

### 3.6 KINGFISH RECIRCULATING AQUACULTURE SYSTEM

PGF Application		For: Approval	
<b>Applicant:</b>	National Institute of Water and Atmospheric Ltd (NIWA)	<b>Pipedrive ID #</b>	Commercial Information
<b>Entity Type:</b>	Crown Entity / Government Agency	<b>PGF Funding Sought:</b>	\$6,000,000
<b>Region</b>	Northland	<b>Total Project Value:</b>	\$ Commercial Information
<b>Tier:</b>	2 - Sectors	<b>Co-contribution rate:</b>	Commercial Information % - NIWA and NRC
<b>Sector:</b>	Aquaculture	<b>Funding Structure:</b>	Loan

#### We recommend that the IAP support the recommendation to:

- a) **Approve** \$6,000,000 from the PGF to construct a 600 tonne/annum recirculating aquaculture operation at NIWA's Ruakaka site in Northland.
- b) **Note** the Recirculating Aquaculture System (RAS) facility will be constructed by Commercial Information commissioning trials through to Commercial Information. The first kingfish harvest will begin in the final quarter of Commercial Information.
- c) **Note** there is clear alignment with regional priorities.
- d) **Note** there are potential further benefits for Northland and further afield if this project is successful.
- e) **Note** 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.
- f) **Note** a clear objective, once this project has demonstrated success is for private sector players to take up the opportunity and invest in a larger 3000 tonne/annum recirculating aquaculture operation including replicates of the 600 tonne/annum module at Bream Bay and elsewhere (beyond Northland).
- g) **Note** if successful, this project will make a significant contribution to New Zealand aquaculture industry target of achieving \$1 billion in annual sales by 2025.
- h) **Note** if successful total regional employment is estimated to increase by Commercial Information FTEs, total household income is forecast to rise by \$ Commercial Information and GDP is estimated to increase by \$ Commercial Information.
- i) **Note** Northland Regional Council are contributing \$ Commercial Information and will be an active partner in this project, NIWA are contributing \$ Commercial Information and PGF through this application are being asked to fund the remaining \$6,000,000.
- j) **Note** 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 to 3000 tonne/annum.
- k) **Note** no additional funding request will made to the PGF for the expansion stage (3000 tonne/annum).
- l) **Note** that we are working with MFAT and MPI to seek their advice while this application is being progressed.

**Proposal:**

The funding will be used to construct a 600 tonnes/annum recirculating aquaculture system (RAS) unit at NIWA's site at Ruakaka, Northland.

This project will enable NIWA to demonstrate the economic and technical feasibility of the RAS to grow yellow tailed kingfish to market size.

The public benefit of the RAS technology is to produce high value seafood with global appeal. <sup>Comm</sup> jobs will be created initially (with the potential of more) and household income is forecasted to rise by \$<sup>C</sup> <sup>all</sup>.

**Commercial Information**

If the RAS performance is successful, there could be other potential benefits for Northland and further afield.

**Assessment against the PGF criteria:**

**Eligibility Criteria**

This applicant is eligible for PGF funding.

**Productivity Potential**

Total regional employment is estimated to increase by <sup>Commer</sup>.

The ultimate aim is to contribute to the growth of the aquaculture industry in New Zealand. A RAS system needs to be built and operated to prove the technical and economic feasibility of RAS technology for growing kingfish, thereby providing a catalyst for subsequent investment and sector uptake.

If this project is successful this could lead to a further expansion to a 3000 tonne/annum RAS operation where private sector has shown interest in investing.

**Commercial Information**

Producing fish in RAS system is a sensible approach to climate change impacts.

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

**Commercial Information**

**Policy objectives and regional priorities**

This project aligns strongly with the PGF key sector focus on Food and Beverage in that a 600 tonne/annum Aquaculture System will be constructed. This includes creating employment opportunities in the region, unlocking economic opportunities where private sector may invest if this project is successful, provides an highly efficient and sustainable means to produce Kingfish and is a sensible approach to climate change.

The development of aquaculture sector in Northland is a specific project listed in the Tai Tokerau Northland Economic Action Plan – February 2016.

The Tai Tokerau Northland Growth Study: Opportunities Report prepared in February 2012 detailed the potential of aquaculture to contribute to the development and expansion of the Northland economy.

Land-based yellowtail kingfish production was also recognised as one of the key opportunities in the Northland Aquaculture Development Strategy launched in 2012.

PGF Criteria	Assessment Commentary	Rating (0✓ to 5✓)
<b>Link with fund and government outcomes</b>		
Creates permanent jobs	<ul style="list-style-type: none"> <li>Total regional employment is estimated to increase by <sup>Comm</sup> jobs.</li> <li>This project is being considered a 'prototype' to determine the success of the RAS operation. If successful, it could lead to the development of an expansion (3000 tonne/annum, current project is for a 600 tonne/annum RAS operation). If the production does expand this would increase employment to <sup>Comm</sup> FTEs and NIWA would also need to increase their staff by a further <sup>Comm</sup> FTEs. The timings for the expansion could be 5+ years away.</li> </ul>	✓✓✓
Delivers benefit to the community	<ul style="list-style-type: none"> <li>The benefits to the community are wider than this initial project.</li> <li>RAS technology removes significant barriers to aquaculture growth in New Zealand.</li> <li>NIWA's financial modelling indicates the RAS operation will generate economic output (farm-gate revenue) of \$<sup>Commercial Information</sup> per annum and estimates the GDP will increase by \$<sup>Commercial Information</sup>.</li> <li>If this project is successful, it could prove to be the catalyst for a full scale 3000 tonne RAS operation (5+ years) and revenue is estimated at \$45m per annum increase GDP to \$<sup>Commercial Information</sup>.</li> </ul>	✓✓✓✓
Increased utilisation and returns of Maori asset base	<ul style="list-style-type: none"> <li>Maori assets are not part of this project.</li> <li>Long-term: Maori will have the opportunity to invest at the expansion phase of the project (3000 tonne stage, potentially 5+ years away).</li> <li>Long-term: the application states that RAS technology offers significant economic output for Maori across Aotearoa with coastal land assets. NIWA are well-placed to introduce this RAS technology to coastal iwi seeking to grow skills and employment for their people.</li> </ul>	✓✓

Enhanced sustainability of natural assets	<ul style="list-style-type: none"> <li>The RAS operation promotes environmental sustainable forms of production for yellow tail kingfish.</li> <li>Aquaculture is a highly efficient means to produce protein with a carbon foot print one-tenth that of dairy production.</li> <li>This project would reduce environmental impacts</li> <li>See comment below regarding climate change effects.</li> </ul>	✓✓✓✓
Mitigation of climate change effects	<ul style="list-style-type: none"> <li>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.</li> </ul>	✓✓✓✓
<b>Additionality</b>		
Adding value by building on what is already there	<ul style="list-style-type: none"> <li>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.</li> <li>This site can accommodate expansion if this initial project is successful. NIWA are investing \$<sup>Commer</sup> in site infrastructure upgrades.</li> <li>NIWA hold a yellowtail kingfish farming licence for the Ruakaka site through to <sup>Commercial In</sup></li> </ul>	✓✓✓
Acts as a catalyst for productivity potential in the region	<ul style="list-style-type: none"> <li>The RAS operation should be viewed as a catalyst for future opportunities across Northland and other regions.</li> <li>This application will provide NIWA to build up their RAS technology and expertise to demonstrate the feasibility of the project. This has the potential to unlock economic growth opportunities including private sector investment.</li> <li>The RAS technology removes a significant barrier to aquaculture growth in NZ.</li> <li>Northland Regional Council (NRC) has worked alongside NIWA for several years to co-develop this opportunity for the region.</li> </ul>	✓✓✓✓
<b>Connected to regional stakeholders and frameworks</b>		
Alignment with regional priorities	<p>Tai Tokerau Northland Economic Action Plan includes this project as a key project, "Secure investment into and establish commercial kingfish production".</p> <ul style="list-style-type: none"> <li>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> </ul> </li> </ul>	✓✓✓✓

	<ul style="list-style-type: none"> <li>• Northland Aquaculture Development Strategy launched in 2012</li> <li>• Aligns with the Coalition Agreement commitments to Regional Economic Development.</li> </ul>	
<p>Support from local governance groups (inc. Councils, Iwi/Hapu)</p>	<ul style="list-style-type: none"> <li>• 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”.</li> <li>• Northland Regional Council is a key partner in this project.</li> <li>• Specific stakeholders are not mentioned in the application. However the application states ‘significant stakeholder support and goodwill exists towards NIWA’s operation at Ruakaka, with NIWA regularly hosing visitors from local iwi, schools, councils, economic agencies and community groups’.</li> <li>• Public consultation hasn’t occurred due to the commercial sensitivity and IP involved.</li> <li>• Letters of support have been provided by seafood companies: <ul style="list-style-type: none"> <li>• Commercial Information</li> <li>• Commercial Information</li> <li>• Commercial Informa</li> <li>• Commercial Informatio</li> </ul> </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>	<p>✓✓✓</p>
<p><b>Governance, risk management and project execution</b></p>		
<p>Robust project management and governance systems</p>	<ul style="list-style-type: none"> <li>• CE’s from both NIWA and NRC will have direct oversight of the project team and there will be regular reporting to both organisations.</li> <li>• The project manager will be appointed by both NIWA and NRC.</li> <li>• The project management team will have members from both organisations on it.</li> </ul>	<p>✓✓✓</p>
<p>Risk management approach</p>	<ul style="list-style-type: none"> <li>• NIWA has considered their risks and thought through the potential mitigation approach well.</li> <li>• Seven risks including their risk rating have been stated in the application. These risks cover: construction risk, utilities supply, feed supply, fish health on-growing know how, RAS costs more than \$6m, lack of demand for kingfish produced by facility.</li> </ul>	<p>✓✓✓</p>

	<ul style="list-style-type: none"> <li>• Additional risk to consider are:             <ul style="list-style-type: none"> <li>• Consider and apply the updated Government Procurement Rules, in effect from 01 October 2019 which includes considering broader outcomes.</li> <li>• Commercial Information</li> </ul> </li> </ul>	
<p>Future ownership / operational management</p>	<ul style="list-style-type: none"> <li>• Commercial Information</li> <li>• Commercial Information</li> <li>• Commercial Information</li> <li>• Commercial Information</li> <li>• On-grown yellowtail kingfish will be sold at the market rate to third parties to processing and marketing.</li> <li>• Progress on the construction will be reported monthly to the CEOs and the PDU.</li> <li>• Quarterly updates will also be provided at the forum for Tai Tokerau Northland Economic Action Plan(TTNEAP).</li> <li>• Commercial Information</li> </ul>	<p>✓✓✓</p>

**Analysis of the benefits and costs**

The funding will be used to construct a 600 tonne/annum RAS to demonstrate the economic and technical feasibility of on-growing yellowtail kingfish to market size at NIWA’s Ruakaka site in Northland. 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.

This application is seeking \$6m in funding (as a loan), NRC are funding \$<sup>Commercial</sup> NIWA \$<sup>Commercial Information</sup> towards this project. Discussions have taken place with Provincial Development Unit (PDU) since 2018 and this application takes into consideration the conversations and recommendations provided by PDU.

All three entities (NIWA, NRC and PGF) are needed to fund this project to progress. If PGF were unable to fund the project, it may be halted. NIWA could fund this project, however due to other priorities this project may not be prioritised at NIWA. In our view, if this application was not supported by PGF it would come to a standstill.

The benefits of this investment relate to a number of regional priorities as mentioned above and align to PGF priorities for growth in the regions, in this case Northland.

This project will make a significant contribution to the New Zealand Aquaculture industry target of achieving \$1 billion in annual sales by 2025.

The benefits include sustainability, as producing fish in land-based RAS systems rather than in sea cages provides a sensible approach to climate change impacts. While this application is targeting yellow tail kingfish, the project seeks to take these learnings and develop new opportunities (land-based finfish production) for New Zealand Aquaculture that will complement the existing industry (indirect benefit).

Another indirect benefit would be that if this project is successful it could lead to further expansion to a 3000 tonne/annum RAS operation including replicating the 600 tonne/annum module, leading to private sector investment and contributing to the local economy by increasing employment and revenue for NIWA as well as increasing the GDP.

NIWA has stated they will not be seeking any further funding from PGF for the expansion stage of the project.

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 the first kingfish harvesting beginning in the final quarter of <sup>Commercial Information</sup> year.

Note that expansion benefits are predicated on this project being successful and NIWA being able to demonstrate the benefits, both economic and the commercial viability of the operation.

### Commercial Information

In summary:

- \$6,000,000 loan is reasonable given the amount of NIWA and NRC are investing combined (\$<sup>Commercial Information</sup>)
- This project is a prototype to determine if a RSA operation can be commercially viable and therefore seek private sector investment
- This RAS will contribute to the growth of the aquaculture industry in New Zealand
- If this project is a success, it could lead to a larger 3000 tonne/annum being constructed including replicating this 600 tonne/annum module in other areas of New Zealand
- This RAS provides a sensible approach to climate change impacts and provides a sustainable way to produce kingfish
- NIWA has thought through the risks of this project well and provided mitigation actions if those risks were to eventuate
- Over the long-term, NIWA are well placed to introduce the RAS technology to coastal iwi seeking to grow skills and employment for their people
- This is a specific project mentioned in the Tai Tokerau Northland Economic Action Plan – February 2016
- 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 to 3000 tonne/annum
- NIWA holds a yellowtail kingfish farming licence for the Ruakaka site to <sup>Commercial Inf</sup>

## Financial Analysis

Analysis of the financial forecast has indicated the following:

The applicant's forecast is under the assumption of:

- <sup>Commercial Information</sup> because detailed information was not provided.
- <sup>Comme</sup>% of PGF loan principal repayment each year will start from year <sup>Commercial Inf</sup>, and the remaining <sup>Comme</sup>% will be fully settled in year <sup>Comme</sup>

Items unclear in the forecast:

- The application stated the total Capital Expenditure will be \$<sup>Commer</sup>, but there is an extra \$<sup>Commer</sup> capital spending forecasted in year <sup>Com</sup>. The additional capital expenditure will result an increase of depreciation expenditure of \$<sup>Commercial</sup> in year <sup>Commercial Informatio</sup>.
- Stock valuation was recognised as Revenue and recorded as a cash inflow which probably would result in cash inflow forecast overstated by \$<sup>ercial In</sup> for <sup>Comme</sup> years, but this will not affect the suggested PGF loan

repayment model.

Analysis:

- The gross and net profit margins were projected around [redacted] % and [redacted] % in average after year [redacted]
- The project will start generate positive Cash flow balance in year [redacted] Commercial Information. The project will continue generating cash and accumulating to balance of \$ [redacted] in year [redacted] Commercial Information

Conclusion:

- This is a very attractive project, but subject to further verification of the margin rates of the global Kingfish’s benchmark rates.

The below table is being provided in confidence.

Year No: Summary Financials for 600T/y RAS: base case scenario  
Commercial Information

[Redacted Table Content]

**Funding Arrangements**

NIWA are requesting a \$6 million loan [redacted] Commercial Information

At [redacted] years the remaining \$ [redacted] principal would be paid in full (Commercial Information). NIWA request the option of repayment of the loan in its entirety at any time with no penalty.

PDU provided input into the above request and is comfortable with this approach.

The total project costs are \$ [redacted] Commercial Information. The proposed sources of funding for this project are:

Source of funding	\$ (excluding GST)	Status
<i>Funding spent to date</i>		
NRC	[redacted] Commercial Information	Received
MPI	[redacted] Commercial Information	Received
NIWA	[redacted] Commercial Information	Received
<b>Total funding spent to date</b>	\$ [redacted] Commercial Information	
<i>Proposed capital funding to establish RAS facility</i>		
NIWA – capital improvements to its site facilities	[redacted] Commercial Information	Confirmed
NRC	[redacted] Commercial Information	In principle
Provincial Growth Fund Funding	\$6,000,000	Through this application
<i>Proposed operational funding once RAD facility established</i>		
NIWA	[redacted] Commercial Information	In principle
<b>Total proposed funding: site preparation, establishment and</b>	\$ [redacted] Commercial Information	



operation of RAS facility		
Grand total	\$	Commercial Informat

A further breakdown of the \$6 million is detailed below.

RAS unit construction (NIWA through \$6 million loan from PGF)	\$6,000,000
Commercial Information	Commercial Inform
Commercial Information	Commercial Inf
Commercial Information	Commercial Inf
Contingency	Commercial Inf
Project Management @ %	Commercial In

### Due Diligence and Ownership

The due diligence has been conducted and is limited to the advised key personnel provided in the application. As NIWA is an SOE they are exempt from the normal due diligence checks.

Key personnel involved in the project are:

- Privacy of natural persons
- Privacy of natural persons
- Privacy of natural persons
- Privacy of natural persons
- Privacy of natural persons
- Privacy of natural persons

None of the above individuals appear on the:

- Companies Office list of disqualified/prohibited persons
- Serious Fraud Office checks
- Employer Stand Down list
- Court and Judicial Decision online checks
- PDU Conflict of Interest list
- Privacy of natural persons

### Risk Assessment

The key risks to the PDU and proposed mitigations of this investment are as follows:

Type of risk	Risk description	Mitigations	Risk Rating L/M/H
Cost Risk	If the cost estimate of \$6m is inaccurate, the applicant may be unable to complete the project to demonstrate the economic and technical feasibility of an RSA operation.	<ul style="list-style-type: none"> <li>• NIWA have factored in a % contingency into the costs.</li> </ul>	Low

## Consultation undertaken or implications:

Privacy of natural persons

, Senior Advisor Performance & Investment, Labour, Science & Enterprise at MBIE has provided the following feedback that incorporates feedback from Strategic Science Investment Fund (SSIF).

- NIWA is requesting funding (\$6 million) to fund the capital purchase of the specialist components (for RAS unit). The components will be housed within a purpose-build building owned by NRC (on NIWA land), which will be leased by NIWA. The specialist fit-out within will be owned by NIWA.
- An upgrade of NIWA's utilities and infrastructure at Bream Bay is already underway - detailed design work on the facilities has been completed and a contract tender process is ready to go - currently waiting for consenting applications to be approved. The upgrade is forecast to require funding of \$<sup>Commercial Information</sup> - and approximately <sup>Com</sup> of the infrastructure improvements will contribute to this project.
- Commercial Information
- The project's proposed sources of funding demonstrate a high level of co-funding from both NIWA (<sup>Comme</sup>%) and NRC (<sup>Com</sup>%).
- The project demonstrates a high level of contribution to PGF outcomes.
- Because they are a CR1, their application should be considered in line with NIWA's Statement of Core Purpose: <https://www.niwa.co.nz/about/scp>  
They have described this in the key details section. NIWA's scope operation includes: "freshwater and marines fisheries" so in this regard, the application meets this criteria.
- NIWA currently receives \$<sup>Commercial Information</sup> of SSIF in this area: Here is a summary of the funding.  

Production of Aquaculture Species. Develop reliable and efficient techniques for the commercial-scale production of established and emerging high-value aquaculture species to grow the value of New Zealand aquaculture.	<sup>Commercial Information</sup>
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### Commercial Information

- Regional potential – the application demonstrates strong collaboration with Northland Regional Council in the project – in funding, project management and research to date.

### Commercial Information

### Commercial Information

Commercial Information

[Redacted text block]

- *Project management – the project will be conducted in a “stand-alone” unit within NIWA for transparency. Independent verification of the project approach has been tested by [Redacted]*
- *Contingency at \$ [Redacted] represents [Redacted] % of total costs which is very low. However, this includes operational costs and for the deliverables of the project: contingency for the building construction only is [Redacted] %, and for the construction of the RAS unit [Redacted] %.*

Note that we are working with MFAT and MPI to seek their advice while this application is being progressed.

<b>Supporting proposal:</b>	Yes
<b>Appendices:</b>	Yes – Application (includes supporting letters from companies)
<b>Author of paper:</b>	Hk, Investment Advisor, PDU Investment Team

PROACTIVELY RELEASED