’.

The proposed western side commercial marina being developed by the private entity Opotiki Marina and Industrial Park Limited is behind schedule and is projected to be completed in late 2024. The commercial marina will support a marine precinct which could in theory be developed ahead of the marina being finalised. This will likely include the necessary area(s) for the land-based element of marine farming including storage and servicing of ropes and floats.

The harbour infrastructure includes a seawater intake on the eastern side which could feed land-based aquaculture initiatives such as a hatchery, an RAS facility and/or research/education facilities.

The business case for the harbour development included a range of key metrics to measure the broader economic and social benefits of the project as these were a fundamental driver for the funding. A report is due at the finalisation of the project to track the range of benefits.

In keeping with the intergenerational aspect of the WMOL business, the mussel processing factory has been '*designed and built for tomorrow*⁴³'. It currently has the capacity to process 10,000 tonnes of mussels but can extend to 25,000. With five processing lines it can be adapted for other shellfish and wetfish. There is capacity at the site to add a mussel powder plant in the future.

The company's 3 vessels are currently operated from Whakatane but the vessel operations will move to Opotiki when the wharf is complete. The fleet is projected to extend to 10 vessels by 2035.

The importance of infrastructure to support research and education has also been recognised across the range of strategies over time. The Bay of Plenty Polytechnic (now Toi Ohomai) began developing a strategy to enable it to meet the future needs of the aquaculture industry in the mid 2000s. This strategy included investment in building and equipment infrastructure for a new science facility focussing on aquaculture, marine and environmental science.

In recent years UoW's aquaculture programme has expanded its infrastructure at the Coastal Marine Field Station to include a dedicated facility for seaweed cultivation. The FARM will have the ability to host both research and commercial activities relating to aquaculture of marine and freshwater algae.

The Te Pou Oranga o Whakatōhea Workforce Development Centre in Opotiki houses the Whakatōhea aquaculture workforce training and education programme⁴⁴.

Research/Technology Development

The particular importance of research and technology in the Bay of Plenty region was recognised early on when the traditional mussel farming structures were found not to be suited to the higher energy environment of the Eastern Seafarms site. The first Bay of Plenty Aquaculture Strategy noted that *‘considerable energy and resource has been committed to understanding what species will prosper in what conditions, and what the likely environmental effects might be, but far less effort has been put into understanding the nature of the structures that are required’*. As a priority it was identified that a collaborative ‘needs analysis’ be undertaken for aquaculture opportunities across the region and that any resulting strategy and actions need to be collaborative also.

The Bay of Connections facilitated a range of aquaculture research reports, covering biosecurity, nutraceutical potential for locally grown mussels, modelling the environmental carrying capacity of the region, assessing mussel spat availability, summarising biosecurity risks and mitigations and identifying a range of new species and technology opportunities.

WMOL, as the first company to undertake aquaculture in the region, have invested significantly in research and technology over time, including in infrastructure, cultivation, and processing and hold important intellectual property. This investment has effectively built a ‘foundation’ for the industry to develop further. Future plans include investment in product and brand development.

UoW has identified a range of research programmes which align with the aquaculture aspirations of the region. These include a toheroa programme, robotics, bioproducts, ecological aquaculture such as IMTA, macroalgal research (eg at the FARM facility) and environmental remediation. Potential partnerships in the region include water quality remediation, restoration of kai moana, new species, support for development of high value marine bioproducts, circular economy programmed and smart technologies.

The newly opened ‘Blue/Green Tech Lab⁴⁵’ will enable collaboration in aquaculture technologies where ‘University of Waikato staff and students will work on projects with and for local companies involving automation, robotics, artificial intelligence and biotechnology’. ‘It will also provide a space for engaging with future students and the local community and reinforces our commitment to growing investment and activity in support of community and industry in the region’.

UoW also has a comprehensive environmental sciences component which can support better understanding⁴⁶ of how aquaculture interacts with coastal ecosystems. Collaboration across the range of intersecting elements, including the land-sea interface, climate change, marine debris, marine protected areas, biodiversity, and restoration can enable well placed aquaculture to best support environmental wellbeing.

Toi Ohomai has aquaculture projects focusing on flounder/pātiki and butterfish aquaculture with their Bay of Plenty hāpu/iwi partners. This also includes the co-development of hāpu-centric microbusiness models. This work is through the University of Waikato and Toi Ohomai/ Te Pūkenga.

The Smart Māori Aquaculture programme has recently ‘brought together some of the top science and

technology minds from across Aotearoa today to finalise a roadmap to developing a world-class aquaculture industry in the rohe⁴⁷⁷. The aim is to prioritise the long, medium, and short-term research and development projects that align with iwi values, vision and goals. The roadmap will enable actions towards mitigating key challenges and achieving the intergenerational opportunities that aquaculture can provide.

Future research and technology development will likely focus more on species opportunities, both marine based and land-based aquaculture technologies, as well as innovations to streamline production and monitoring.

Looking to the Future

Future Timeline

The case for continued aquaculture development in the Bay of Plenty region is compelling both because of the significant need for improvements in wellbeing for iwi/Māori, the community, and the environment and because the region itself is well suited to a range of new initiatives.

Future aquaculture development in the region will be predominately iwi led, both through continuation of the strategies of iwi already invested such as Whakatōhea and Te Whānau-ā-Apanui, and through the upcoming iwi settlement processes including the Crown aquaculture settlements, individual Treaty settlements and the MACAA customary marine title applications. These processes have their own timeframes, and the outcomes can not necessarily be anticipated, so this adds complexity to the overall picture of the future configuration of the industry.

Through examination of the range of ‘strategies’ and stakeholder discussions a ‘pictorial’ representation of programmed future development has been created showing ‘snapshots’ of development in the region now (2022), in the short term (2025), the medium term (2035) and beyond (2050). As the timeframes extend there is less clarity about what might be programmed, and which of those initiatives may come to fruition. However, it provides a helpful picture of how and where the current aspirations might lead. These are attached as Appendix 3 – Future Timeline.

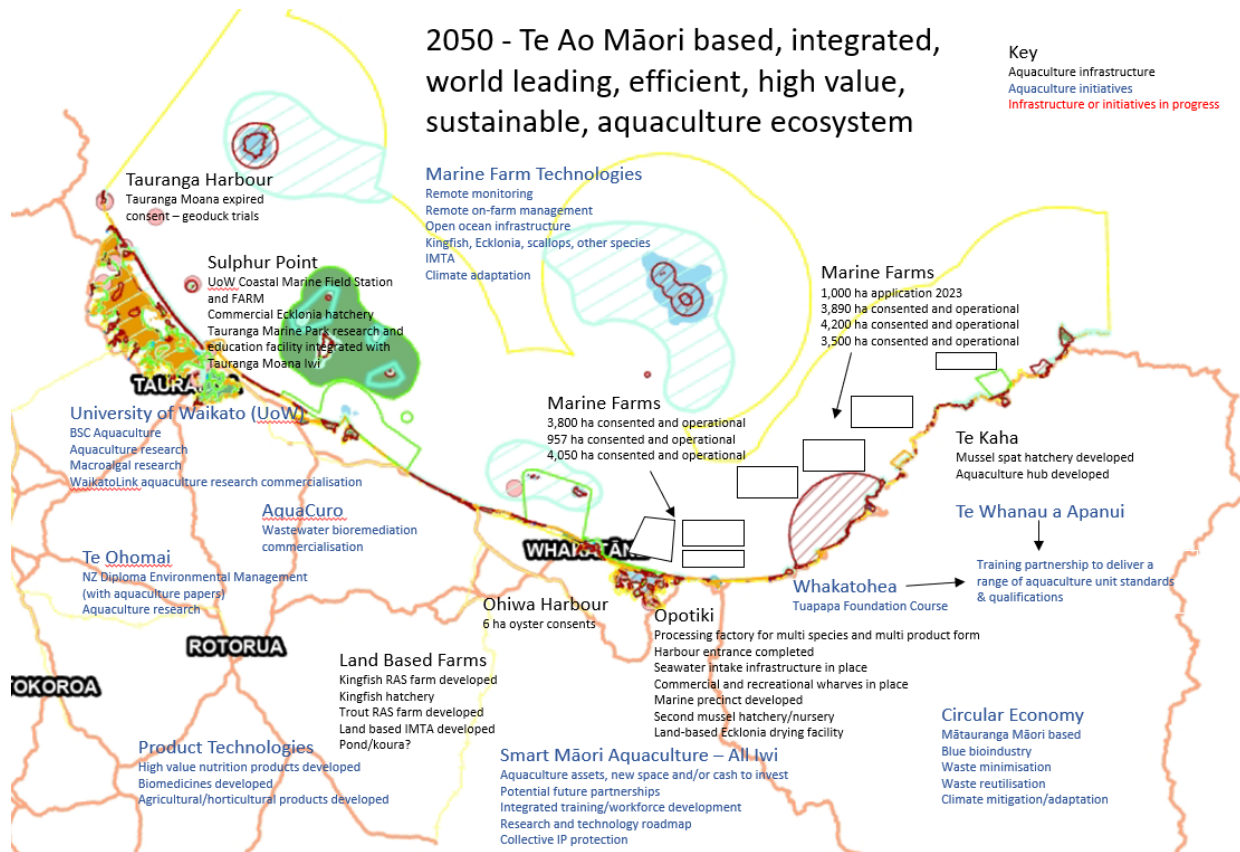


Figure 10. Future timeline 2050

2025 sees those developments that are currently in the pipeline having progressed. 2035 then includes the outcomes of settlement processes (noting that the settlement decisions will be made in 2023 and the consenting processes and any staged development will follow from there). 2050 provides a picture of the overarching aspiration – a Te Ao Māori based, integrated, world leading, efficient, high value, sustainable and profitable aquaculture ecosystem. Iwi aspirations, being intergenerational, will extend well beyond 2050 and these will likely be drivers informing settlement decisions along the way.

Gaps and Opportunities

As we can see from the history to date, aquaculture development can be challenging. The future aspirations in the region require significant investment and collaboration in planning, infrastructure, technologies, and workforce development, and have investment timelines that are long. Strategic alignment across the region will be important to maximise the wellbeing benefits. A clear ‘pathway’ showing whether/how each of the initiatives will best support the overarching vision will be important to inform commercial decision making and funding decisions. The ‘wrap-around’ support that the Government, particularly through MPI, are providing to Iwi in the region will be essential to sustain the anticipated development as it progresses.

The challenge will be facilitating collaboration between different commercial entities (including Iwi with aquaculture assets) when commercial entities by their nature need to protect any perceived or real sensitivities, advantages and/or intellectual property. ‘Cooperating to compete’ (or co-opetition⁴⁸) models

such as those proposed by TOKM may be worth investigating for the region generally.

This review can only provide an overview of the range of strategies however it has highlighted a range of gaps in the overarching picture, which may signal gaps in what is required to enable realisation of the anticipated benefits. Opportunities to work more collaboratively and to enable clear signalling of priorities for investor and funding support are identified.

Marine Based Aquaculture Development

Marine based aquaculture is the key building block of the future. Investment in technologies and infrastructure will not make sense unless the water space can be consented and can viably grow product.

Currently there are nearly 5,000 hectares of consented water space offshore of Opotiki, growing mussels at present, but some also consented for scallops, Pacific oysters, and flat oysters as well as for pilot farming of 'other species'. An additional 5,500 hectares is currently in application stage.

A further 7,500 hectares of 'new space' is under investigation as part of the upcoming iwi settlement processes. As noted above, three areas have been 'gazetted' for this purpose and decisions on this new space are required by mid 2023. There are a range of factors which will influence each iwi's decision-making, including MACAA space covered by two or three of the Iwi, so it is difficult to predict the future configuration, but two broad outcomes are possible:

- Iwi could decide to take up the authorisations, in which case they will need to apply for the required resource consents.
- Iwi could decide not to take up the authorisations, in which case it is possible that one or more 'private' entities may apply for consent(s) for that space.

Resource consenting of new marine farming space is currently complex and costly and can take up to ten years to be finalised. Once a consent is in place the Undue Adverse Effects⁴⁹ (UAE) test can add further time and costs. Government has indicated a range of support mechanisms will be in place, including enabling the necessary science and inter-agency engagement, to streamline the consenting process for Iwi.

Once consents are in place there are often requirements for further monitoring prior to undertaking the activity and for staged development over time. It is reasonable to expect that the 'new space' would be fully developed by 2035 if not before.

A range of 'species' configurations have been proposed. The Smart Māori Aquaculture programme has highlighted Kingfish, Ecklonia and mussels as best meeting the 'four pou' economic, environmental, cultural and social outcomes anticipated from the settlement. Piloting of scallops is also included. Investments in other seaweeds are on the horizon.

The consenting 'ecosystem' towards the final configuration is complex and many elements will be commercially sensitive. Competing interests, including from external stakeholders, could potentially

hinder the planned development. To achieve the best outcome for the region, these processes should be as aligned and as collaborative as possible. The existing industry, applicants and the IAOs will need to be closely involved as the aquaculture settlement decisions are made and the consenting processes progress. A framework to facilitate this is recommended.

An added complexity is the Government's current reform of the Resource Management Act (RMA)⁵⁰. The reforms are due to be in place in 2023 but as yet it is unclear how they will affect aquaculture consenting. The principal policy lever will be the requirement for councils (with Government support) to undertake long term regional spatial planning however spatial planning is not a simple exercise and will likely take a number of years for communities to agree. Signals from MPI are that the reforms will include streamlining provisions for aquaculture, but these are still unclear at present too. It is reasonable to assume that a collaborative 'aquaculture spatial plan' which has had input from a broad range of stakeholders in the Bay of Plenty community would then be able to be relatively easily integrated into the broader plan. Support from MPI for this exercise is highly recommended.

The size and format of future marine space will be a significant indicator of the future ecosystem of the broader industry across the region. Once this 'gap' is filled, a clearer overarching strategy will emerge.

As noted in more detail below, it is clear that the research required to establish what and how to fill the economic opportunity must not be under-estimated. Work is well underway with the universities and other research institutes to develop the 'contemporary science', alongside the 'traditional science' in the rohe moana of the Bay of Plenty.

Land Based Aquaculture Development

A certain level of land-based aquaculture will be required to support the marine space. Mussel hatcheries/nurseries are a key example, but so are seaweed and finfish hatcheries.

At present the Te Huata mussel hatchery is projected to produce the equivalent of 30% of the current mussel spat supply. The Smart Māori Aquaculture programme has included spat from the Te Huata hatchery as a dependency (with wild spat also caught on the farms).

The Aquaculture New Zealand Mussel Spat Strategy projects that the industry will require a 40% increase in spat by 2025 and a 60% increase by 2035. With those metrics in mind, it is reasonable to anticipate that there is 'room' for a second hatchery in the region. As noted above, and alongside Te Huata's plans to build a second hatchery, Whakatōhea may also develop a hatchery at Opotiki.

The Smart Māori Aquaculture programme includes a business case for a land-based Kingfish RAS farm which would include the need for a hatchery. The programme also scopes the opportunity for marine based Kingfish which would require a land-based hatchery. Specific locations for these have not been investigated.

The Smart Māori Aquaculture programme anticipates that marine based Ecklonia would be serviced by a

'newly constructed hatchery in eastern BOP.' This may be aligned with the University of Waikato FARM at Sulphur Point in Tauranga which is in the process of achieving the necessary licensing to enable commercialisation of an Ecklonia hatchery.

The Smart Māori Aquaculture programme included an early assessment of the potential for land-based pond culture such as inanga and koura. At this stage the economics and technology are limiting factors, but these may be revisited at a later date.

Land-based algal bioremediation initiatives are also under investigation. The furthest advanced is the Aqua Curo *Oedogonium* trial at the Te Puke wastewater plant. Tauranga Moana iwi are also interested in an IMTA based system whereby cow effluent is 'remediated' in algal ponds and the algae are subsequently utilised in mullet or flounder culture. Further initiatives are likely to be explored as technologies advance and awareness of the potential benefits of bioremediation are understood however it is difficult to predict at what locations and scales.

There may be additional private commercial interest in developing land-based aquaculture in the region. The level of additional interest outside the existing strategies is unknown.

The inability to progress land-based trout is seen by most stakeholders as a significant missed opportunity for the region. Because of trout's legal status, the Government funded Smart Māori Aquaculture programme was unable to develop a business case for trout, despite finding it to be the highest of all potential opportunities assessed in the options refinement. It scored high on demand readiness, expected margin, technology readiness and time horizon, equal only to salmon. MPI had made a submission to the Primary Production Select Committee that a full analysis of commercial trout farming should be undertaken (as well as *'consultation with tangata whenua and stakeholders'*) before the legal status can be reconsidered. This 'analysis' is a current gap which might be a priority to address.

For the most part, the existing 'strategies' seem well aligned. As noted above, further development of land-based hatcheries will be dependent on the programmed configuration of the marine space. RAS finfish is not dependant on this however and, with technology developments and increasing efficiencies it is likely that at least one RAS finfish facility will be developed in the region in the medium to longer term.

Land Based Infrastructure

The Opotiki Harbour development is programmed to provide a range of key land-based infrastructure including vessel berthing and servicing which are critical to the success of the marine operations. The pre-positioning of seawater intake structures will enable land-based research and development at Opotiki. Seawater intakes are one of the key critical building blocks for land-based aquaculture of marine species, it may be that additional intakes are required to support development in other parts of the region.

Because the Opotiki marine precinct is still at its early stage of development it would be prudent to have an overview of what kinds of infrastructure might be programmed for that location. A 'hub' for 'expressions of interest' in the site might be helpful. This could enable more detailed spatial and services planning for the precinct.

The Smart Māori Aquaculture programme anticipates that processing of the range of species/product format options can be processed at the WMOL factory at Opotiki. The factory has been developed in a way that it can stage up as requirements increase. The programme also anticipates that a land-based Ecklonia drying facility would be established 'near to the point of harvest' so presumably also at Opotiki.

Private commercial entities seeking to develop RAS finfish in the region would likely include their own on-site processing.

Three separate 'research and education' type hubs are proposed within the existing strategies. Te Whānau ā Apanui plans one based alongside the Te Huata spat hatchery, Whakatōhea has plans for one at Opotiki and a Tauranga Moana supported research and education facility is proposed for Marine Park in Tauranga⁵¹. UoW intend to host a wide range of short-term student led research projects at the site, which might serve as a triage to test potential projects for further development at the more commercially focussed Opotiki and Te Huata facilities. While each of these have significant merit on paper it would be prudent to facilitate engagement between the stakeholders to ensure they complement each other and/or the initiatives can be reprogrammed accordingly.

As the industry moves to incorporate circular economy principles, there will be a need to house biowaste innovation facilities near to the source of waste biomass. Opotiki is the most likely location, but some might be hosted at UoW Tauranga and others further afield may also be viable.

As with land-based aquaculture, a full picture of required infrastructure will be informed by the marine-based spatial configuration. Infrastructure providers will be looking for early signals about what kinds of infrastructure are planned for when and where. Early signals are particularly important in this time of longer lead times for labour and raw materials. A land-based 'spatial plan' may provide a useful guide for future investment.

Research and Technology Development

Research and technology have been at the forefront of the region's aquaculture development from the early days. The region is well supported by the University of Waikato and Toi Ohomai research and technology programmes hosted within the region but the key broader aquaculture research providers, NIWA, Cawthron and Plant and Food all have programmes which are focussed on a range of aquaculture developments.

Because there a range of drivers and funding streams supporting aquaculture research initiatives it is difficult to get a clear picture of how current programmes support or otherwise align with the overarching development strategy. One way of achieving this might be to request information from each of the providers detailing which particular programmes they view as priorities and how they fit into the 'future timeline' identified here. Perhaps the onus should be placed on the research providers to demonstrate how they are adding value to the region's overall goals.

As noted above, it will be important to ensure that the three planned 'centres of excellence' have aligned

rather than competing programmes.

The Smart Māori Aquaculture research and technology roadmap will be an important initiative and future resource and it will be important to connect that with the requirements and strategies of industry and research stakeholders.

This lack of a clear picture means that it is difficult to identify specific overlaps or areas of competition in the research space. The 'stakeholder relationships' overview in Figure 1 also highlights the current absence of any specific agency with a 'cross research and education' perspective for the region. This may be a priority for future initiatives so that each entity can most efficiently contribute to realising the overarching vision.

Workforce Development

Workforce development is a primary driver for the support for aquaculture in the region. The benefits to the Opotiki community from employment at WMOL, including the wrap-around support programmes provided, are already significant.

Whakatōhea have a critical 'foundation course' in place to support the community to develop the foundation skills required for entry into the industry. Te Whānau ā Apanui have plans to partner with Whakatōhea to develop a range of 'unit standards' from the farming, factory and hatchery SOPs to combine into a range of appropriate qualifications. In this way, delivery of the unit standards can be a combination of class based and 'on the job'.

The Toi Ohomai envisaged 'centre of expertise' would host a range of workforce, education and career opportunities related to aquaculture, from vocational training (skippers, deckhands, processing workers) through to undergraduate and post graduate qualifications and 'careers'. These would be delivered in partnership with the University of Waikato.

Tauranga Moana have expressed interest in a partnership of Tangaroa Aquaculture, Te Kura Kaupapa o Te Kura Kokiri, Te Wharekura o Tauranga Moana and Te Wananga o Tauranga Moana within the proposed Marine Park research and education facility. Ideally this would also be in partnership with Toi Ohomai.

The Smart Māori Aquaculture programme's workforce development programme includes a 'high-level proposal of action' and notes that a detailed workforce development strategy will be incorporated and executed once the business cases are decided.

UoW are currently reviewing their aquaculture degree structure, connecting the related components including marine sciences, engineering and technology and build connections with industry to streamline pathways to aquaculture careers. Signals from industry and Iwi about the 'future format' of the industry will be important context.

Alignment with the Government Strategy

As outlined above, the Government has a comprehensive multi-agency programme to enable aquaculture to develop into a sustainable, productive, inclusive, resilient industry to support the range of well-beings. The 2021 investment roadmap outlines the key infrastructure and research investments currently underway and those required to accelerate delivery of the Government Aquaculture Strategy to achieve its goal. It focusses on maximising the value of existing aquaculture, open ocean salmon aquaculture and new opportunities include seaweeds and new species.

Of note for the Bay of Plenty are the Opotiki Harbour infrastructure investment, the Cawthron Shellfish Aquaculture Platform projects, the Cawthron national algal research centre, the Plant and Food accelerated breeding programme, the Moana Project and production of the industry spat strategy.

Future actions include a research roadmap, support for industry-led hatchery infrastructure and identifying how the Government can de-risk the transition stage between research and commercialisation. The Government has identified a range of future investments and actions to underpin industry success including market development support, nutraceutical ingredient verification, building social licence, supporting indigenous provenance, a waste and plastics minimisation programme and increasing laboratory capacity. Future research includes biosecurity surveillance tools, models and maps to support spatial planning, and research and technology to explore transportation formats, automated processing and remote monitoring.

MPI and Kānoa⁵² are in the process of formulating an 'acceleration plan' for aquaculture, particularly for the Bay of Plenty. They are looking for clear signals about priority projects for the region including coherent proposals which demonstrate collaboration. The region's strategy will need to take this plan into account once details have been released.

The combined economic impact of the four aquaculture opportunities assessed in the Smart Māori Aquaculture business case was in the order of \$932 million per year. If realised, this order of magnitude would comprise 1/3 of the total \$3 billion anticipated in the Government aquaculture strategy by 2035. Bearing in mind that there are few other regions where this level of opportunity is feasible, there is a significant impetus for continued Government support of the region's aspirations.

In depth assessment of the alignment with the Government strategy and the regional strategies is outside the scope of this report but there is a clear intent to support maximisation of the investment made to date, as well as to provide comprehensive 'wraparound' support to enable the iwi settlement.

Summary

The following is a summary of the gaps and opportunities identified in this stocktake, which can in turn be used to inform any gaps analysis undertaken as part of developing a regional strategy.

Gaps	Opportunities
Marine Based Aquaculture	
What will be the result of the Whakatōhea 4,500 hectare consent application? What is the timeline for its development?	<ol style="list-style-type: none"> 1. Agree a broad strategy and spatial plan for marine based aquaculture. Use the 'future timeline' as a template. 2. Create an information hub to encourage engagement and connect current and future marine based aquaculture stakeholders without undermining commercial interests. Consider models for 'co-opetition'. 3. Ensure Government support for streamlining consenting applications which fit within the overarching strategy 4. Ensure broader stakeholder engagement on the overarching strategy and spatial plan in order to integrate it into the new RMA spatial planning requirements. 5. Use the information hub to enable signals to other stakeholders about requirements for support including co-investment, aligned land-based aquaculture, infrastructure, research and technology, education and workforce requirements.
What will be the result of the Te Whānau ā Apanui 10,000 hectare consent application? What is the timeline for its development?	
Which (if any) IAOs will take up which gazetted aquaculture space? Will all three authorisations be utilised? What will be the result of those consenting applications? What is the timeline for their development?	
Will there be future applications for more marine space in the region? How might that sit within the broader regional strategy?	
What is the optimal configuration for marine based aquaculture in 2050? How might each marine site interrelate?	
What support is needed and when from Government and regional agencies to enable this?	
Land Based Aquaculture	
How might a second mussel spat hatchery support the overarching regional strategy?	<ol style="list-style-type: none"> 1. Agree a broad strategy and spatial plan for land-based aquaculture. Use the 'future timeline' as a template. 2. Consider whether land-based trout is a priority opportunity. 3. Use the information hub to encourage engagement and connect current and future land-based aquaculture stakeholders without undermining commercial interests 4. Ensure Government support for streamlining consenting applications which fit within the overarching strategy 5. Ensure broader stakeholder engagement on the overarching strategy and spatial plan in order to integrate it into the new RMA spatial planning requirements. 6. Use the information hub to enable signals to other stakeholders about requirements for support including co-investment, aligned marine-based aquaculture, infrastructure, research and technology, education and workforce requirements.
Which (if any) IAOs will take up the opportunity to develop land-based kingfish RAS? Where and when might this opportunity be realised?	
Will there be future land-based algal aquaculture? How and where might that be enabled?	
Which (if any) new commercial entities might seek to develop land-based finfish RAS in the region? How might this be integrated into the overarching strategy?	
Is the land-based trout RAS opportunity a priority for the region? If so, how might that be enabled?	
What is the optimal configuration for land-based aquaculture in 2050? How might each land site interrelate?	
What support is needed and when from Government and regional agencies to enable this?	

Land Based Infrastructure	
What key infrastructure is required to support the programmed marine farms.	<ol style="list-style-type: none"> 1. Develop a broad infrastructure needs analysis based on the overarching strategy. 2. Consider whether and how Opotiki can host the required infrastructure and what support or information is required to enable this. 3. Use the information hub to encourage engagement and connect current and future land-based infrastructure stakeholders without undermining commercial interests 4. Ensure Government support for streamlining consenting applications which fit within the overarching strategy 5. Ensure broader stakeholder engagement on the overarching strategy and spatial plan in order to integrate it into the new RMA spatial planning requirements. 6. Use the information hub to enable signals to other stakeholders about requirements for support including co-investment, research and technology, education and workforce requirements.
Does this all need to be located at Opotiki?	
What are the spaces and services required for Opotiki to support that infrastructure?	
What additional processing facilities (if any) are required to support the planned aquaculture development	
What other land-based infrastructure might be required to support the overarching strategy and where would that best be located?	
What are the specific plans for each 'centre of excellence' and how will they 'add' value to the collective rather than result in duplication?	
What circular economy infrastructure might be needed to support the overarching strategy and where would that best be located?	
How can the 'whole picture' of infrastructure needs including priorities and dependencies be signalled to investors, funders and infrastructure providers?	
Research and Technology Development	
What is the range of research required to support the overarching strategy?	<ol style="list-style-type: none"> 1. Develop a broad research and technology needs analysis based on the overarching strategy. 2. Use the information hub to encourage engagement and connect current and future research and technology stakeholders. 3. Consider whether a higher order 'connecting agency' is required to ensure alignment between programmes. 4. Enable connectivity between the three planned 'centres of excellence' to optimise alignment. 5. Undertake a needs analysis to understand the barriers and solutions for pathways from research to commercialisation. 6. Enable connectivity with the Smart Māori Aquaculture research roadmap. 7. Use the information hub to enable signals to other stakeholders about requirements for support including co-investment, infrastructure, education and workforce requirements.
What research is currently in progress or planned?	
How are research entities working together or separately and is there an opportunity to foster more collaboration?	
What kinds of research is anticipated at each 'centre of excellence' and how will they 'add' value to the collective rather than result in duplication?	
What are the barriers in the pathway from research to commercialisation and how would this be better enabled?	
How will the Smart Māori Aquaculture research roadmap connect with the broader research requirements?	
Is there a role for a 'connecting' agency to support alignment in research and technology across the region?	
Workforce Development	
What support to Whakatōhea and Te Whānau ā Apanui need for their workforce development programmes?	<ol style="list-style-type: none"> 1. Develop a broad workforce and education needs analysis based on the overarching strategy. 2. Consider whether and how the various planned programmes align with the overarching needs. Identify any
Is the Toi Ohomai 'centre of expertise' model canvassed in 2011 still a good model for the region? If so, how can the	

range of stakeholders collaborate to deliver it? What support might it need?	gaps. 3. Consider what external support including funding might be required to ensure the overarching needs are met. 4. Enable connectivity with the Smart Māori Aquaculture workforce development programme. 5. Use the information hub to enable signals to other stakeholders about requirements for support including co-investment, infrastructure, and support requirements.
What is anticipated at the Tauranga education facility? How might that fit into the broader picture?	
How does the Smart Māori Aquaculture workforce development programme relate?	
How can the UoW aquaculture programme review align with the other programmes in the region?	
Alignment with the Government Strategy	
What are the priority areas for Government support in the short and medium term?	1. Identify the areas of programmed Government support. 2. Identify the key priorities for Government support across marine and land-based aquaculture, land-based infrastructure, research and technology development and workforce development. 3. Analyse the importance of the overarching regional strategy for enabling the broader Government aquaculture strategy. 4. Develop coherent, collaborative proposals for Government to address these priorities.
What specific Government support is programmed for aquaculture in the region? How does that fit into the region's priorities?	
Are there gaps to enabling the existing initiatives to be successful? If so, how can they be better supported?	
What is the acceleration plan for the region? How can stakeholders connect with that?	
How critical are the region's growth projections in contributing to the broader national strategy and goals?	

Next Steps

The intergenerational approach that Iwi have taken to aquaculture development reflects the complexity of the industry as well as the culture of the Iwi. A fundamental recommendation for all aquaculture ventures is to prioritise resourcing into the initiatives that are known and proven while allowing the flexibility to innovate and adapt over time. A key recommendation for aquaculture in the Bay of Plenty region is to continue to focus on and support those initiatives already in place, such as development of the existing space, the Opotiki marine precinct, the WMOL workforce development programme, the Te Huata spat hatchery and the research and education programmes undertaken by Toi Ohomai and the University of Waikato.

A spatial plan is required for aquaculture in the Bay of Plenty which gives optics and insights into the opportunities for development, alongside those that are already underway. This would provide benefit to the region in many ways, alongside any number of Government agencies and commercial enterprises looking to support the aquaculture sector's endeavours in the Bay of Plenty. It can also inform the regional spatial planning requirements signalled in the upcoming RMA reform.

The Smart Māori Aquaculture programme, while running in parallel with the existing aquaculture initiatives and developments, will be a significant factor in the way that aquaculture develops in the future. Its aligned research and technology roadmap and workforce development strategy will be equally important. A priority for agencies wishing to enable the overarching benefits, Iwi/Māori wellbeing, social wellbeing, and environmental wellbeing, will be ensuring connectivity and collaboration between existing

stakeholders and the iwi stakeholders as the aquaculture settlement decisions are made.

Government, local government and advocacy agencies, such as the Bay of Plenty Aquaculture Group should foster and enable information sharing, potentially creating a 'hub' for information, hosting the range of strategies and reports identified in this stocktake and keeping this up to date and available to interested parties. Research and technology providers could be asked to input into the hub to provide clear information about which specific programmes are aligned with the overall strategy for the region.

If there is continued support for trout as an opportunity amongst stakeholders then investment should be made in revitalising Trout New Zealand's⁵³ previous desktop assessment to communicate the range of benefits, risks and mitigations which could be used to support a revised bid to Government for legislative change⁵⁴.

Above all, continued communications both within the sector and in the broader community will be vital to ensure the long-term vision is realised. While each stakeholder will have their own communications strategies, there is a need for shared messaging expressing shared values and building knowledge about the industry and its benefits. Resourcing to support collaboration and communication will be essential.

Because of the significant enthusiasm and potential for aquaculture in the region it is conceivable that resources may be spread too thin or concentrated in areas that don't lead toward the overarching vision. The key next steps are to draw the pieces of the puzzle together, the stakeholders, their individual and collective aspirations, the spatial elements of marine and land-based activities and the optimum timing for these pieces to come together to create an overarching strategy for the region.

Suggested next steps are to:

1. Develop a broad strategy for aquaculture in the region, encompassing an overarching vision for the wellbeing outcomes anticipated and the aquaculture requirements to achieve those outcomes, but focussed on identifying specific actions to address priority gaps and opportunities. Identify how the region's strategy aligns with Government's strategy.
2. Catalyse an over-arching spatial plan for aquaculture in the Bay of Plenty. This will help ensure harmonisation and leverage of the past, current and future investments made in aquaculture in order we capture the outcomes sought for all.
3. Develop a 'connectivity hub' to encourage collaboration where appropriate and enable a collective overview of how (and if) the various stakeholders' individual plans and strategies will fit together within the overarching strategy.
4. Identify key priorities for investor and funding support in the short, medium and longer term.

Appendix 1 – Strategy Register

File Reference	Name	Owner	Category (Select)	Type (Select)	Wellbeing through Aquaculture*							Issue Year
					CW	IMW	EW	MBAD	LBAD	LBID	RTD	
ST 1 2006	The New Zealand Aquaculture Strategy	New Zealand Aquaculture Council	Strategy	Industry	Y	Y	Y	Y	Y	Y	Y	2006
ST 2 2009	World Class Aquaculture Region Enabling Strategy	Bay of Connections	Strategy	Council	Y		Y	Y		Y	Y	2009
ST 3 2009	World Class Aquaculture Region Growth Plan	Bay of Connections	Strategy	Council	Y			Y		Y	Y	2009
BPC 1 2011	Opotiki - Whakatohea Mussel Farm Information	Whakatohea Mussels Opotiki and Opotiki District Council	Business Plan/Case	Industry				Y		Y		2011
RPT 2 2011	Tertiary Education in Aquaculture	Bay of Plenty Polytechnic	Report	Research/Education	Y						Y	2011
BPC 8 2020	Te Waiariki Iwi Aquaculture Opportunities Options Refinement Overview	Smart Maori Aquaculture	Business Plan/Case	Iwi			Y				Y	2020
RPT 3 2011	Region Wide Knowledge Base for Bay of Plenty Aquaculture	RAO	Report	Council			Y	Y	Y	Y	Y	2011
RD 1 2011	Offshore Aquaculture PGP Application	Sealord Group Ltd	Research /Development Plan	Industry			Y	Y			Y	2011
ST 4 2010	Opotiki Harbour Transformation Project Overview	Opotiki District Council and Te Whakatōhea	Strategy	Council	Y					Y		2010
ST 5 2012	Government's Aquaculture Strategy and Five Year Action Plan	New Zealand Government	Strategy	Government	Y	Y	Y	Y	Y	Y	Y	2012
RPT 4 2012	Land Based Aquaculture Opportunities and Challenges	Enterprise Great Lake Taupo	Report	Council					Y		Y	2012
RPT 5 2013	Building a Billion Dollar Sector	Aquaculture New Zealand	Report	Industry		Y	Y	Y	Y	Y	Y	2013
BPC 2 2013	Eastern Seafarms Spat Catching Business Plan	Eastern Seafarms	Business Plan/Case	Industry				Y				2013
ST 6 2013	Bay of Connections Aquaculture Strategy 2013	Bay of Connections	Strategy	Council	Y		Y	Y		Y	Y	2013
RPT 20 2014	Aquaculture in the Bay of Plenty Biosecurity Risk Assessment	Bay of Connections	Report	Council			Y	Y	Y			2014
RPT 6 2014	How the Bay of Plenty Could Achieve \$250M Aquaculture	Bay of Connections	Report	Council	Y			Y		Y	Y	2014

RPT 7 2014	Summary of Projects - Nutraceutical, Spat, Biosecurity	Bay of Connections	Report	Council			Y	Y				2014
BPC 6 2020	The Weaving of Relatives - Presentation	Indigi X	Business Plan/Case	Iwi		Y						2020
BPC 9 2020	Whakatohea Aquaculture Experience	Te Whakatohea	Business Plan/Case	Iwi		Y	Y					2020
RPT 8 2015	Te Moana a Toi Growth Study	Ministry for Primary Industries	Report	Government	Y	Y		Y	Y	Y	Y	2015
RD 12 2014	Lipid and Fatty Acid Composition of New Zealand Greenshell Mussels	Bay of Connections	Research /Development	Council				Y			Y	2014
RD 9 2017	Potential Aquaculture Expansion in the Bay of Plenty	Cawthron	Research /Development Plan	Research/Education				Y			Y	2017
BPC 3 2017	Opotiki Harbour Development Business Case Peer Review	Ministry for Primary Industries	Business Plan/Case	Government				Y		Y		2017
RD 2 2016	Aquaculture Innovation Forum Overview	Bay of Connections	Research /Development Plan	Council				Y	Y		Y	2016
RPT 9 2017	Opotiki Harbour Transformation - Supporting Innovation	Bay of Connections	Report	Council				Y	Y		Y	2017
BPC 4 2017	Opotiki Harbour Development Single Stage Business Case Summary	Ōpōtiki District Council	Business Plan/Case	Council				Y		Y		2017
RPT 12 2018	MPI Trout Submission	Ministry for Primary Industries	Report	Government					Y			2018
RPT 10 2017	Opotiki Harbour Transformation - Options for New Space	Bay of Connections	Report	Council				Y			Y	2017
RPT 21 2017	Extending Open Ocean Aquaculture in the Eastern Bay of Plenty	Bay of Connections	Report	Council			Y	Y		Y	Y	2017
RD 3 2019	Accelerated Breeding Programme Overview	Plant and Food	Research /Development Plan	Research/Education				Y			Y	2019
ST 10 2019	New Zealand Government Aquaculture Strategy	New Zealand Government	Strategy	Government	Y	Y		Y	Y	Y	Y	2019
RD 10 2021	Whakatohea Education and Training Programme	Te Whakatohea	Research /Development Plan	Iwi	Y	Y						2021
ST 8 2018	Bay of Connections Aquaculture Strategy 2018	Bay of Connections	Strategy	Council	Y	Y	Y	Y	Y	Y		2018
BPC 10 2020	Building a New Mussel Hatchery in Te Kaha	Te Whānau-ā-Apanui & Aotearoa Mussel Limited	Business Plan/Case	Iwi		Y			Y		Y	2020
BPC 7 2020	Te Waiariki Iwi Aquaculture Opportunities Assessment Overview	Smart Maori Aquaculture	Business Plan/Case	Iwi		Y		Y	Y		Y	2020
BPC 15 2020	Te Waiariki Iwi Aquaculture Opportunities Options Refinement	Smart Maori Aquaculture	Business Plan/Case	Iwi		Y		Y	Y		Y	2020
BPC 5 2020	Whakatōhea Mussels Opotiki Factory	Whakatohea Mussels	Business Plan/Case	Industry				Y		Y		2020

	and Farm Business Case	Opotiki										
BPC 12 2020	Te Waiariki Iwi Aquaculture Opportunities Assessment	Smart Maori Aquaculture	Business Plan/Case	Iwi		Y	Y	Y	Y		Y	2020
RPT 11 2018	Opotiki Harbour Transformation - Land Based Scoping Resource	Bay of Connections	Report	Council					Y			2018
RPT 19 2019	Bay of Connections Submission on Trout Farming	Bay of Connections	Report	Council					Y			2019
BPC 13 2020	Te Waiariki Iwi Aquaculture Opportunities Assessment Appendices	Smart Maori Aquaculture	Business Plan/Case	Iwi		Y	Y	Y	Y		Y	2020
RD 4 2020	Science and Technological Innovation for Aquaculture	Cawthron	Research /Development Plan	Research/Education			Y	Y			Y	2020
RPT 1 2021	Bay of Plenty Regional Aquaculture Agreements Overview	Te Ohu Kaimoana	Report	Iwi		Y						2021
RPT 14 2021	Bay of Plenty Aquaculture IP Review	Smart Maori Aquaculture	Report	Iwi		Y						2021
RD 16 2016	Aquaculture Mid Term Research Strategy	Ministry for Primary Industries	Strategy	Research/Education				Y	Y	Y	Y	2016
RD 17 2013	Kura ki Uta, Kura ki Tai	Cawthron and Whakatohea	Research /Development Plan	Research/Education	Y	Y	Y	Y			Y	2013
RPT 15 2021	Bay of Plenty Aquaculture Business Case Cultural Assessment	Smart Maori Aquaculture	Report	Iwi		Y						2021
RPT 16 2021	Te Moana a Toi Opportunities Economic Assessment	Smart Maori Aquaculture	Report	Iwi	Y	Y						2021
RD 18 2022	Smart Maori Aquaculture Science and Technology Roadmap	Smart Maori Aquaculture	Research /Development Plan	Research/Education	Y	Y	Y	Y	Y	Y	Y	2022
RPT 23 2021	Regional Labour Market and Socio Economic Profile	Bay of Plenty Regional Skills Leadership Group	Report	Government	Y	Y						2021
RD 19 2022	Moana Project Summary	Moana Project	Report	Research/Education			Y	Y			Y	2022
ST 23 2021	Government Aquaculture Investment Roadmap	New Zealand Government	Strategy	Government				Y	Y	Y	Y	2021
BPC 19 2022	Government Aquaculture Implementation Plan	New Zealand Government	Business Plan/Case	Government				Y	Y	Y	Y	2022
RPT 24 2021	Government Aquaculture Environmental Monitoring Method	New Zealand Government	Report	Government			Y	Y	Y			2021
ST 21 2021	Te Mahere Turoa Long Term Plan 2021 - 2031	Bay of Plenty Regional Council	Strategy	Council	Y	Y	Y				Y	2021
BPC 20 2022	Impact Marine Interest in RAS Salmon in BOP	Impact Marine	Business Plan/Case	Industry					Y			2022
ST 24 2022	Marine Biosecurity 2025	New Zealand Government	Strategy	Government			Y	Y				2022

RD 22 2022	Blue Green Tech Lab in Tauranga	University of Waikato	Research /Development Plan	Research/Education			Y	Y	Y		Y	2022
ST 22 2022	Toi Kai Rawa Strategic Focus	Toi Kai Rawa - Maori Economic Development	Strategy	Council	Y	Y						2022
RD 11 2021	Smart Aquaculture Workforce Development Strategy	Anaru Timutimu	Research /Development Plan	Iwi	y	y					Y	2021
ST 15 2020	Fit for a Better World - Primary Industry Strategy	New Zealand Government	Strategy	Government	Y	Y	Y	Y	Y	Y	Y	2020
ST 12 2020	New Zealand Greenshell Mussel Spat Strategy	Aquaculture New Zealand	Strategy	Industry			Y	Y	Y			2020
RD 20 2022	Capability Summary	Plant and Food	Research /Development Plan	Research/Education							Y	2022
RD 21 2022	Aquaculture Futures	University of Waikato	Research /Development Plan	Research/Education				Y	Y		Y	2022
RD 7 2022	BOP Iwi Aquaculture Collective Science, Research & Technology	NIWA	Research /Development Plan	Research/Education				Y	Y		Y	2022
ST 14 2020	Regional Aquaculture Organisation Overview	Bay of Connections	Strategy	Council	Y	Y		Y	Y	Y		2020
RD 6 2022	World Class Science for a Better Future	Cawthron	Research /Development Plan	Research/Education		Y	Y				Y	2022
RD 8 2021	Breeding New Finfish Species for Aquaculture	Plant and Food	Research /Development Plan	Research/Education				Y			Y	2021
BPC 16 2021	The Weaving of Relatives - Report	Indigi X	Business Plan/Case	Iwi		Y						2021
BPC 14 2021	Te Waiariki Iwi Aquaculture Opportunities Business Case Overview	Smart Maori Aquaculture	Business Plan/Case	Iwi	Y	Y		Y	Y		Y	2021
BPC 18 2019	Te Ara Moana a Toi	Opotiki District Council	Business Plan/Case	Council	Y	Y				Y		2019
ST 16 2021	Fit for a Better World - Progress Update	New Zealand Government	Strategy	Government	Y	Y		Y	Y	Y	Y	2021
ST 19 2021	Whakatane District Council Aquaculture Information	Whakatane District Council	Strategy	Council	Y							2021
BPC 17 2021	Opotiki Harbour Industrial Zone Development Plan	Chris Petersen	Business Plan/Case	Council						Y		2021
RD 13 2021	Aqua Curo Bioremediation	Aqua Curo	Research /Development Plan	Research/Education					Y		Y	2021
RD 14 2022	Facility for Aquaculture Research of Macroalgae	University of Waikato	Research /Development Plan	Research/Education				Y	Y		Y	2022
ST 20 2022	Tangaroa Aquaculture Aspirations	Tauranga Moana	Strategy	Iwi		Y	Y	Y	Y		Y	2022
RD 15 2022	Sulphur Point Marine Research and Education Facility	University of Waikato	Business Plan/Case	Research/Education	Y	Y	Y			Y	Y	2022

*														
	Wellbeing													
CW	Community Wellbeing													
IMW	Iwi/Maori Wellbeing													
EW	Environmental Wellbeing													
	Aquaculture													
MBAD	Marine Based Aquaculture Development													
LBAD	Land Based Aquaculture Development													
LBID	Land Based Infrastructure Development													
RTD	Research and Technology Development													

Appendix 2 – Strategy Stocktake

Industry Strategy Stocktake

File	Name	Owner	Key Themes	Scope, Stakeholders, Objectives, Recommendations, Timeframes	Status
ST 1 2006	The New Zealand Aquaculture Strategy	New Zealand Aquaculture Council	New Zealand Aquaculture Growth Strategy	Industry-led strategy to transform the 2006 industry to a \$1 billion dollar sector by 2025. Primarily seeking certainty for consenting existing and new aquaculture space and building relationships with stakeholders. Recognising importance of Māori partnerships and environmental stewardship. Growth focussed on market development and new space for existing species. Includes strategic partnerships for innovation and workforce development. Aquaculture New Zealand (AQNZ) is the industry body formed as a result of the strategy and continues to facilitate implementation.	Current.
RD 1 2011	Offshore Aquaculture PGP Application	Sealord Group Ltd	Marine Based Aquaculture Development, Research and Technology Development	PGP application for funding for new technology to enable farming at the Eastern Seafarms Opotiki site noting that it had not been viable to date. Proposes five projects, water quality, structure design and engineering, mussel biology, new species trials and biodiscovery. Summarises benefits for the BOP region and a 'path to market' which includes port and processing facilities, training and education and product and market development. Didn't progress.	Dated but still a useful model.
BPC 1 2011	Opotiki - Whakatohea Mussel Farm Information	Opotiki District Council	Marine Based Aquaculture Development, Land Based Infrastructure Development	Presentation from Ian Craig on Whakatohea plan for development of Eastern Seafarms water space. Outlines 3 year commercial trial commencing 2010 and programmed development over 12 years. Outlines accompanying plans for processing, hatchery and wharf development.	Has been superseded by further developments.
BPC 2 2013	Eastern Seafarms Spat Catching Business Plan	Eastern Seafarms	Marine Based Aquaculture Development	Overview of options for Eastern Seafarms to develop its site following on from non-progression of the PGP application noting that the site still had just 3 lines implemented. Notes current industry spat shortage and recommends staged development of 10 lines per year and staging to focus on spat catching/holding to 10-15 mm. Sets out projected financials accordingly.	Has been superseded by further developments.
RPT 5 2013	Building a Billion Dollar Sector	Aquaculture New Zealand	New Zealand Aquaculture Growth Strategy	Presentation from Gary Hooper summarising analysis of various industry growth scenarios. Identifies 'business as usual' will not meet the 2025 growth targets (2006). Drills into effects of three growth strategies – value add marketing, new space and new species, and increased productivity. Consolidated potential (all three strategies) up to \$1.4 billion by 2025. Sets out a range of conditional elements including continued Government and public support.	Dated but still a useful model.
BPC 5 2020	Whakatōhea Mussels Opotiki	Whakatohea Mussels	Marine Based Aquaculture	Redacted final business case for MBIE funding for WMO farm and factory development. Summarises farm history, planned development and intangible benefits but all commercial	Current.

	Factory and Farm Business Case	Opotiki	Development, Land Based Infrastructure Development	information redacted.	
ST 12 2020	New Zealand Greenshell Mussel Spat Strategy	Aquaculture New Zealand	Marine Based Aquaculture Development, Land Based Aquaculture Development	Industry-led strategy which sets out recommended measures to ensure the mussel industry has sufficient spat to meet its updated (2019) growth target of \$1 billion (for mussels) by 2035. Proposes this through securing and diversifying spat supplies, optimising spat use and increasing hatchery production. Includes a table identifying mussel industry growth targets for space, production and value. Spat hatcheries and nurseries are the key focus. Sets out stakeholder (including industry, research and Government) responsibilities and timeframes.	Current.
BPC 20 2022	Impact Marine Interest in RAS Salmon in BOP	Impact Marine	Land Based Aquaculture Development	Web page signalling interest in developing an RAS salmon facility in the region	Current.

Iwi Strategy Stocktake

File	Name	Owner	Key Themes	Scope, Stakeholders, Objectives, Recommendations, Timeframes	Status
BPC 9 2020	Whakatohea Aquaculture Experience	Whakatohea Iwi	Iwi/Māori Development	Presentation to Smart Māori Aquaculture hui outlining Whakatohea aquaculture journey and vision for the future. Outlines integrated strategies and goals with big picture priorities in aquaculture economic and education development. Summarises investment to date and plan for the future including a centre for innovation in open ocean aquaculture.	Current.
BPC 10 2020	Building a New Mussel Hatchery in Te Kaha	Te Whānau-ā-Apanui & Aotearoa Mussel Limited	Land Based Aquaculture Development, Research and Technology Development	Presentation to Smart Māori Aquaculture hui outlining joint venture between Te Whanau-a-Apanui and Aotearoa Mussel Limited to set up a mussel hatchery at Te Kaha. Includes Callaghan research funding for work with Cawthron to set up a breeding programme and establish a centre of excellence in Te Whanau-a-Apanui rohe. Following this funding, constructing and operating the hatchery. Construction scheduled to commence in 2021.	Current with delayed timeframes. Government funding confirmed in March 2022.
BPC 6 2020 and BPC 16 2021	Weaving of Relatives	Indigi-X	Iwi/Māori Development	Presentation and accompanying report outlining the Indigi-X programme to facilitate connection of indigenous professionals internationally to encourage collaboration and facilitate economic growth. Proposes setting up a 'weaving of relations' process for an Aotearoa and Canadian Indigenous Commission/Committee noting synergies in aquaculture opportunities. Seeking Government funding to support this.	Unclear.
BPC 12 2020, BPC 13 2020 and BPC 7 2020	Te Waiariki Iwi Aquaculture Opportunities Assessment Stage One Report including Appendices	Bay of Plenty Iwi	Marine Based Aquaculture Development, Land Based Aquaculture Development, Iwi/Māori Development, Research and Technology Development	Report on completion of Stage One of the Te Moana-a-Toi Aquaculture Opportunities Assessment programme. Provides overview of background, governance and methodology, and describes 'success'. Provides information on international and New Zealand trends in production and markets and translates these to the Bay of Plenty region. Summarises opportunities for the Bay of Plenty and carries out a high level assessment of a range of species using a species feasibility matrix. Provides key findings on selected species opportunities using marine, land-based and geothermal resources. Notes opportunities for regenerative aquaculture and climate change adaptation. Outlines technology and collaboration opportunities. Provides four key potential aquaculture pathways: shellfish, seaweed, finfish and land-based aquaculture.	Current, although Stages Two and Three have developed this programme further.
BPC 15 2020 and BPC 8 2020	Te Waiariki Iwi Aquaculture Opportunities Options Refinement	Bay of Plenty Iwi	Marine Based Aquaculture Development, Land Based Aquaculture Development, Iwi/Māori Development, Research and Technology Development	Report on completion of Stage Two of the Te Moana-a-Toi Aquaculture Opportunities Assessment programme. Outlines development of a 'four pou' (social, cultural, environmental and economic) multicriteria analysis to further refine the opportunities identified in Stage One. Identified five species which scored best overall. Also outlines development of a commercial matrix tool to support assessment including job creation, market, and commercial viability and tests the refined options against this. Made recommendations for refined options to test in business cases (Stage Three)	Current, although Stage Three has developed this further.
BPC 14 2021	Te Waiariki Iwi Aquaculture	Bay of Plenty Iwi	Marine Based Aquaculture	Presentation summarising the business cases developed as Stage Three of the Te Moana-a-Toi Aquaculture Opportunities Assessment programme. Summarises the opportunity, costs,	Current.

	Opportunities Business Case Overview		Development, Land Based Aquaculture Development, Iwi/Māori Development, Economic/Social Development	revenue, jobs and potential economic impact for; offshore Greenshell mussels, offshore Ecklonia seaweed, offshore Yellowtail Kingfish and land-based Yellowtail Kingfish. Proposes an aligned scallop farming pilot to further inform that opportunity.	
BPC 11 2021	Whakatohea Education and Training Programme	Whakatohea Iwi	Economic/Social Development, Iwi/Māori Development	Presentation to Smart Māori Aquaculture hui summarising Whakatohea aquaculture aspirations and developments and introducing the Tuapapa Foundation Course. Provides an overview of course content, unit standards and schedule. Outlines the partnership approach between Te Pou Oranga o Whakatohea which provides the foundation training and Whakatohea Mussels Opotiki which then recruits trainees and facilitates further training through the Primary ITO. Highlights social and economic outcomes.	Current with further developments.
RPT 1 2021	Bay of Plenty Regional Aquaculture Agreements Overview	Te Ohu Kaimoana	Iwi/Māori Development	Presentation to Smart Māori Aquaculture hui summarising the aquaculture settlement process for Te Moana a Toi Iwi. Shows how new aquaculture space will then trigger Iwi aquaculture space and/or settlement. Outlines the current work to value new space in the region in order to inform potential settlements. Outlines programmed support for Iwi to make informed decisions about potential space including undertaking preliminary site assessments. Sets out options and considerations for joint settlements. Outlines timing including proposal for extension to June 2022. Timing contingent on Iwi having the opportunity to consider the business cases developed as Stage 3 of the Bay of Plenty Iwi Aquaculture Opportunities programme and then each Iwi Aquaculture Organisation being able to make informed decisions about their settlement preferences.	Current with further developments.
RPT 14 2021	Bay of Plenty Aquaculture IP Review	Bay of Plenty Iwi	Iwi/Māori Development	Presentation summarising the Stage 2 IP report which provides a high level snapshot of international intellectual property rights in the context of the Bay of Plenty Iwi Aquaculture Opportunities programme. Cautions against waiting for the national programme for revision of the Māori IP framework. Proposes a 'pioneering new 'collective' intellectual property strategy for Bay of Plenty Iwi aquaculture.	Current.
RPT 15 2021	Bay of Plenty Aquaculture Business Case Cultural Assessment	Bay of Plenty Iwi	Iwi/Māori Development	Report providing a cultural assessment of the Bay of Plenty Iwi Aquaculture Opportunities programme which will be included in the overall business cases. Notes that the aim of the CIA is to understand the potential high-level cultural considerations arising from the development of Māori aquaculture in the region and approaches to help ensure that the cultural interests of Iwi in the Bay of Plenty are enhanced. Notes that it is not a consenting CIA but is intended to inform the decision-making process and that the next steps will be 'deeper engagement following the business case'. Makes a range of recommendations both addressing specific concerns and grouped by cultural principles to which they align.	Current.
RPT 16 2021	Te Moana a Toi Opportunities Economic Assessment	Bay of Plenty Iwi	Iwi/Māori Development, Economic/Social Development	Report providing an economic assessment to inform the four Bay of Plenty Iwi Aquaculture Opportunities business cases. Includes both cost benefit analysis (CBA) and economic impact assessment (EIA) using a 30 year period. Presents findings including that the two finfish opportunities score highest for CBA and all opportunities show large positive EIA impacts. Provides high level commentary on wider social and environmental impacts including wider	Current.

				employment effects.	
RD 11 2021	Smart Aquaculture Workforce Development Strategy	Anaru Timutimu	Economic/Social Development, Iwi/Māori Development, Research and Technology Development	Report outlining a 'Smart Aquaculture Workforce Development Strategy' to sit alongside development of Iwi aquaculture opportunities. Details career and role groupings and opportunities transcribed from the business cases and describes learning pathways from level 2 through to NZ diploma recognised qualifications. Provides a 'high-level proposal of action' and notes that a detailed workforce development strategy will be incorporated and executed once the business cases are decided.	Current.
ST 20 2022	Tangaroa Moana Aquaculture Aspirations	Tangaroa Moana	Iwi/Māori Development, Research and Technology Development	Outlines a range of aquaculture initiatives that Tangaroa Moana Iwi are pursuing including geoduck aquaculture at a trial site in Tauranga Harbour, sea lettuce aquaculture for potential human and horticultural medicinal properties, reinvigorating a project to create an IMTA project with cow effluent, algae and finfish, investigation of methane reduction and carbon capture seaweed projects, and collaboration on development of the Tauranga marine education and research facility at Sulphur Point.	Current.

Council Strategy Stocktake

File	Name	Owner	Key Themes	Scope, Stakeholders, Objectives, Recommendations, Timeframes	Status
ST 2 2009 and ST 3 2009	World Class Aquaculture Region Enabling Strategy – Base Document and Public Document	Bay of Connections	Economic/Social Development, Marine Based Aquaculture Development, Land Based Infrastructure Development, Research and Technology Development	Strategy developed in response to the Bay of Connections Regional Economic Development Strategy (EDS) (2008) and the New Zealand Aquaculture Strategy (2006) (NZAS) to set out how aquaculture can contribute to the Bay of Plenty's economic development strategy goals. References the EDS goal 'to establish a significant aquaculture industry in the Eastern Bay of Plenty, and investigate options for a harbour entrance at Opotiki'. Identifies a range of opportunities related to developing aquaculture in the region and a vision of \$250 million export sales by 2025. Includes an action plan which complements the NZAS with guiding principles and eight key areas of focus. Identifies opportunities, risks and high level actions for each focus area. Sets out timeframes and responsibilities for each action.	Superseded by 2013 strategy but still a good model.
ST 4 2010	Opotiki Harbour Transformation Project Overview	Opotiki District Council	Economic/Social Development, Land Based Infrastructure Development	Report setting out the vision for the transformation of the Opotiki community through aquaculture and the key harbour transformation projects to achieve that vision. Outlines the progress to date in developing the Opotiki seafarm and planning the Opotiki harbour entrance and highlights how they are inextricably linked. Summarises the associated expected benefits to the community. Sets out key project components, stakeholders and next steps across three stages. Sets the scene for development of a business case for funding.	Sets the scene for future developments.
RPT 3 2011	Region Wide Knowledge Base for Bay of Plenty Aquaculture	RAO	Marine Based Aquaculture Development, Land Based Aquaculture Development, Land Based Infrastructure Development, Research and Technology Development	Report commissioned in response to the Bay of Plenty Aquaculture Strategy which provides a resource for stakeholders wishing to establish aquaculture in the region. Provides a stocktake of existing aquaculture ventures and future opportunities. Relating to these, outlines requirements for capital equipment, investment/funding, operations, infrastructure, skill base, training and science. Also lists requirements for aligned support industries. Includes high level considerations for biodiversity and biosecurity.	Dated but useful model.
RPT 4 2012	Land Based Aquaculture Opportunities and Challenges	Enterprise Great Lake Taupo	Land Based Aquaculture Development, Research and Technology Development	Report commissioned in response to the Bay of Plenty Aquaculture Strategy which provides an overview of opportunities and challenges associated with land based aquaculture of a range of freshwater species. For thirteen species groups provides information on biology, opportunities and challenges and recommendations. Summarises potential issues, technology and case studies for geothermal aquaculture. Identifies five species which have potential and sets out the requirements for collaboration in next steps.	Still a useful resource.
ST 6 2013	Bay of Connections Aquaculture Strategy 2013	Bay of Connections	Economic/Social Development, Marine Based Aquaculture Development, Land Based Infrastructure Development, Research	Strategy developed as an update to the 2009 Bay of Plenty Aquaculture Strategy noting that many of the goals of that strategy have been achieved. Reiterates the overarching goal of \$250 million by 2025. Identifies four focus areas for the years to 2016, collaboration, new species and technologies, science/technology/training/education and infrastructure support. Sets out an updated action plan with timeframes and responsibilities.	Superseded by 2018 strategy.

			and Technology Development		
RPT 6 2014	How the Bay of Plenty Could Achieve \$250M Aquaculture	Bay of Connections	Economic/Social Development, Marine Based Aquaculture Development, Land Based Infrastructure Development, Research and Technology Development	Stocktake of progress to date against the aquaculture strategies. Includes the range of initiatives undertaken by the Regional Aquaculture Organisation (RAO) since its inception in 2010. Provides a summary and analysis of opportunities and sets out related challenges including infrastructure, investment, the need for the wharf and marine farming regulatory and operational challenges. Provides high level summary of marine-based species opportunities.	Dated but useful resource.
RPT 7 2014	Summary of Projects - Nutraceutical, Spat, Biosecurity	Bay of Connections	Marine Based Aquaculture Development, Research and Technology Development	Report summarising findings from three separate aquaculture desk top studies: comparative nutraceutical value of Bay of Plenty mussels, analysis of mussel spat availability in the region, and aquaculture biosecurity risks. Outlines key outcomes and recommendations from each report. Concludes that there are opportunities for nutraceuticals and spat in the region and that biosecurity risks can be managed.	Dated but still useful resource.
RPT 20 2014	Aquaculture in the Bay of Plenty Biosecurity Risk Assessment	Bay of Connections	Marine Based Aquaculture Development, Land Based Aquaculture Development	Review of all known biosecurity risks and likely occurrences of any biosecurity events in the Bay of Plenty region. Highlights 25 marine and freshwater pests and pathogens that could significantly impact the industry. Notes that risks come from both aquaculture activities and other activities in the region. Notes that biosecurity risks are less able to be mitigated in open ocean environments compared with land-based facilities. Makes recommendations for risk minimisation.	Dated but still a useful resource.
RD 2 2016	Aquaculture Innovation Forum Overview	Bay of Connections	Marine Based Aquaculture Development, Land Based Aquaculture Development, Research and Technology Development	Presentation to an aquaculture innovation forum run by the RAO which summarises key aquaculture opportunities and challenges identified in previous work and innovation projects (under RAO workstream WS15) underway at the time.	Dated.
BPC 4 2017	Opotiki Harbour Development Management Case	Ōpōtiki District Council	Land Based Infrastructure Development, Marine Based Aquaculture Development	A subsection of the Opotiki Harbour Development Business Case, this sets out how the development will be undertaken and how the risks will be managed. Responds to the Cabinet funding requirements for a range of Key Performance Indicators (KPIs). Sets out the KPIs, the critical path of activities that make up the harbour project and decisions required at various milestones. Shows timelines, dependency links and responsibilities.	Superseded, development now underway.
RPT 9 2017	Opotiki Harbour Transformation - Supporting Innovation	Bay of Connections	Marine Based Aquaculture Development, Land Based Aquaculture Development, Research and Technology Development	Summary report of opportunity and expert review findings in the innovation workstream WS15. Identifies two distinct areas of focus: new open ocean shellfish opportunities and macroalgae (seaweed) opportunities. Outlines key findings from each and recommended next steps. Overall recommendations are to focus primarily on shellfish, especially Pacific oysters (but also flat oysters, geoduck, scallops and crayfish) and more collaboratively progress both high rate algal pond (HRAP) and marine macroalgae.	Superseded by the Bay of Plenty lwi programme.
RPT 10	Opotiki Harbour	Bay of	Marine Based	Summary report of key findings from the marine zone expansion workstream WS14. This	Superseded by

2017	Transformation - Options for New Space	Connections	Aquaculture Development, Research and Technology Development	workstream sought to identify 8,000 ha of new aquaculture area, provide a platform for new industry entrants and promote business diversity to support the Opotiki Harbour business case. Provides a review of the Cawthron report (RD 9 2017), identifies potential new industry stakeholders and sets out potential allocation methods for new space. Supports the case for the Opotiki Harbour and recommends collaboration, particularly on consenting new space.	the Bay of Plenty Iwi programme.
RPT 21 2017	Extending Open Ocean Aquaculture in the Eastern Bay of Plenty	Bay of Connections	Marine Based Aquaculture Development, Land Based Infrastructure Development, Research and Technology Development	The full report from WS15 making an evidence based initial opportunity assessment for Pacific oysters, flat oysters, geoduck, scallops and crayfish. Reiterates the need for the harbour development in tandem with marine farm development. Notes that research, hatchery and abundant hygienic sea water supply and clyster support facilities are key elements in the value creation aquaculture precinct.	Superseded by the Bay of Plenty Iwi programme.
ST 8 2018	Bay of Connections Aquaculture Strategy 2018	Bay of Connections	All	Strategy developed as an update to the 2013 Bay of Plenty Aquaculture Strategy noting that many of the goals of that strategy have been achieved. Reiterates the goal of \$250 million by 2025. Summarises highlights to date and sets out five focus areas for the years to 2021: continued advocacy and leadership, continued support for the harbour development, encourage aligned infrastructure development including the expansion of the coastal marine field station at Sulphur Point, promote new opportunities including trout and advocate for science, technology, education and training.	Current, though potentially due for review.
RPT 11 2018	Opotiki Harbour Transformation - Land Based Scoping Resource	Bay of Connections	Land Based Aquaculture Development	Report providing a resource for scoping potential opportunities for a land based marine hatchery/nursery facility in the Bay of Plenty region. Notes that a mussel hatchery will then support further development of marine based mussel farming as well as provide potential infrastructure for development of new species. Outlines high level site attributes including locational and infrastructure requirements, provides an overview of the planning context, and an overview of stakeholders and funding opportunities. Notes that collaboration will be key to further progress and recommends constraints mapping to refine potential site options.	Dated but still relevant.
BPC 18 2019	Te Ara Moana a Toi	Opotiki District Council	Land Based Infrastructure Development	Revised business case outlining programme for development of the Opotiki harbour entrance, development of the aligned marine industrial zone including areas for vessel repair and maintenance, commercial wharf and berthage, slippage and haul-out and a public wharf. Includes redacted growth projections for marine based aquaculture and aligned services. Projects 332 additional direct FTEs by 2030 and 739 by 2040. Projects total economic value created of \$132 million at full development. Harbour development to be complete by 2025.	Current.
RPT 19 2019	Bay of Connections Submission on Trout Farming	Bay of Connections	Land Based Aquaculture Development	Bay of Connections submission to the Primary Production Select Committee for Parliament to review trout farming legislation. Notes the 'undeniable case' for reviewing the trout prohibition. Sets out the background to the current setting, and notes that land based freshwater farming of trout has the highest potential. Provides counterarguments to opponents 'concerns'.	Potential to develop a business case for further advocacy.
ST 14 2020	Regional	Bay of	All	Presentation summarising the inception, vision, goals and achievements of the RAO as a	Current.

	Aquaculture Organisation Overview	Connections		stepping stone for development of the new organisation – the Bay of Plenty Aquaculture Group.	
ST 19 2021	Whakatane District Council Aquaculture Information	Whakatane District Council	Economic/Social Development	Whakatane District Council webpage https://www.whakatane.com/live-and-work/work-here/aquaculture noting that advances in the Opotiki harbour development and sea farms will 'open diverse business prospects' for the Whakatane District.	Current.
BPC 17 2021	Opotiki Harbour Industrial Zone Development Plan	Chris Petersen	Land Based Infrastructure Development	Proposed development of land adjacent in the Opotiki Harbour Industrial Zone to support aquaculture-related land-based activities.	Current.
ST 21 2021	Te Mahere Turoa Long Term Plan 2021 - 2031	Bay of Plenty Regional Council	Iwi/Māori Wellbeing, Community Wellbeing	Long term plan setting out strategic direction for Bay of Plenty Regional Council including four 'hoe waka' representing community outcomes of a healthy environment, freshwater for life, safe and resilient communities, and a vibrant region. Does not identify aquaculture per se but includes many relevant initiatives and outcomes including biosecurity, climate change, natural resource management, protecting lakes and catchments, developing social, cultural and economic wellbeing. Supported by the aligned science plan.	Current.
ST 22 2022	Toi Kai Rawa Strategic Focus	Toi Kai Rawa - Māori Economic Development	Iwi/Māori Wellbeing, community Wellbeing	Toi Kai Rawa Trust is the Bay of Plenty regional māori economic development agency. The strategic priority areas are - Rangatahi (youth), Whenua (land), Tangata (people) and Pakihi (business). Outlines key enablers for Maori economic wellbeing.	Current.

Research/Education Strategy Stocktake

File	Name	Owner	Key Themes	Scope, Stakeholders, Objectives, Recommendations, Timeframes	Status
RPT 2 2011	Tertiary Education in Aquaculture	Bay of Plenty Polytechnic	Economic/Social Development, Research and Technology Development	Presentation from Andrew Morgan outlining existing tertiary education options for aquaculture, identifying gaps and proposing a Bay of Plenty based 'centre of expertise – aquaculture institute'. Proposes an integrated model which includes University of Waikato (UoW), polytechnic and wananga and brings stakeholders and industry components together in feedback loops.	Dated but still a useful model.
RD 2013	Kura ki Uta, Kura ki Tai	Cawthron and Whakatohea	Iwi/Māori Development, Research and Technology Development, Marine Based Aquaculture	Vision Matauranga project for Cawthron and Whakatohea to share skills and knowledge to better utilise mātauranga Māori in aquaculture research R&D. Intended outcomes to generate a collaborative five year research strategy and two year action plan, towards development of existing and new species, develop the Whakatohea training programme and further foster collaboration.	Superseded by Te Kete Rau Kotahi
RD 2016	Aquaculture Mid-Term Research Strategy 2016	Ministry for Primary Industries	Research and Technology Development, Marine Based Aquaculture	Strategy capturing current research issues and priorities which aims to inform collaboration between industry, research providers, academic institutions, and government. Sets out vision, desired outputs, and priorities – growing space, biosecurity, growing better and consumer and communities.	Programmed for review

				For each priority identifies issues and research opportunities.	
RD 9 2017	Potential Aquaculture Expansion in the Bay of Plenty	Cawthron	Marine Based Aquaculture Development, Research and Technology Development	Report commissioned by Bay of Plenty Regional Council to provide high level assessment of water column and connectivity between potential new aquaculture sites. Consideration of four large (3,700 ha) and one smaller (1,000 ha) site. Concludes that staged management of development of the up to 16,000 ha, in the locations assessed, should viably address potential issues.	Still relevant as high level assessment.
RD 3 2019	Accelerated Breeding Programme Overview	Plant and Food	Marine Based Aquaculture Development, Research and Technology Development	Report for year four of five year programme to develop accelerated breeding approaches for New Zealand finfish to produce new aquaculture-ready species. Demonstrates growth gains for both tāmure/snapper and araara/trevally and ability to 'reliably produce sea-pen-ready juveniles'.	Year five report will have superseded this.
RD 4 2020	Science and Technological Innovation for Aquaculture	Cawthron	Marine Based Aquaculture Development, Research and Technology Development	Presentation to the Smart Māori Aquaculture hui summarising new developments and research focus areas in precision farming technologies for aquaculture. Towards a vision for 'a smart and connected aquaculture industry capable of doubling production of premium value products through remote on-farm management'.	Still relevant
RD 8 2021	Breeding New Finfish Species for Aquaculture	Plant and Food	Marine Based Aquaculture Development, Research and Technology Development	Presentation summarising and updating on the accelerated breeding programme, noting that semi-commercial farming of both snapper and trevally is underway in Beatrix Bay in the Marlborough Sounds.	Still relevant
RD 13 2021	Aqua Curo Bioremediation	Aqua Curo	Land Based Aquaculture Development, Research and Technology Development	Web page summarising the Aqua Curo venture to utilise macroalgae for wastewater bioremediation.	Current
RD 7 2022	BOP Iwi Aquaculture Collective Science, Research & Technology	NIWA	Land Based Aquaculture Development, Research and Technology Development	Presentation to the Smart Māori Aquaculture science and technology hui summarising NIWA's strategic aquaculture objective, capabilities and opportunities for land-based finfish farming. Summarises the new Yellowtail Kingfish RAS development at Ruakaka with capacity for 600 tonnes market fish per annum with anticipated profit margin of 30%.	Still relevant, though the work will have progressed.
RD 6 2022	World Class Science for a Better Future	Cawthron	Iwi/Māori Development, Research and Technology Development	Presentation to the Smart Māori Aquaculture science and technology hui summarising projects that are applicable to the region. Includes a collaborative research project which aims to support the growth of a Kaupapa Māori aquaculture industry in Waiariki. The programme will develop a mātauranga Māori centred, ecosystem-based aquaculture strategy for the region. Also remote marine monitoring including via Kutai Cam and open ocean technologies as well as support for iwi to develop hatchery capability.	Ongoing. The Programme still in process. The Kete Rau Kotahi strategy will be important.
RD 14 2022	Facility for Aquaculture Research of Macroalgae (FARM)	University of Waikato	Land Based Aquaculture Development, Marine Based Aquaculture	Web page summarise the University of Waikato aspirations and activities at the newly developed FARM site at Sulphur Point, Tauranga.	Current

			Development, Research and Technology Development		
RD 15 2022	Marine research and education facility	University of Waikato and Tauranga City Council	Research and Technology Development, Land Based Infrastructure Development, Research and Technology Development	Proposal to rezone part of the Tauranga Marine Park to enable University of Waikato to lease and develop of marine research and education facility. Tauranga Maori Iwi support. Currently open for public comment.	Current.
RD 19 2022	Moana Project Summary	Moana Project	Environmental Wellbeing, Marine Based Aquaculture, Research and Technology Development	The Moana Project is an \$11 million ocean project funded by the NZ Ministry for Business, Innovation and Employment. The project aims to vastly improve understanding of coastal ocean circulation, connectivity and marine heatwaves to provide information that supports sustainable growth of the seafood industry, science research efforts, iwi initiatives and how we manage our marine environments.	Current and relevant.
RD 18 2022	Smart Māori Aquaculture Science and Technology Roadmap	Smart Māori Aquaculture	All	Science and technology roadmap developed during a hui in June 2022 to prioritise the long, medium and short-term science and technology projects that align with iwi values, vision and goals.	Current and relevant.
RD 20 2022	Capability Summary	Plant and Food	Research and Technology Development	Outlines capabilities across the seafood supply chain from consenting assessment, production, processing and value add, to distribution/logistics and sales. Core expertise in breeding and genomics, data science, bioengineering, finfish husbandry and food and consumer science.	Current.
RD 21 2022	Aquaculture Futures	University of Waikato	Marine Based Aquaculture, Land Based Aquaculture, Research and Technology Development	Presentation to Smart Maori Aquaculture hui outlining aquaculture focussed elements of UoW programmes, includes a toheroa programme, robotics, bioproducts, ecological aquaculture such as IMTA, macroalgal research (FARM) and environmental remediation. Outlines potential partnerships in the region including water quality remediation, restoration of kai moana, new species, support for development of high value marine bioproducts, circular economy programmes and smart technologies.	Current and relevant.
RD 22 2022	Blue-Green Tech Lab in Tauranga	University of Waikato	Environmental Wellbeing, Marine Based Aquaculture, Land Based Aquaculture, Research and Technology Development	Research and development lab at University of Waikato focussed on new engineering and technology for primary industries including marine sector. Hosting research/industry partnership projects in automation robotics, AI and biotechnology.	Current.

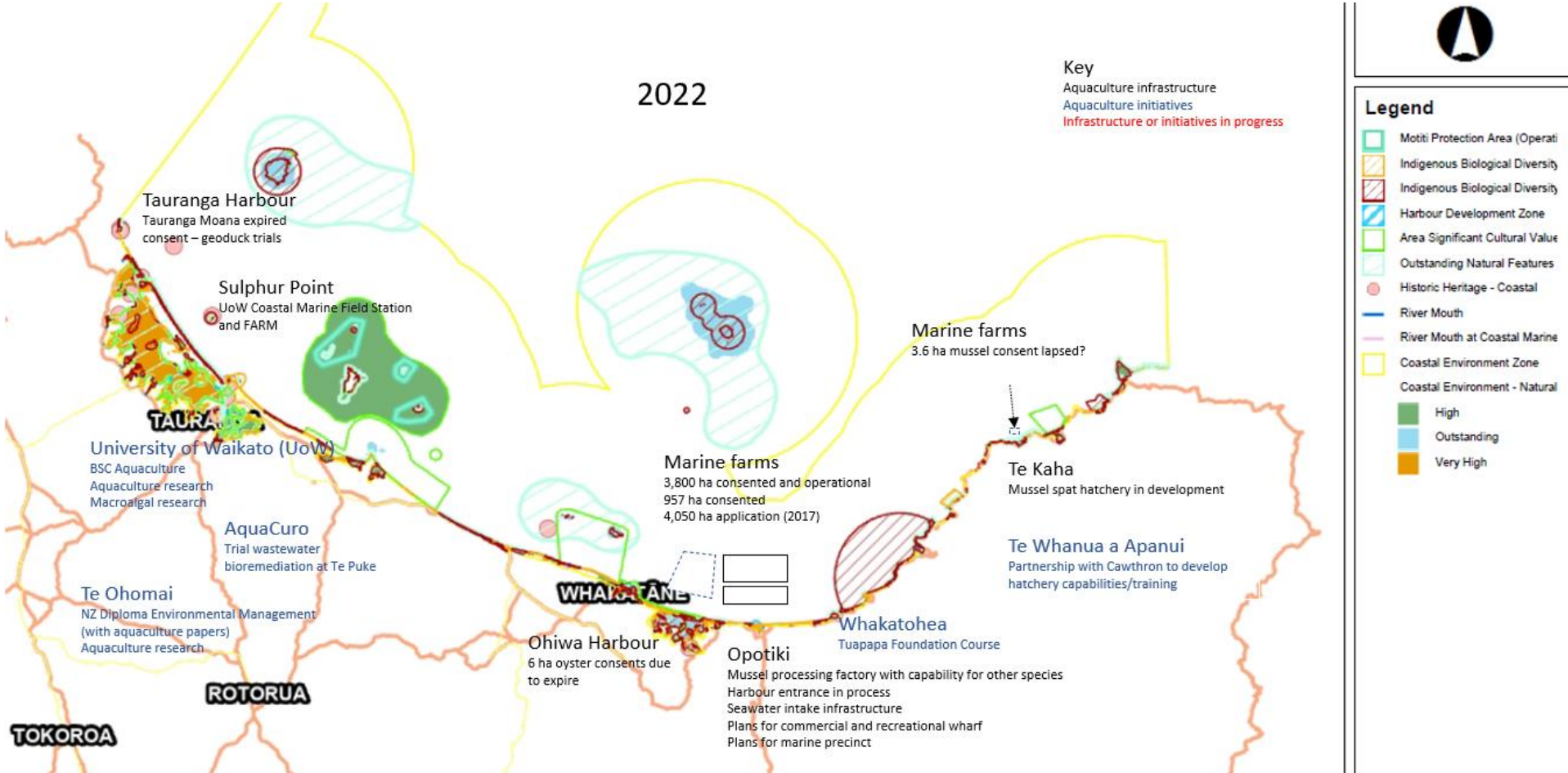
Government Strategy Stocktake

File	Name	Owner	Key Themes	Scope, Stakeholders, Objectives, Recommendations, Timeframes	Status
ST 5 2012	Government's Aquaculture Strategy and Five Year Action Plan	New Zealand Government	New Zealand Aquaculture Growth Strategy	Government's response to the 2006 industry strategy, setting out Government's aspirations, responsibilities and actions. Outlines a 'coordinated response across Government' in seven strategic areas: a healthy aquatic environment, quality planning and permitting, effective and responsive regulation, support Māori objectives, increase market revenues, increase value through R&D and sound governance. Includes key agencies, timelines and performance measures.	Superseded by 2019 strategy.
RPT 8 2015	Te Moana a Toi Growth Study	Ministry for Primary Industries	All	Regional growth study for Bay of Plenty led by Ministers for Economic Development, Primary Industries and Māori Development. Identifies significant scope for development in primary industries including aquaculture. Highlights importance of raising Māori economic performance. Identifies the Opotiki mussel farm as a major commercial opportunity and key element in the region's strategy. Notes growth and economic projections and two key opportunities, investment in Opotiki seafarm, processing and harbour development and establishment of commercial trout farming.	Dated but still relevant.
2015 – 2017 MPI (and BOPRC) activity in the interim commissioning reports to investigate feasibility of application for harbour development funding.					
BPC 3 2017	Opotiki Harbour Development Business Case Peer Review	MPI	Land Based Infrastructure Development, Marine Based Aquaculture Development	Peer review of the aligned business cases (2017) for the Whakatohea Mussels Opotiki (WMO) processing factory and the Opotiki District Council harbour development. Identifies logistical and investment constraints for the projected farm development and models a staged development scenario to inform future decision-making.	Dated but still a useful model.
RPT 12 2018	MPI Trout Submission	Ministry for Primary Industries	Land Based Aquaculture Development	MPI submission to the Primary Production Select Committee for Parliament to review trout farming legislation. Notes potential economic benefits but significant recreational angling opposition. Considers 'further analysis' and 'extensive consultation' would be required' to understand risks and mitigations. Appears in contrast to 2015 Te Moana a Toi Growth Study position.	Potential to review?
ST 10 2019	New Zealand Government Aquaculture Strategy	New Zealand Government	All	Revised Government strategy introducing vision for \$3 billion by 2035. Led by Fisheries New Zealand supported by Department of Conservation and Ministry for the Environment and including strategic stakeholder partnerships including with Māori. Introduces the key pillars, sustainable, productive, resilient, inclusive. Sets out the growth pathway through: maximising the value of existing farms through innovation, extending into high value land-based aquaculture and extending aquaculture into the open ocean. Provides visual summary of growth pathway on page 6.	Current and relevant, provided a stepping stone for current Government focus on Bay of Plenty opportunities.
ST 15 2020	Fit for a Better World - Primary Industry Strategy	New Zealand Government	All	Government response to COVID pandemic referencing the food and fibres sector as the key to 'our export-led recovery'. Establishes the new Primary Sector Council to develop a shared direction for the sector. Echoes the 2019 key pillars of sustainable, productive, resilient and inclusive. Identifies aquaculture as a transformational opportunity and seeks to accelerate the aquaculture strategy by 'improving regulatory settings and investment certainty, investing in critical wharf and hatchery infrastructure and	Current and relevant.

				unlocking open ocean aquaculture opportunities'. Includes the mussel industry and SPATnz as a case study.	
ST 16 2021	Fit for a Better World - Progress Update	New Zealand Government	All	Progress report from the 2020 primary industry strategy. Includes a roadmap with 'three ambitious targets out to 2030. Notes PGF funding for Opotiki harbour development and the Cawthron national algae research centre. Priorities for aquaculture for 2021/22 include regulatory options to enable open ocean aquaculture and develop a research investment roadmap. Programmes decisions and implementations on Māori/Iwi open ocean aquaculture for Q3 and Q4 of 2022.	Current and relevant.
RPT 23 2021	Regional Labour Market and Socio Economic Profile	Bay of Plenty Regional Skills Leadership Group	Iwi/Māori Wellbeing, Community Wellbeing	Provides a snapshot of the regional labour market settings including unemployment, jobseekers, employment metrics, education metrics, immigration metrics as well as a snapshot of the socioeconomic settings including deprivation and housing affordability. Identifies key skills and workforce enablers and barriers. Not specific to aquaculture but a useful tool to measure future success.	Current and relevant.
ST 23 2021	Government Aquaculture Investment Roadmap	New Zealand Government	Marine Based Aquaculture, Land Based Aquaculture, Land Based Infrastructure Development, Research and Technology Development	Investment Roadmap which outlines the key infrastructure and research investments currently underway and those required to accelerate delivery of the Government Aquaculture Strategy to achieve its goal. Focussed on maximising the value of existing aquaculture, open ocean salmon aquaculture and new opportunities include seaweeds and new species. Of note for BOP are the Opotiki Harbour infrastructure investment, the Cawthron Shellfish Aquaculture Platform projects, the Cawthron national algal research centre, the Plant and Food accelerated breeding programme, the Moana Project and production of the industry spat strategy. Future actions include a research roadmap, support for industry-led hatchery infrastructure and identifying how the Government can de-risk the transition stage between research and commercialisation. Identifies a range of future investments and actions to underpin industry success including market development support, nutraceutical ingredient verification, building social licence, supporting indigenous provenance, a waste and plastics minimisation programme and increasing laboratory capacity. Future research includes biosecurity surveillance tools, models and maps to support spatial planning, and research and technology to explore transportation formats, automated processing and remote monitoring.	Current and relevant.
BPC 19 2022	Government Aquaculture Implementation Plan	New Zealand Government	Marine Based Aquaculture, Land Based Aquaculture, Land Based Infrastructure Development, Research and Technology Development	Annual implementation plan summarising initiatives progressed in 2021 and highlighting those prioritised for 2022. Identifies the focus areas as: concluding advice to Ministers on open ocean aquaculture and resource management reform for aquaculture, commencing spatial planning to identify potential exposed aquaculture sites in Te Waipounamu, finalising and implementing an updated New Space Plan for delivering aquaculture settlement, implementing the Accelerate the Aquaculture Strategy: investment roadmap and implementing Ministerial direction on a work programme for improved biosecurity management.	Current and relevant.
RPT 24 2021	Government Aquaculture	New Zealand Government	Environmental Wellbeing, Marine	The method and approach proposed as the first step for measuring (and supporting) the environmental performance of New Zealand aquaculture. Based on the aquaculture	Current and relevant.

	Environmental Monitoring Method		Based Aquaculture Development, Land Based Aquaculture Development	industry's A+ Sustainable Management Framework with additional components 'to ensure that A+ remains the right vehicle'. Proposes a plan to work with the industry in 2022 to develop and incorporate additional measures that will add more transparency and consistency with international best practice. The data then to be collated, independently verified by a third party, and reported at the end of 2023 and yearly thereafter.	
ST 24 2022	Marine Biosecurity 2025	New Zealand Government	Environmental Wellbeing, Marine Based Aquaculture	Multi-system strategy to improve marine biosecurity. Includes inter-regional pathways planning, the Top of the North Marine Pest Group, small scale pest management plans, and border initiatives. Aquaculture biosecurity within this also through A+ Biosecurity Standards.	Current.

Appendix 3 – Future Timeline

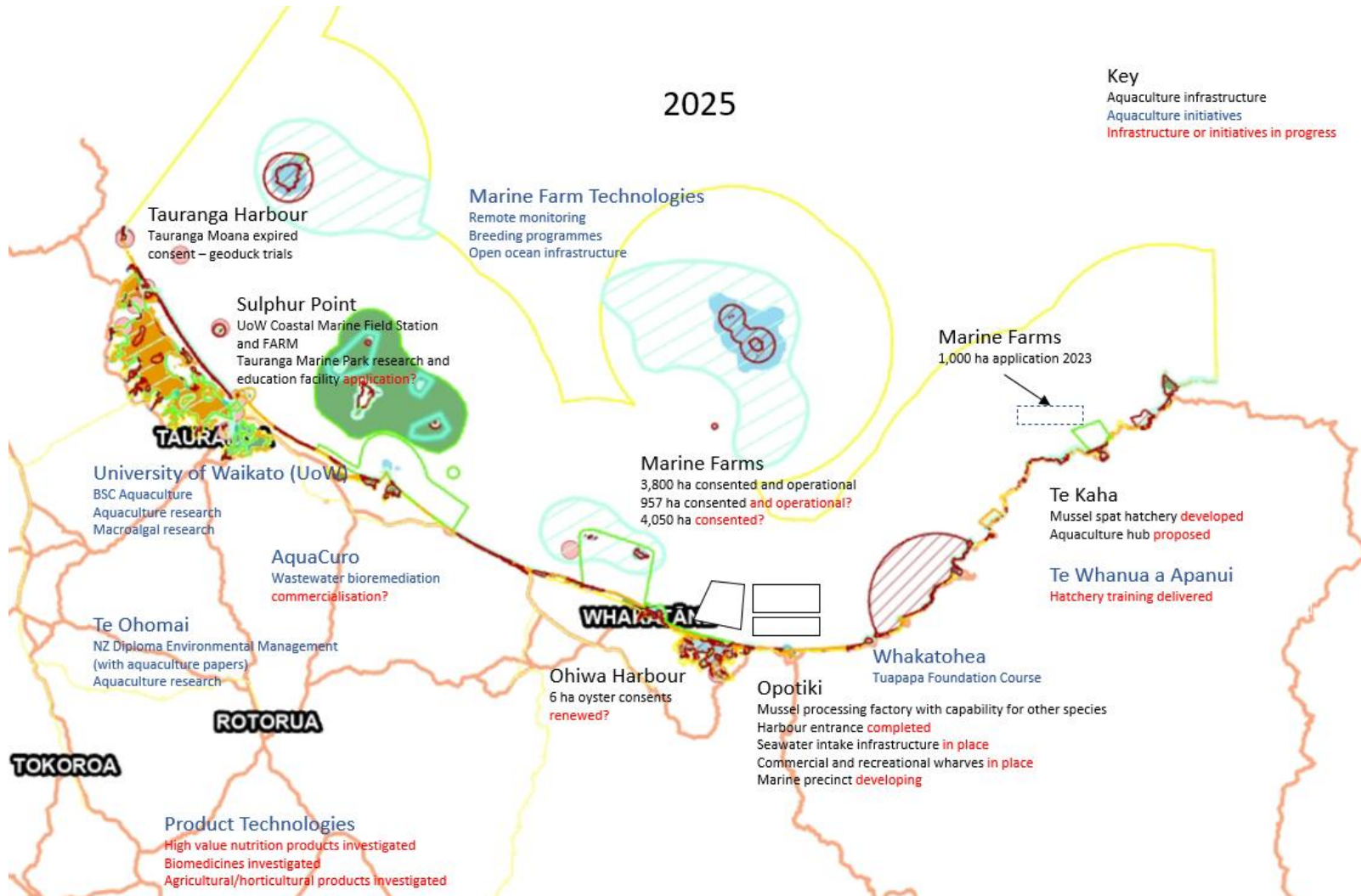


2025

Key
 Aquaculture infrastructure
 Aquaculture initiatives
 Infrastructure or initiatives in progress

Legend

- Motiti Protection Area (Operational)
- Indigenous Biological Diversity
- Indigenous Biological Diversity
- Harbour Development Zone
- Area Significant Cultural Value
- Outstanding Natural Features
- Historic Heritage - Coastal
- River Mouth
- River Mouth at Coastal Marine
- Coastal Environment Zone
- Coastal Environment - Natural
- High
- Outstanding
- Very High

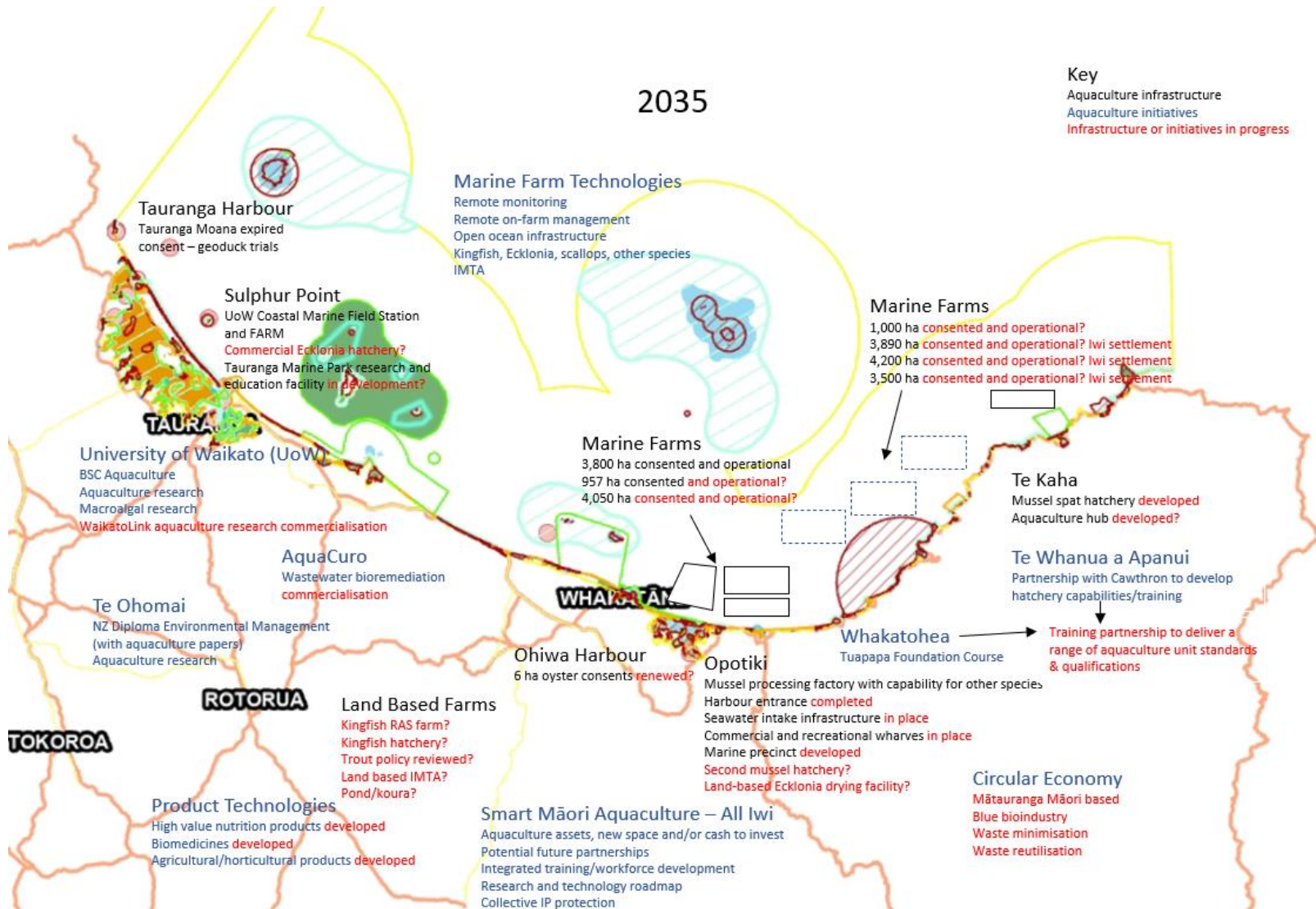


2035

Key
 Aquaculture infrastructure
 Aquaculture initiatives
 Infrastructure or initiatives in progress

Legend

- Motiti Protection Area (Operational)
- Indigenous Biological Diversity
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- Harbour Development Zone
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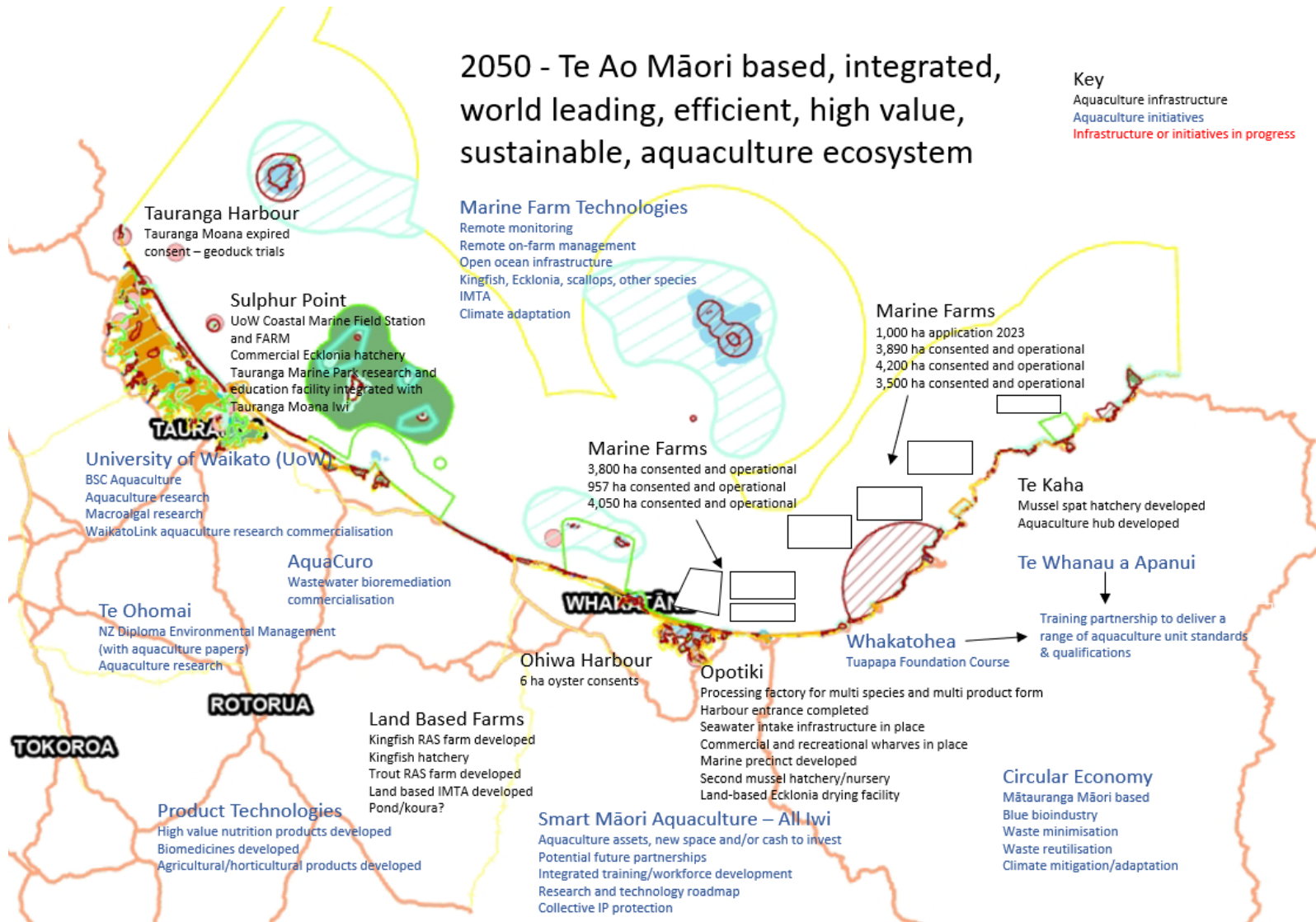
2050 - Te Ao Māori based, integrated, world leading, efficient, high value, sustainable, aquaculture ecosystem

Key
 Aquaculture infrastructure
 Aquaculture initiatives
 Infrastructure or initiatives in progress



Legend

- Motiti Protection Area (Operati
- Indigenous Biological Diversity
- Indigenous Biological Diversity
- Harbour Development Zone
- Area Significant Cultural Value
- Outstanding Natural Features
- Historic Heritage - Coastal
- River Mouth
- River Mouth at Coastal Marine
- Coastal Environment Zone
- Coastal Environment - Natural
- High
- Outstanding
- Very High



OPOTIKI HARBOUR DEVELOPMENT

Whakatohea Development?

- Hatchery/RAS facility potential
- Aquaculture Centre of Excellence

Marine Precinct/Industrial Zone

- Marina basin providing safe berthing for recreational and commercial vessels.
- Two-lane boat launching ramp.
- Mobile Boat Hauler (MBH) haulout facility.
- Commercial wharf servicing the aquaculture industry allowing unloading of mussels and transfer to trucks for cartage.
- Marine industry support for and servicing of vessels both onshore on hardstand via MBH liftout and transfer or alongside a purpose-built maintenance wharf.

Public Wharf

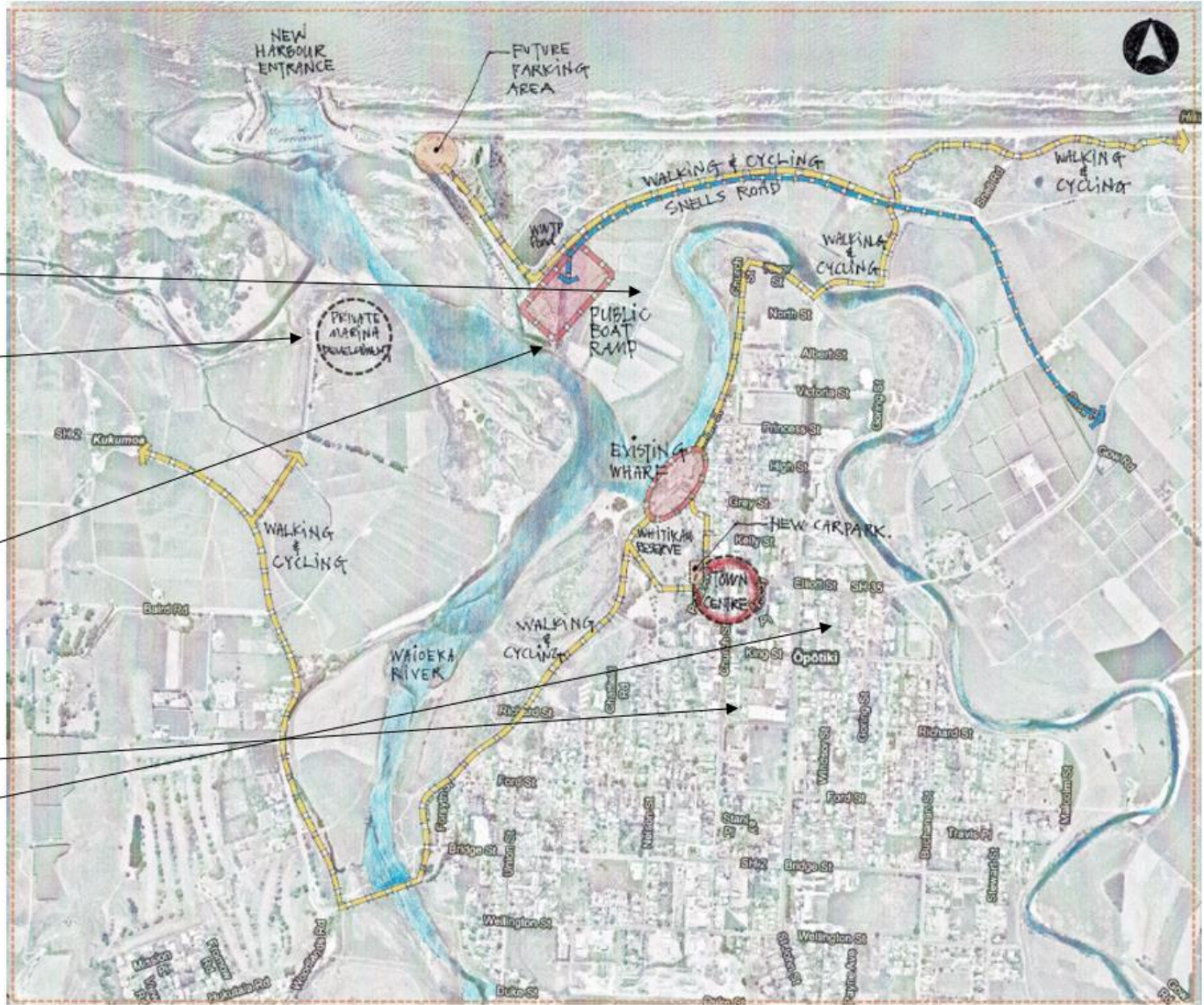
- Servicing aligned industries including recreational fishing charters and marine/eco-tourism

Whakatohea Mussels Opotiki

- Processing factory
- Training delivery

Whakatohea

- Tuapapa Foundation Course



TAURANGA RESEARCH/EDUCATION DEVELOPMENT



University of Waikato Coastal Marine Field Station and FARM

- Base for aquaculture innovations and education including macroalgal facility and pathway to commercialization

Key

- 1 Proposed area for reclassification
- 2 Current overflow car park
- 3 Tauranga Fish & Dive Club
- Marine Park boundary



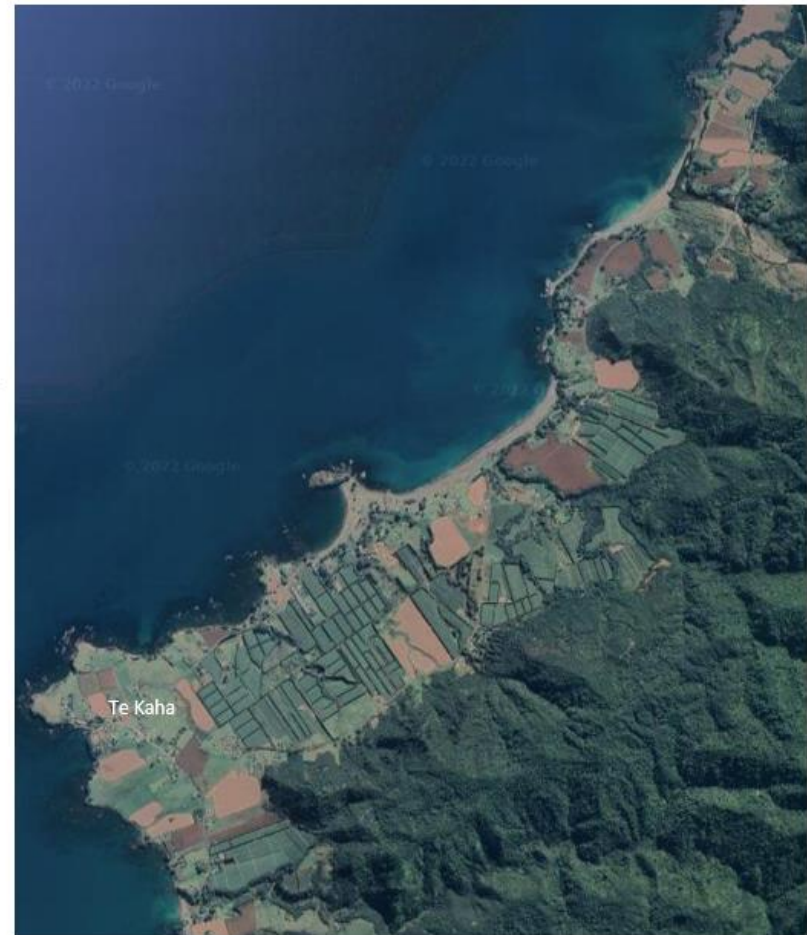
Aerial view of proposed area for reclassification

Marine Park Proposal

- The development of a marine research and education facility would allow Tauranga to further establish itself nationally and internationally in this important and valuable sector by increasing tertiary and post-tertiary education options.
- Accessible marine and coastal environmental-based education, including for the Bay of Plenty's primary and secondary education sector
- Ongoing employment opportunities
- Environmental benefits stemming from an increased capability to protect New Zealand's marine environments, such as developing innovative and sustainable responses to the effects of climate change
- Sustainable and valuable commercial developments such as cancer drugs and nutraceutical products
- Opportunities for applying a Māori lens to environmental management through mātauranga Māori.
- Partnership with Tauranga Moana



TE HUATA HATCHERY AND AQUACULTURE HUB



Huata Mussel Hatchery

- Site identified near Te Kaha with coastal access to sea water within metres of the beach, fresh water and access to major utilities.
- Partnership with Cawthron Institute on a three-pronged research programme to provide the foundation for commercial spat-breeding programme.

Aquaculture Hub

- Support base for Te Whanau a Apanui broader aquaculture aspirations
- Aquaculture central of excellence for research and technology developments
- Base for delivery of future aquaculture unit standards and qualifications in conjunction with Whakatohea

Footnotes

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¹⁹ m.e consulting (2021). *Bay of Plenty Aquaculture Options Economic Assessment*. Smart Māori Aquaculture

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²¹ Heath, P. (2014). *Aquaculture in the Bay of Plenty Biosecurity Risk Assessment*. Bay of Connections <https://www.bayofconnections.com/key-focus-areas/aquaculture/>

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²⁵ NIWA (2009). *Aquaculture Development in New Zealand: Scientific and Technical Information to Inform Maori*. Report for Te Puni Kokiri <https://www.tpk.govt.nz/en/a-matou-mohiotanga/natural-resources/ahumoana-ahutangata-aquaculture-development-in-new>

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- ⁵¹ <https://www.tauranga.govt.nz/exploring/facilities/proposed-reclassification-of-part-of-marine-park-sulphur-point>
- ⁵² <https://www.mbie.govt.nz/business-and-employment/economic-development/regional-economic-development/kanoa-regional-economic-development-investment-unit/>
- ⁵³ <https://www.troutnz.org/>
- ⁵⁴ <https://www.mpi.govt.nz/dmsdocument/45385-Government-response-to-the-report-of-the-Primary-Production-Committee-on-Petition-of-Clive-Edward-Barker-Legislation-to-allow-commercial-trout-farming-Proposal-Cabinet-paper>