Report: National Kina Barrens Workshop

Prioritising science to address kina barrens in fisheries management decisions.

Meeting date & time: 28 March 2023, 900am until 1400pm & 29 March 2023, 900am until 1200pm.

For: NZSFC

By: Sydney Curtis and John Holdsworth

Date: 29 March 2023

Attendees (online): Ani Kainamu (Māori researcher NIWA), Bianca Hampton (Ngāti Porou, Te Ohu Kaimoana Policy Analyst), Bruce Hartill (MPI), Ceila Balemi (Auckland Uni, PhD Candidate), Duncan Petrie (MPI Team manager of Inshore Fisheries), Hamish Clueard (retired commercial fisherman), Jim Missen (Policy Analyst Te Ohu Kaimoana), John Holdsworth (NZSFC), Karen Tunley (Aquatic environment team and fisheries science MPI), Kelsey Miller (Auckland Uni, PhD Candidate, Libby Liggens (Research at Massey Uni), Mark Fenwick, Mike Beentjes, Natalie Taufa (Graduate intern, NIWA), Phil Clow (Commercial), Sydney Curtis (NZSFC), Sandra Mauger, Steve Wing, Todd H, Tracey Williams. Online attendees changed throughout the day on both days.

Attendees (in-person): see table a bottom of document. In-person introductions were difficult to hear, the attendee list has been attached.

Workshop Objectives:

1. Establish what we know: existing knowledge on the extent on kina barrens in NZ and contributing factors.
2. Identify key knowledge gaps required to support informed management decisions.
3. Identify methods and research to fill these information gaps.

Outputs from the Workshop:

1. A vetted literature review with the most relevant science and information on kina barrens and next steps based on workshop feedback.
2. A prioritised list of research required to address kina barrens in fisheries management decisions.

Overall comments:

The presentations were a mix of research that is currently underway and research that has already taken place and is published. It was primarily to display what information is readily available to inform the kina barren issue. The upcoming Aquatic Environment Biodiversity Report (see below) covers a wide range of relevant topics associated with kina and will be a helpful source of information. The brainstorming notes at the bottom of this report outlines the overall concerns of workshop attendees and what they believe is required in future management.

Day One

Setting the scene: Presentation of findings from Draft AEBR literature review on kina barrens. Reviewing the primary literature on kina barrens in New Zealand.
Brandon Doheny & Bryony Miller (E3 Scientific Ltd)

Link to presentation: FITC_BDoheny_E3Scientific PPT.pdf

Scope and objectives:

1. Review and update evidence for fishing-induced trophic cascades (**FITCs**) in New Zealand.
2. Summarise and discuss the relationship between fishing and urchin barrens in New

Zealand.
3. Provide suggestions for the science required to further test relevant hypotheses and better inform management of coastal fisheries.

Takeaways:

1. FITCs are defined as the removal of predatory species (through fishing) and the effect this has on prey species and following trophic levels. This is a top-down effect and also known as predator release.
2. Key points that will be outlined in the Aquatic Environment Biodiversity Report (**AEBR**):
    a. Biology and ecology of sea urchins in New Zealand (kina and the long-spined sea urchin) including predation by red rock lobster, snapper, and blue cod.
    b. Kelp forest ecology in NZ.
    c. Alternative environmental stressors: climate change, land-based stressors, and oceanography.
    d. Evidence for fishery induced trophic cascades in NZ.
        i. Research within marine reserves and outside reserves.
    e. Known areas of kina barrens in NZ.
3. The fear effect – predators can influence movement and location of prey species through behavioural cues. Predation cues such as crushed urchins in the area have been suggested to initiate predator avoidance, escape response and defensive behaviours in sea urchins, therefore reducing rate of grazing.
4. Trophic effects model and multi-effects model
    a. Multi-effects = episodic recruitment, disease, overfishing etc
5. New Zealand based studies of kina barrens have indicated a clear association between predator control of kina around north-eastern NZ however, barrens in areas such as Marlborough Sounds and Fiordland are triggered by a combination of stressors.
6. Some studies have shown that marine reserves in New Zealand may not be protecting predator populations to the degree required for complete effects and appropriate study of fishing-induced trophic cascades over space and time.
7. FITCs are context dependent and require detailed assessment at the local level to understand the magnitude of disturbance by fishing.

Science required:

8. Mapping and monitoring of living marine resources and environmental variables.
9. Imagery and remote sensing of the coastal zone
10. Urchin barren extent and progression across NZ (citizen science)
11. Spatial representations of fishing pressure at the reef scale.

Recent research on sea urchin barrens in New Zealand
Associate Professor Nick Shears (University of Auckland)

Link to presentation: Shears - Kina workshop 2023 PPT.pdf
Takeaways:

1. Kelp forests are declining 2 times faster than coral reefs and 4 times faster than tropical forests.
2. Kina barrens were first observed in the Hauraki Gulf in late 50's.
3. Experimental removal of kina and kelp transplantation underway across Queen Charlotte Sound to examine role of kina vs. other factors in preventing/limiting kelp recovery.
4. In the Hauraki Gulf, kina barrens primarily occur in the 8-12m depth range.
5. Presented research showing kina barren extent changes between late 1970s to 2019. Areas included, Mokohinau Islands, Mimiwhangata Marine Park (36% increase), Leigh Marine Reserve (35% coverage to 3%).
6. Following full no-take protection of predators at Leigh, it took > 20 years to reduce kina barrens. Kelp forest recovery can take up to 30-years at some sites.
7. To reverse kina barrens, adult densities need to be reduced below ~1m^2.

Comments:
This presentation was similar to Nick's past research which has promoted the use of marine reserves for ecosystem restoration.

Fisheries Management Background and Tools
Tanayaz Patil (FNZ fisheries management)

Link to presentation: Fisheries Management and kina barrens.pdf
Takeaways:

1. Presentation about fisheries management in New Zealand (QMS, management tools etc.). Management of kina, commercial harvest and management of associated species, snapper and rock lobster.

Day Two

Genetic structure and larval dispersal of sea urchins
Associate Professor Libby Liggins (Massey University, Auckland)

Link to presentation: Genetic structure and larval dispersal of sea urchins.pdf
Takeaways:

1. Uses genetics to forewarn future demographic change and community shifts.
2. There are two genetically different populations of long-spined urchins in New Zealand. One in Rangitāhua and the other along the north-eastern coast of NZ. They have observed migration of individuals from Rangitāhua to mainland NZ.
3. Ongoing work: species distribution modelling to determine the potential range extent of urchin species under current, and future ocean climate scenarios.

Comments:
Presentation focused on the history and distribution of long-spined sea urchins, briefly touched on other species and how these methods are applied to them.

Biomass surveys and condition of Kina in the Marlborough Sounds
Dr. Owen Anderson (NIWA)

Link to presentation: Tory_Channel_Survey_OAnderson PPT.pdf
Objectives:

1. Provide estimates of current absolute abundance (numbers and biomass in tonnes green weight), length frequency, density, and depth profile for kina in a selected area of SUR 7A in the Marlborough Sounds.
2. To co-develo9p a condition index following reports of skinny kina.
3. Combine the outputs from Objectives 1 and 2 to provide estimates of kina abundance in terms of roe weight in each condition category.

Takeaways:

1. Concerns about kina roe quality was first raised by mana whenua of Te Tauihu. Fisheries New Zealand (**FNZ**), contracted NIWA to engage with Te Tauihu Fisheries Forum and kina fisheries to investigate and understand the issues.
2. Survey took place in the Tory Channel across the preferred harvesting locations.
3. Condition of the roe was based on, (1) colour (dark brown to bright orange and yellow), (2) size or volume of roe, (3) taste of roe, and (4) sex, if it could be determined consistently.
4. Examination of the kina roe will inform development of a condition index for each site.
5. Will provide an indication of the real value of the fishery and relate kina abundance back to the subject of most interest and value – roe quality.

Kina removal and implications for the ecosystem
Peter Herbert (Herb) (Sea Urchin New Zealand)

Link to 2009 report: James & Herbert 2009 Kina roe enhancement report - Pdf.pdf
Objectives:

1. To enhance the roe of kina by transferring the kina from areas of low feed availability to areas of high food availability.

Takeaways:

1. Kina was translocated and left at new site for approximately 7 months.
2. Results of the trial showed significant increases in GI in the kina transferred to translocation sites. increases in GI were also observed in the kina that remained in the initial kina barren sites, this is expected to be due to a reduction in kina abundance at the sites and re-growth of algal species.
3. Roe taken from the kina at the conclusion of the trial was processed and sold on domestic market to test for quality. Roe from all of the sites was accepted by customers as high-quality east coast, North Island roe.
4. Site selection is a critical factor when kina is translocated between sites as changes in environmental conditions (such as sudden exposure to large swells) may reduce the ability of kina to increase their GI values to their maximum potential.

Group brainstorming notes:

The top research priorities were:

1. Desktop review of kina distribution and kina barrens around NZ (LEK + aerial imagery, fishers' knowledge)
2. Engagement with tangata whenua on kina management methods
3. Long term monitoring of costal reef ecosystems. Define baseline.

Following with equal votes:

1. Review local scale projects addressing kina barrens. Reach out to different organisations.
2. Build relationship with hāpu / iwi / whanau.

Methods required to inform kina management:

5. Desktop review of kina distribution and kina barrens around NZ (LEK + aerial imagery, fishers' knowledge)
6. Engagement with tangata whenua on kina management methods
7. Develop education package on kina culling.
8. Assess number of kina needed to be culled to remove barrens and establish healthy ecosystem.
9. Regular monitoring of key sites to assess kina / fishery / ecosystem health.
10. ID full range of kina predators and their impact on kina
11. More education of general public on rāhui distinguish legislated and traditional rāhui.
12. Review local scale projects addressing kina barrens. Reach out to different organisations.

Immediate needs

13. Define healthy ecosystem.
14. Researching application of rāhui / kina removal
15. Define standard measures for ecosystem health (indicator species)
16. Long term monitoring of costal reef ecosystems. Define baseline.
17. Education on biodiversity and ecosystem service of inshore reefs
18. Determine scale of appropriate management
19. Bioeconomic modelling of predator harvest vs ecosystem services.
20. Policy pathways to achieve ecosystem health.
21. Investigate funding opportunities.
22. Build relationship with hāpu / iwi / whanau.
23. Acknowledge importance of engaging early before developing a project
24. Identifying which mana whenua, you need to engage with
25. Get used to communicating with relevant hāpu for specific areas.
26. Review Harvest Strategy Standard to set more appropriate targets for key predators.
27. More funding to fish down kina in customary management areas. Local community responsibility.

28. Find ways to use kina removed from barrens.
29. Bring more power at local level to implement fisheries management changes.
30. Education of people on the processes required to make management changes.

Management actions:

31. Rāhui and managed harvest via special permit

Attendees (in-person):

Institution	Name
Meeting Facilitator	Martin Cryer
University of Auckland	Assoc. Professor Nick Shears
University of Auckland	Professor Andrew Jeffs
DOC	Monique Ladds
E3 Scientific Ltd	Brandon Doheny
Environmental Law Initiative	Simon Childerhouse
Executive Officer - Hauraki Gulf Forum	Alex Rogers
Kina fisher (Chisholm Associates)	Bill Chisholm
Kina fisher (Cando Fishing)	Campbell McManaway
Kina fisher (Sea Urchin New Zealand)	Peter Herbert (Herb)
Marine Citizen Science	Nicole Miller
MPI (Fisheries Management, Inshore, Central)	Cliff Baird
MPI (Fisheries Management, Inshore - North)	Tanayaz Patil
MPI (Fisheries Management, Inshore - South)	Paul Creswell
MPI (Fisheries Management, Inshore - North)	Phil Ross
MPI (Fisheries Science - Aquatic Environment)	Johan Gouws
MPI (Fisheries Science - Stock assessment)	Marine Pomarède
MPI (Fisheries Science - Stock assessment & AE)	Ian Tuck
MPI (Fisheries Science - Aquatic Environment)	Jean Davis
MPI (Customary Fisheries)	Te Puea Dempsey
NIWA	Owen Anderson
NIWA / Taranaki Whānui Ki Te Upoko o Te Ika	Lee Ruahina-August
Fisheries Inshore NZ	Laws Lawson
National Rock Lobster Management Group	Mark Edwards
NZUA/NZSFC/NRLMG - Recreational fishing rep	Allan Davidson
Kaimahi Putaiao Moana - Marine Science Advisor - Te Runanganui o Ngati Porou	Justin Tibble
Mai I Nga Kuri - iwi rep	Jonathan Te Rire
Nga Hapu o Te Uru o Tainui - iwi rep	Joanna Katipa
Nga Hapu o Ngati Porou - iwi rep	Marijke Warmenhoven
Te Taihauāuru - iwi rep	Bill Carter
Te Tau Ihu - iwi rep	Hori T Elkington
Te Tai Tokerau – iwi rep	Howard Reti