



From kina barrens to kelp forests — assessing potential recovery solutions

This document summarises a joint project about the causes of and solutions to kina barrens. You can find a full report on the project on the [Sustainable Seas website](#).

Kelp forest ecosystems provide essential habitats and food for many ecologically and commercially important fish and invertebrate species. However, habitat shifts from kelp forests to kina barrens is increasingly recognised as an issue affecting coastal reefs in Aotearoa New Zealand. Management actions are urgently needed that address this problem, using existing information.

The purpose of this project was to:

- share knowledge between Fisheries New Zealand (FNZ), Tangata Whenua representatives, and Sustainable Seas researchers about the causes of kina barrens in Northland, New Zealand
- identify and explore management actions that could address the issue.

Existing knowledge collected, modelled, and summarised

Two workshops were held to share understanding of the causes of kina barrens and potential management solutions to recover kelp. The workshops included four Sustainable Seas marine ecosystem researchers, three Fisheries New Zealand (FNZ) science staff, and four Tangata Whenua representatives.

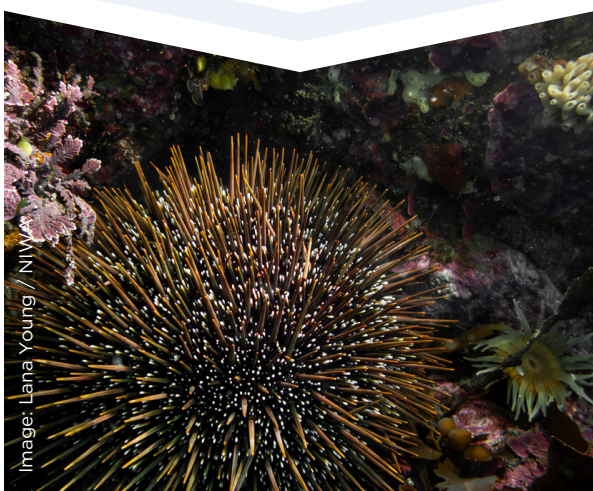
We developed a Bayesian Network model — a probabilistic model that can integrate different types of knowledge. We developed the model to:

- summarise current knowledge
- inform marine management decision-making
- help FNZ mitigate the impacts of kina barrens.

Consensus on the causes of kina barrens

A key result of this project was consensus between all workshop attendees about the ecological drivers of kina barrens and the need to restore the abundance of large predators (including snapper and crayfish) to recover kelp forests long term.

The emerging science and mātauranga held by Tangata Whenua representatives was aligned, as was agreement regarding the increase in kina barrens in recent years and the general decline of the snapper and crayfish fisheries. Workshop attendees also agreed that, to address the issue, fisheries closures or bespoke management actions at a local scale, which involve Māori, would be required.



Bayesian Network models helped run integrated scenarios

The Bayesian Network model building process helped focus discussions, share knowledge, and synthesise key information, which was used to run scenarios to generate further discussion and explore potential management outcomes. By including some of the cultural values identified by Tangata Whenua, the model illustrated how differences in the method of management approach (via rāhui / mātaītai vs Crown-led closure) had significant implications for iwi / hapū.

In addition, the relationship between FNZ and Tangata Whenua was discussed, and suggestions made to improve this relationship in the future. This included FNZ and the government honouring their obligations under the Treaty of Waitangi by empowering Tangata Whenua to take a greater leadership role in research outputs and management decision-making for their rohe.

Model improvements were identified

Opportunities to improve the utility of the model were also discussed. These improvements included:

1. updating the model to be able to look into different management options for example, changes to total allowable catch, management targets, customary harvest occurring in marine protected areas, and local closures
2. incorporating ecosystem health within and outside the modelled area, to assess the flow-on or spillover effects of management actions at different scales
3. ongoing training and expert advice on the use and refinement of the model
4. collating and collecting additional data to fill gaps in understanding of kina barrens and potential management solutions, noting that data gaps should not be considered a barrier to management action.

Actions to increase numbers of large predators the most promising

Emerging research, supported by workshop attendees, demonstrates that management actions that increase the abundance of large predators (in addition to potential kina culling) are the most promising approaches to reducing kina barrens and restoring kelp forests.

The overarching message from the workshops was that lack of data should not be used as a reason to delay management action to address the kina barren issue. By implementing informed management actions now, despite uncertainty in exact outcomes, the impacts of precautionary measures on kelp recovery and associated biodiversity will be valuable for informing and refining future management actions.

Continued investment in co-developing management strategies with iwi / hapū, community, and other stakeholders is key to supporting restorative action and restoration success.



Image: Katie Cook / NIWA