

# Knowledge priorities



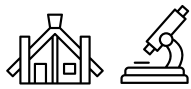
## Seaweed knowledge success

### Aspirational success



Seaweed research provides enabling practical knowledge and mātauranga for local species and pathways to higher value products and services.

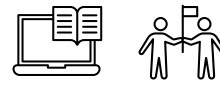
## Success components



Aotearoa New Zealand's seaweed research is practical and transdisciplinary incorporating both traditional science and mātauranga knowledge bases.



Research is co-ordinated through a research strategy co-developed by research providers, industry, government and Māori that identifies knowledge gaps.



Outputs are widely available and easily understood.

## Main user groups and needs



Mātauranga Māori knowledge base for rimurimu (seaweed) established and built upon to create unique opportunities for Māori.



Knowledge that supports appropriate spatial planning, enabling adaptive, responsive, and effective environmental management.



Hatchery methods and technology for producing NZ's commercially important seaweed species.



Farming systems, processes and practices optimised for NZ's commercially important species and farm environments to maximise both productivity and ecosystem benefits while minimising costs and biosecurity risk.



Processing techniques that produce consistently high-quality products to food safety and product format standards, maintaining Aotearoa New Zealand's premium position.



Research/evidence that supports unique product positioning through efficacy and health claims, and quantification of ecosystem services.



## Current state of research

Relevant areas and purpose

Research area	Relevance to NZ seaweed sector
<b>Fundamental seaweed biology and ecology</b>	<ul style="list-style-type: none"> <li>» Fundamental aspects of seaweed genetics and biology support aquaculture and inform wild harvest management.</li> <li>» Understanding seaweed ecology assists with spatial planning, carbon sequestration potential and informs wild harvest management.</li> <li>» Distribution mapping, biodiversity studies and taxonomy inform spatial planning, biosecurity and species potential.</li> </ul>
<b>Aquaculture</b>	<ul style="list-style-type: none"> <li>» Pilot scale farming of brown kelp (<i>Ecklonia radiata</i>) establishes understanding of commercial viability.</li> <li>» Co-culture of algae with shellfish species quantifies the benefits of integrated farming.</li> <li>» Farming systems suit exposed ocean conditions and enable industry expansion.</li> <li>» Regenerative practices ensure positive environmental outcomes.</li> </ul>
<b>Food and bioactives</b>	<ul style="list-style-type: none"> <li>» Identifying and developing high value products and processes for scalable extraction provides multiple commercial opportunities for the sector.</li> <li>» New products created from material remaining after processing enable opportunities for biorefinery cascades.</li> </ul>
<b>Bioremediation</b>	<ul style="list-style-type: none"> <li>» Pilot scale land-based bioremediation using <i>Ulva</i> establishes the cost-effectiveness of algal waste-water treatment and potential for additional product revenue (e.g., biostimulants).</li> </ul>
<b>Animals feeds and feed supplements</b>	<ul style="list-style-type: none"> <li>» <i>Asparagopsis</i> hatchery production, farming and processing research ensures high levels of bromoform (the key bioactive ingredient) and establishes standards and commercial production potential.</li> <li>» Understanding efficacy and food safety aspects of feeding <i>Asparagopsis</i> as a supplement to livestock enables <i>Asparagopsis</i> to be registered and sold as a methane inhibitor, ensuring consumer acceptance.</li> <li>» Understanding the methane reduction potential of other seaweed species provides alternative commercial opportunities for farming other species.</li> <li>» Understanding the pathways for breakdown of <i>Asparagopsis</i> helps to understand environmental risks.</li> </ul>
<b>Horticulture</b>	<ul style="list-style-type: none"> <li>» Demonstrating the effectiveness of seaweed based biostimulants helps create market demand.</li> <li>» Assessing seaweed-based plant pathogen treatments (e.g. kiwifruit PSA) provides new product opportunities.</li> <li>» Utilising wakame (<i>Undaria pinnatifida</i>) biofouling from mussel farming as an effective biostimulant provides circular economy opportunities.</li> </ul>
<b>Mātauranga</b>	<ul style="list-style-type: none"> <li>» Mātauranga of different rimurimu (seaweed) species.</li> </ul>



## Main research barriers to seaweed sector vision



Aotearoa New Zealand lacks much of the practical knowledge needed to efficiently produce seaweed and seaweed products including hatchery and farming techniques, processing methods, and demonstration of product potential. We also lack the solid knowledge base to underpin the sector including taxonomy, species distributions, reproduction, genetics, pathogen threats and ecology.



Lack of established processes and frameworks for whānau, hapū, iwi and/or Māori enterprise engagement in relation to kaitiaki of mātauranga and seaweeds creates uncertainty for researchers, and intellectual property and commercialisation challenges, and risks failing to meet Māori expectations.



## Required research responses

Urgent responses - 2022/2023

Intent	Required research response	Entity
<b>Create a sector research strategy</b>	Prepare a sector research strategy collaboratively between researchers, sector participants, government and Māori to identify knowledge gaps and prioritise research. Learn from overseas approaches to collaborative research and development.	MPI, Māori, ANZSA, Research Organisations
<b>Ensure appropriate use and management of rimurimu mātauranga and commercialisation of rimurimu</b>	Co-design processes and frameworks to guide researchers on appropriate use and management of mātauranga and commercialisation of rimurimu/seaweed research.	Māori, TOKM, TPK, Te Arawhiti
<b>Predict and confirm the value proposition</b>	Bioeconomic modelling to precede investment decisions to reduce risk, identify sensitivities, and inform further research priorities.	Research Organisations, Industry
<b>Identify unique seaweed value proposition(s) for Aotearoa New Zealand</b>	Identify bioactives and characterise benefit(s) of endemic and/or native species.	Research Organisations



## Medium-term research responses

2023/32

Intent	Required research response	Entity
<b>Protect Aotearoa New Zealand's seaweed resource</b>	Population genetics studies to inform the genetic management of Aotearoa New Zealand's native commercial species.	Research Organisations, Māori, MPI
<b>Enable the development of hatcheries</b>	Scalable hatchery methods for key farmed species and industry handbook.	Research Organisations, Industry
<b>Enable marine based seaweed aquaculture</b>	Understand the productivity of Aotearoa New Zealand's species and environmental and seasonal effects on composition.	Research Organisations, Māori Industry, MPI
	Develop breeds and cultivars of commercially attractive, regional strains for priority species.	Research Organisations, Industry
	Develop and/or import technologies and practices to enable farming of priority species in appropriate farm environments.	Research Organisations, Regulators
	Understand pest and diseases threats, and mitigation options.	Research Organisations, Industry
	Create farming systems for open ocean aquaculture and land-based systems for identified high-value species.	Research Organisations
<b>Maximise ecosystem services from marine based seaweed aquaculture</b>	Establish the role and importance of farm practices, scale, production intensity, species and local environmental characteristics on habitat value for other marine species.	Research Organisations
	Determine nutrient uptake, carbon sequestration potential, and co-culture benefits of farmed species.	
<b>Enable responsive and adaptive management</b>	Develop technology for remote monitoring and management.	Research Organisations, Industry, Regulators

Intent	Required research response	Entity
<b>Ensure processing is scalable and commercially viable</b>	Develop scalable low-cost drying and processing techniques including biorefinery cascade approaches, ideally with low energy requirements or utilising sustainable energy sources.  Develop cost-effective processing techniques for higher value extracts.	Research Organisations, Industry
<b>Develop unique seaweed value proposition(s) for Aotearoa New Zealand</b>	Determine composition and identify bioactives within Aotearoa New Zealand species.	Research Organisations
<b>Create demand for Aotearoa New Zealand's seaweed products</b>	Provide research/evidence to support health claims and registration of seaweed products as agricultural compounds and veterinary medicines.	Research Organisations, Industry, MPI
<b>Build new mātauranga</b>	Provide opportunities for Māori to further grow and develop new mātauranga and ensure kaitiaki of our natural rimurimu (seaweed) resources.	Māori



Photo credit: Paul South, Cawthron

**For more information on this project, visit:**

[www.sustainableseaschallenge.co.nz/our-research/building-a-seaweed-economy](http://www.sustainableseaschallenge.co.nz/our-research/building-a-seaweed-economy)



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