

## Kingfish Recirculating Aquaculture System

### Projects overview

<b>Name of the project</b>	Kingfish Recirculating Aquaculture System
<b>Region</b>	Northland
<b>Tier and type</b>	Tier 2: Sectors
<b>Applicant</b>	National Institute of Water and Atmospheric Ltd (NIWA)
<b>Estimated total project cost</b>	\$ <sup>Commercial Information</sup>
<b>Amount of funding sought from the PGF</b>	\$6 million
<b>Financial instrument requested</b>	Loan
<b>PDU recommendation</b>	<b>Approve</b>

85. NIWA has requested PGF funding to construct a 600 tonnes/annum recirculating aquaculture system (RAS) unit at NIWA's site at Ruakaka, Northland. This will enable NIWA to demonstrate the economic and technical feasibility of the RAS to grow yellow tailed kingfish to market size.
86. This project is being considered a 'prototype' to determine the success of the RAS operation. If successful, it will lead to a commercially driven 3000 tonne/annum RAS operation. This will contribute to the growth of aquaculture industry in New Zealand leading to further adoption of RAS technology to produce high value seafood with global appeal.
87. The project will contribute to the growth of aquaculture industry in New Zealand leading to further adoption of RAS technology to produce high value seafood with global appeal. <sup>Comme</sup> jobs will be created initially while household income is forecast to rise by \$<sup>Commercial Information</sup> and GDP estimated to increase by \$<sup>Commercial Information</sup>.
88. All appropriate water rights and resource consents are in place to allow both this 600 tonne/annum unit to proceed and also the future expansion of a 3000 tonne/annum.
89. If funding approval is in place by October 2019, the timeframe to complete the construction of the RAS facility is <sup>Commercial Information</sup>, commissioning trials through to <sup>Commercial Information</sup>. The first fingerling introductions in the first quarter of the <sup>Commercial Information</sup> year, with the first kingfish harvesting beginning in the final quarter of <sup>c</sup> <sup>Commercial Information</sup> year.
90. NIWA is receiving \$<sup>Commercial In</sup> to \$<sup>Commercial In</sup> per kg for kingfish currently with the first harvest from the 600 tonne/annum expected approximately in <sup>Commercial Information</sup>. NIWA is increasing its experimental production in the interim to supply other companies to further increase the demand for the product. It is noted that fish processors / sellers on sell the product to restaurants for \$<sup>Commercial inf</sup> per kg.

## Market Analysis

91. [Redacted] Commercial Information [Redacted]

92. NIWA took on-board the advice from [Redacted] Commercial Information and is seeking to establish this prototype of a 600 tonne/annum RAS to provide confidence to private sector investors and demonstrate the technical ability as well as the financial benefits of commercialising this operation.

93. Market analysis over recent years has confirmed the demand for farmed kingfish as a premium product, with particular appeal in Japanese style cuisine.

94. [Redacted] Commercial Information [Redacted]

### *PDU recommendation*

95. The PDU recommends that you approve NIWA's application for a \$6 million loan from the Provincial Growth Fund to construct a 600 tonne/annum recirculating aquaculture operation at NIWA's Ruakaka site in Northland, subject to:

- a. A maximum fair value write-down of \$ [Redacted] Commercial Information
- b. NIWA engaging external commercial advisors at the PDU's recommendation to help ensure the project is a commercial success.
- c. NIWA partnering with fish processors / sellers that will take the product to market through their existing business.

96. The PDU has been in discussions with the applicant since 2018, and this application takes into account suggestions from the PDU. Two concerns the PDU had, which have been reinforced by other agencies consulted, were the need to ensure a) NIWA has adequate commercial expertise during the 600 tonne phase and b) that there is a market for the end product. MPI and the PDU are satisfied with the market demand and will ensure NIWA continues to engage external commercial expertise throughout the life of the project. MPI and PDU are confident with NIWA's ability to sell the fish produced due to their existing relationships with large scale fish processors / sellers. [Redacted] Commercial Information [Redacted]

97. The PDU is aware NIWA has been developing the RAS technology over many years at Ruakaka with the view of eventually commercialising the technology. Given NIWA has gone to the market via an ( [Redacted] Commercial Information ) expression of interest process, and following feedback from the market NIWA's advisor [Redacted] Commercial Information has recommended NIWA establish a 600 tonne facility, the PDU recommends further (and final) government investment for this stage.

98. All three entities (NIWA, NRC and PGF) are needed to fund this project to progress. [Redacted] Commercial Information [Redacted]

## Costs and funding

### Co-funding secured

99. Northland Regional Council is contributing \$ <sup>Commercial Information</sup> and will be an active partner in this project, NIWA is contributing \$ <sup>Commercial Information</sup> and PGF through this application is being asked to fund the remaining \$6,000,000.
100. PDU investment has been requested for a third of the capital requirements, with the risk being shared amongst investors.
101. <sup>Commercial Information</sup>
102. NIWA has noted that it will not be seeking any additional funding from the PGF for the expansion stage (3000 tonne/annum). NIWA believes that this project will act as a catalyst for private sector and lender support (e.g. bank) as this initial 600 tonne/annum is to demonstrate the performance of the RAS at commercial-scale and de-risk the production process.

### Loan details

103. NIWA is requesting a \$6 million <sup>Commercial Information</sup> loan <sup>Commercial Information</sup>
104. <sup>Commercial Information</sup>
105. A further breakdown of the \$6 million is detailed below:

#### *Loan break-down*

<b>RAS unit construction (NIWA through \$6 million loan from PGF)</b>	<b>\$6,000,000</b>
On-growing system (RAS specialist equipment)	\$ <sup>Commercial Information</sup>
<sup>Commercial Information</sup>	\$ <sup>Commercial Information</sup>
<sup>Commercial Information</sup>	\$ <sup>Commercial Information</sup>
Contingency	\$ <sup>Commercial Information</sup>
Project Management @ <sup>Com</sup> %	\$ <sup>Commercial Information</sup>

### Cost breakdown

106. The total project cost is \$ <sup>Commercial Information</sup> as outlined in the table below:

#### *Cost break-down*

Source of funding	\$ (excluding GST)	Status
<i>Funding spent to date</i>		
NRC	\$ <sup>Commercial Informa</sup>	Received
MPI	\$ <sup>Commercial Informa</sup>	Received
NIWA	\$ <sup>Commercial Informatio</sup>	Received
<b>Total funding spent to date</b>	\$ <sup>Commercial Informatio</sup>	
<i>Proposed capital funding to establish RAS</i>		

<i>facility</i>		
NIWA – capital improvements to its site facilities	\$ Commercial Information	Confirmed
NRC	\$ Commercial Information	In principle
Provincial Growth Fund Funding	\$6,000,000	Through this application
<i>Proposed operational funding once RAD facility established</i>		
NIWA	\$ Commercial Information	In principle
<i>Total proposed funding: site preparation, establishment and operation of RAS facility</i>	\$ Commercial Information	
Grand total	\$ Commercial Information	

## PDU assessment of the project

107. This section provides an overview of PDU’s assessment against the PGF eligibility and assessment criteria.

### Assessment against PGF criteria

Criteria	Rating (1✓ to 5✓)	Comment
<i>Link with fund and government outcomes</i>		
<b>Creates permanent jobs</b>	✓✓✓	Total regional employment is estimated to increase by <sup>Comme</sup> jobs. This project is being considered a ‘prototype’ to determine the viability of the RAS operation. If successful, it will lead to the future expansion of a 3000 tonne/annum, (current project is for a 600 tonne/annum RAS operation). When the production does expand this would increase employment to <sup>Co mpe</sup> FTEs and NIWA would also need to increase their staff by a further <sup>omme</sup> FTEs.
<b>Delivers benefit to the community</b>	✓✓✓	The benefits to the community are wider than the initial project. RAS technology removes significant barriers to aquaculture growth in New Zealand. NIWA’s financial modelling indicates the RAS operation will generate economic output (farm-gate revenue) of \$ <sup>Commercial Information</sup> per annum and estimates GDP will increase by \$ <sup>Commercial Information</sup>
<b>Increased utilisation and returns of Māori asset base</b>	✓✓	Māori assets are not part of this project. Over the long-term, Māori have the opportunity to invest at the expansion phase of the project and will offer significant economic output for Māori across Aotearoa with coastal land assets. NIWA is well-placed to introduce this RAS technology to coastal iwi seeking to grow skills and employment for their people.
<b>Enhanced</b>	✓✓✓✓	The RAS operation promotes environmental sustainable forms of production for yellow tail kingfish. Aquaculture is a highly efficient

Criteria	Rating (1✓ to 5✓)	Comment
<b>sustainability of natural assets</b>		means to produce protein with a carbon foot print one-tenth that of dairy production, reducing the environment impacts.
<b>Mitigation of climate change</b>	✓✓✓✓	Producing fish in land-based RAS systems rather than in sea cages provides a sensible approach to climate change impacts, reducing or removing entirely the effects of extreme sea temperatures.
<i>Additionality</i>		
<b>Adding value by building on what is already there</b>	✓✓✓	The RAS operation will be located on an 8 hectare freehold title owned by NIWA. The site is ideal for aquaculture as it includes seawater intake and discharge infrastructure. This site can accommodate expansion when this initial project is successful. NIWA is investing \$ [redacted] in site infrastructure upgrades. NIWA hold a yellowtail kingfish farming licence for the Ruakaka site through to [redacted] <small>Commercial Info</small>
<b>Acts as a catalyst for productivity potential in the region</b>	✓✓✓✓	The RAS operation should be viewed as a catalyst for future opportunities across Northland and other regions. This application will provide NIWA to build up its RAS technology and expertise to demonstrate the feasibility of the project. This has the potential to unlock economic growth opportunities including private sector investment. The RAS technology removes a significant barrier to aquaculture growth in NZ.  Northland Regional Council (NRC) has worked alongside NIWA for several years to co-develop this opportunity for the region.
<i>Connected to regional stakeholders and framework</i>		
<b>Alignment with regional priorities</b>	✓✓✓✓	Tai Tokerau Northland Economic Action Plan includes this project as a key project, "Secure investment into and establish commercial kingfish production". This application also aligns with: <ul style="list-style-type: none"> <li>• The Tai Tokerau Northland Growth Study: Opportunities Report prepared in February 2012</li> <li>• Northland Aquaculture Development Strategy launched in 2012.</li> </ul>
<b>Support from local governance groups</b>	✓✓✓	Northland Inc, councils and iwi jointly developed the Tai Tokerau Northland Economic Action Plan which is included as a key project, "secure investment into and establish commercial kingfish production".  NRC is a key partner in this project. The applicant has advised that there is 'significant stakeholder support and goodwill exists towards NIWA's operation at Ruakaka, with NIWA regularly hosting visitors from local iwi, schools, councils, economic agencies and community

Criteria	Rating (1✓ to 5✓)	Comment
		<p>groups'. Public consultation hasn't occurred due to the commercial sensitivity and IP involved.</p> <p>Letters of support have been provided by seafood companies:</p> <ul style="list-style-type: none"> <li>• Commercial Information</li> <li>• Commercial Information</li> <li>• Commercial Information</li> <li>• Commercial Information</li> </ul> <p>The above companies support this initiative and have strong interest in buying the product, a view that it is a high quality product and that it will have strong demand.</p>
<i>Governance, risk management and project execution</i>		
<b>Robust project management and governance systems</b>	✓✓✓	Chief Executives from both NIWA and NRC will have direct oversight of the project team and there will be regular reporting to both organisations. The project manager will be appointed by both NIWA and NRC. The project management team will have members from both organisations involved.
<b>Risk management approach</b>	✓✓✓	NIWA has considered its risks and thought through the potential mitigation approach well. These and the risks outlined by the PDU can be found in the risk assessment section below.
<b>Future ownership / operational management</b>	✓✓✓	<p>NRC will lease the land from NIWA, as NRC will own the building and core infrastructure, receiving rental income from NIWA as the tenant. Yellowtail kingfish fingerlings will be purchased at market rate from NIWA. On-grown yellowtail kingfish will be sold at the market rate to third parties to processing and marketing.</p> <p>Progress on the construction will be reported monthly to the CEOs and the PDU. Quarterly updates will also be provided at the forum for Tai Tokerau Northland Economic Action Plan. NIWA will also have a forward sales agreements in-place with seafood companies.</p>

## Agency comments

Ministry of Foreign Affairs and Trade (MFAT)

108.

Commercial Information

109. [Redacted] Commercial Information [Redacted]

110. [Redacted] Commercial Information [Redacted]

111. [Redacted] Commercial Information [Redacted]

*Ministry of Primary Industries (MPI)*

112. MPI has undertaken multiple discussions with the PDU and the applicant and are confident of the purpose for which funding is sought.

113. MPI supports the project for the following reasons:

- The project aligns with the new government aquaculture strategy.
- The project is identified within the Tai Tokerau Northland Economic Action Plan.
- The proposed construction site is purpose built for aquaculture development.
- The science is well tested.

114. MPI recommends that capability be included in the project team that is able to provide an entrepreneurial / aquaculture business perspective. This will assist with project cost efficiencies and market development.

115. MPI sought input from its own Aquaculture unit and Aquaculture NZ, which has informed its advice above.

*New Zealand Trade and Enterprise*

116. NZTE worked with NIWA, MPI and Northland Inc to look at opportunities for establishing a KingFish Operation at NIWA's Northland site. [Redacted] Commercial Information [Redacted] were engaged to provide a scoping study.

117. NZTE has advised that from its research they understand that the technology is proven, and that for operations to be successful sufficient scale is required. NZTE considers that this project is sufficiently scaled to be successful, however if it is much smaller then it may face risks resulting from lack of economies of scale.

118. NZTE notes that feasibility research currently suggests that this project may result in an investable proposition and help establish a new Operation in NZ. As such, NZTE Investment will continue to assist the project in investment readiness and investor connections.

*Te Puni Kōkiri*

119. TPK would like to ensure that local hapū and whānau are well-connected to any supply and employment opportunities that are generated (social procurement opportunities).

120. The proposal states that [Redacted] Commercial Information [Redacted]. This is correct and [Redacted] Commercial Information [Redacted] and NIWA have a good ongoing relationship, however TPK understand the [Redacted] Free and frank opinions [Redacted]

Free and frank opinions

121. Should PDU support this project, TPK notes that there is opportunity to more visibly specify engagement and planning steps with local Māori as part of the Crown's conditions for funding.

## Risk assessment

122. Due diligence has been undertaken, no concerns identified.

123. NIWA has considered its risks and thought through the potential mitigation approach well. Seven risks including the risk rating have been noted in the application. These risks cover: construction risk, utilities supply, feed supply, fish health on-growing know how, RAS costs more than \$6 million, and lack of demand for kingfish produced by facility.

124. Additional risks identified are:

- a. Consider and apply the updated Government Procurement Rules, in effect from 01 October 2019 which includes considering broader outcomes.
- b. The RAS is new innovative technology and this project may still not attract private sector investors.

125. The PDU has identified the following key risks and mitigations:

Type of risk	Risk description	Mitigations	Risk Rating L/M/H
<b>Procurement</b>	The Government Rules of Sourcing will be replaced on 01 October 2019 by a new updated version	<ul style="list-style-type: none"> <li>• NIWA to update its procurement processes to the 4<sup>th</sup> edition of Government Procurement Rules effective from 01 October 2019 including Principles and Supplier Code of Conduct.</li> </ul>	Low
<b>Construction</b>	Construction risk	<ul style="list-style-type: none"> <li>• Appointment of experienced Project Manager.</li> <li>• Criteria for sourcing of suppliers weighted on track record for similar specialist projects.</li> <li>• Project delivery critical risk register actively managed.</li> </ul>	Medium
<b>Utilities</b>	Utilities supply	<ul style="list-style-type: none"> <li>• NIWA has a complete seawater exchange infrastructure, including 600m and 800m pipes extending into Bream Bay, along with appropriate consents.</li> <li>• NIWA maintains standby generation capacity to and redundant generation capacity</li> </ul>	Low



		to meet all basis water supply requirements in case of electricity supply failure.	
<b>Feed</b>	Feed supply	<ul style="list-style-type: none"> <li>NIWA has established relationships with <small>Commercial Information</small></li> <li>Maintain high feed storage onsite to isolate from disruptive risks.</li> </ul>	Low
<b>Fish health</b>	Fish health risks	<ul style="list-style-type: none"> <li>Incoming water supply is filtered to remove particulates greater than <small>Commercial Information</small></li> <li><small>Commercial Information</small> System redundancy in-place in case of failure.</li> <li>Onsite biosecurity protocols in place (and certified by MPI), strictly enforced.</li> </ul>	Low
<b>On-growing know how</b>	On-growing know how	<ul style="list-style-type: none"> <li>NIWA has developed significant IP through its research. Scaling this up to a commercial operational level will be supported by contracting an experienced consultant for a <small>Commercial Information</small> period from start-up to help advise on running the facility.</li> </ul>	Medium
<b>RAS unit cost</b>	RAS unit costs more than budget of \$6 million	<ul style="list-style-type: none"> <li>The budgeted hardware for fit-out costs has been derived from RAS supplier quotes.</li> <li>Strong project management practices will be put in place to ensure project comes within budget.</li> <li>A standard contingency of <small>Comm</small> % (\$<small>Commercial Information</small>) has been factored into costs.</li> <li>In the unlikely event of costs exceeding \$6 million, NIWA will need to divert capex budgets to complete the RAS unit build.</li> </ul>	Medium
<b>Lack of demand</b>	Lack of demand for kingfish produced by facility	<ul style="list-style-type: none"> <li>Market had been well-tested, and <small>Commercial Information</small>.</li> <li>There is significant demand for high-value aquaculture products for health and sustainable production</li> </ul>	Low

		<p>reasons.</p> <ul style="list-style-type: none"> <li>• Commercial Information [Redacted]</li> <li>• Commercial Information [Redacted]</li> <li>• [Redacted]</li> </ul>	
<p><b>Commercial</b></p>	<p>Project may not result in private sector investors for RAS technology.</p>	<ul style="list-style-type: none"> <li>• Commercial Information [Redacted]</li> </ul> <p>NIWA's advisor <sup>Commercial Informat</sup> [Redacted] has recommended NIWA establish the 600 tonne facility</p> <ul style="list-style-type: none"> <li>• The PDU has recommended NIWA engage external commercial advice to complement its in-house commercial experience</li> </ul>	<p>Medium</p>