Northland Regional Plan – Topic 14 – Marine Protected Areas

Ecology Expert Conference on 9 and 10 June 2021 - Joint Witness Statement (JWS)

ENV-2019-AKL-000117

Unless authorised otherwise by the Court, this JWS is confidential to the experts and the parties and their counsel

Witnesses who participated and signed their agreement to the content of this Joint Witness Statement ("JWS") on 10 June 2021 are:

Name	Employed or engaged by	
Dr Mark Morrison	Bay of Islands Maritime Park Inc, Royal Forest and Bird Protection Society Inc and Ngāti Kuta	
Dr Nicholas Shears	Bay of Islands Maritime Park Inc, Royal Forest and Bird Protection Society Inc and Ngāti Kuta	
Dr Phil Ross	Northland Regional Council	
Dr Rebecca Stirnemann	Bay of Islands Maritime Park Inc, Royal Forest and Bird Protection Society Inc, Ngāti Kuta, and Te Uri o Hikihiki	
Dr Victoria Froude	Bay of Islands Maritime Park Inc, Royal Forest and Bird Protection Society Inc, Ngāti Kuta, and Te Uri o Hikihiki	
Enrique Pardo	Minister of Conservation	
Simon West	Fishing Industry Parties	
Vince Kerr	Te Uri o Hikiki Hapu and Ngāti Manuhiri	

Facilitator: Environment Commissioner Jim Hodges

Recorder: Ms Ingrid Kuindersma

Dr Shears had to leave the conference before the end and will provide email comment on any matters he wishes to raise.

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Environment Court Practice Note

When signing this JWS, the experts confirm that they have read the Environment Court Consolidated Practice Note 2014 and in particular Section 7 (Code of Conduct, Duty to the Court and Evidence of an expert witness) and Appendix 3 - Protocol for Expert Witness Conferences - and agree to be bound by it. They also confirm that they were familiar with all relevant information prior to the start of conferencing unless stated otherwise in this JWS.

Definitions

The experts referred to in this JWS are the ecological experts listed above unless stated otherwise.

Biogenic habitat	Is the natural habitat created by the physical structure of living or dead organisms or by the interaction of those organisms with the substrate, including either a hard (reef) or soft (sediment) substrate. Examples may include bryozoans, horse mussel beds, sponges, coral gardens, macro algal beds, seagrass meadows.
Bryozoans	Bryozoans are a colonial animal that collectively forms colonies. These colonies can range in size from centimetres to metres and can be hard or soft depending on species.
Habitat forming species	Species that form biogenic habitats.
Mobile bottom contact fishing methods	Bottom trawling, Danish seining and dredging
Kina barrens	A rocky reef community that is dominated by kina (*Evechinus chloroticus*) and devoid of large brown seaweeds (kelp). "Sea urchin barren" is a broader term used internationally to refer to reef areas dominated by sea urchins and devoid of kelp. In New Zealand most sea urchin barrens are comprised of kina, hence the term "kina barrens" (but see paragraph 33(c) in regards to *Centrostephanus*).

Rhodolith beds	Rhodoliths are colourful, unattached calcareous nodules, composed of crustose calcareous red algae (coralline algae) that resemble coral. "Rhodolith beds" are areas of high numbers of rhodoliths and are recognized as an important biogenic habitat that supports diverse benthic communities.
Rocky reefs	Areas of continuous or semi-continuous rock substrate as described in the Oceans 20/20 and Northland Marine Habitat Map 2009.
Seagrass meadows	A seagrass meadow (eel grass) or seagrass bed is an underwater ecosystem (both intertidal and subtidal) formed by seagrasses. Seagrasses are marine (saltwater) plants found in shallow coastal waters and estuaries. The only seagrass in New Zealand is *Zostera muelleri.*
Trophic cascades	Trophic cascades are indirect interactions that can control entire ecosystems. Trophic cascades occur when predators limit the density and/or behaviour of their prey and thereby enhance survival of the next lower trophic level, e.g. snapper and crayfish directly impact kina populations, which indirectly affects the abundance and distribution of kelp and other seaweeds.

BACKGROUND

1. Te Uri o Hikihiki seek that Te Mana o Tangaroa Protection Areas be incorporated into the Proposed Northland Regional Plan (PNRP). Ngāti Kuta ki te Rawhiti Hapū, Bay of Islands Maritime Park Inc and Royal Forest and Bird Protection Society Inc seek that Te Ha o Tangaroa Protection Areas be incorporated into the PNRP.

2. When preparing this JWS, the experts focussed on the desire of the Appellants to protect and restore areas from the Bay of Islands to Mimiwhangata (refer to the Map in Attachment 1[1]) from the actual and potential adverse effects of fishing activities.

3. The experts noted that there are some aspects of the Agreed Statement of Facts – Ecology dated 1 June 2021 that they do not agree with. However, they do rely on the Statement where stated in the JWS.

4. The proposed management areas are variously described in different evidence as three "Areas" or three "Sub-areas and with some duplication of prefix letters, leading to confusion. In this JWS, for the avoidance of doubt, the different areas are described as follows, using names used in the evidence, not any recent change of names:

The proposed Te Hā o Tangaroa Protection Area includes:

Area A	Maunganui Bay-Oke Bay Rāhui Tapu (6.2 km^2)
Area B	Ipipiri benthic protection area (57.6 km^2)
Area C	Ipipiri-Rakaumangamanga Protection Area (new area - 288 km^2)

The proposed Te Mana o Tangaroa Protection Area includes:

Area A	Mimiwhangata Rāhui Tapu (46 km^2)
	Mimiwhangata Rahui Buffer Area (9.8 km^2)
Area C	Te Au o Morunga Protection Area (664.4 km^2)

Notes: There is no Area B within the Te Mana o Tangaroa Protection Area. The two areas C overlap.

5. The experts agree that the best available information to characterise the sea floor includes the Oceans 20/20 Bay of Islands programme and Northland Marine Habitat Map (DOC, 2009). The experts agree that this information adequately defines the spatial

[1] The Map is the updated version provided by Bay of Islands Maritime Park Inc, Royal Forest and Bird Protection Society Inc, Ngāti Kuta Te Uri o Hikihiki immediately prior to conferencing on 8 June 2021.

extent of rocky reef areas within the proposed protected areas. The experts agree that, as in most coastal areas of NZ, the information available to quantify the biodiversity attributes of the soft sediment ecosystem is limited.

6. The experts agree that the following areas are ecologically important and they support the management measures proposed by the appellants:

Te Hā o Tangaroa	Area A - Maunganui Bay-Oke Bay Rāhui Tapu
Te Mana o Tangaroa	Area A - Mimiwhangata Rāhui Tapu and Buffer Area
Te Hā o Tangaroa	Area B – Ipipiri Benthic Protection Area

7. In view of the agreement expressed in 6, those areas are only discussed to a limited extent in this JWS. The remainder of the JWS focuses primarily on the following areas, collectively referred to as "Areas C" where comments apply to both:

Te Hā o Tangaroa	Area C - Ipipiri-Rakaumangamanga Protection Area
Te Mana o Tangaroa	Area C - Te Au o Morunga Protection Area.

8. Pargraphs 9 – x relate to the two Areas C.

9. The experts agree that the rocky reef areas are ecologically important and they support the management measures proposed by the appellants. To protect the integrity of rocky reefs, a buffer including soft sediment areas would be required if the area is not managed as a whole. The extent of the buffer would need to be determined. By way of example, the Northland Regional Plan SEAs use a 1 km buffer. Some experts consider that a greater buffer may be required.

10. All experts agree that the soft sediment areas are ecologically important and, other than Mr West, they support the management measures proposed by the appellants. Mr West considers that the soft sediment areas unlike the rocky reef areas do not meet the NZCPS 11(a). The soft sediment areas meet NZCPS 11(b) based on their importance to life stages of taxa. Therefore, he does not agree that the same level of protection is required of the soft sediment areas as is required on the rocky reef areas.

11. Dr Stirnemann considers that all of Areas C is ecologically important for threatened and at-risk seabirds for feeding. Other experts accept her expertise in this area.

RESPONSES TO QUESTIONS

Fishing

12. What can be the impacts of fishing activities on marine biodiversity at ecosystem, species and genetic levels?

(a) All experts generally agree with the fishing impacts stated in the Agreed Statement of Facts. They also note the impacts of fishing also include but are not limited to:

- Changes in the food web. An example of that is Trophic Cascade which is discussed further below.
- Altering the behavior of species.
- Altering population genetic structure.
- Reductions in frequency of surface fish schools (workups) that are critical to the survival and reproduction of threatened and at-risk seabirds based on Dr Stirnemann's evidence.

The experts stress this is not a complete list of effects.

13. What have been the biodiversity benefits of establishing:

(i) No take marine protected areas (no removal of plants or animals)

The experts agree that:

(a) Well-designed no-take areas provide the greatest level of protection from the effects of fishing including commercial, recreational and customary. These areas have been shown to reverse the impacts of fishing within

their boundaries and return the ecosystem to a more natural state. This involves the recovery of abundance and size of exploited species, which can have flow-on effects on the overall ecosystem. This can result in an ecosystem that is more resilient to other stressors and there is growing evidence that this can help supplement populations of exploited species outside marine protected areas.

(b) No take areas provide protection for, and allows recovery of, sensitive sea floor habitats and species, especially biogenic habitats from fishing gear impacts. These controls also remove bycatch impacts resulting in additional mortality and injury.

(c) Potentially provide protection of as yet undiscovered species and species as yet unclassified in terms of threat classification.

(ii) Marine protected areas with method controls

The experts agree that:

(a) Areas in which mobile bottom contact fishing methods are prohibited, provide protection for, and allows recovery of, sensitive sea floor habitats and species, especially biogenic habitats from fishing gear impacts. These controls also remove bycatch impacts resulting in additional mortality and injury.

(b) In marine protected areas that allow recreational fishing (eg Mimiwhangata Marine Park) the biodiversity benefits seen in no-take areas (refer 13(i). above) have not been observed.

Habitats / ecosystems

14. Which are the species, habitats or ecosystems within each of the proposed marine protected areas that trigger NZCPS 11(a) or 11(b) or the significance criteria in Appendix 5 of the RPS?

(a) The experts agree that the biodiversity present on the rocky reefs trigger the requirements to avoid adverse effects in accordance with Policy 11(a), for example: clusters of corals and gorgonian fans.

(b) As inferred earlier, the experts agree that available information does not allow a species-specific threat classification in soft sediment areas. However, the experts agree that soft sediment areas generally are known to have diverse and productive invertebrate communities that have an important ecological role in the coastal environment. The experts agree that these communities form the base of many ecological food webs, which connect species e.g. invertebrates, fish, mammals and seabirds.

(c) The experts agree that some of the seabird species listed in Appendix 4 of the Agreed Statement of Facts are threatened or at-risk species and trigger policy 11(a).

(d) The experts agree soft sediment habitats fall within NZCPS Policy 11(b).

15. Which and where are soft sediment habitats in the proposed marine protected areas that are ecologically significant in terms of NZCPS or the RPS for Northland?

(a) This is addressed in the evidence of Dr Froude in paragraphs 110-124, in the evidence of Dr Morrison in paragraphs 4-21, 27-28 and in Dr Stirnemann's evidence section 120.

(b) The experts agree that the available information does not enable a detailed assessment to be made against the above criteria, except as noted elsewhere in this document.

16. Which other biogenic habitats are present in these areas?

(a) The expert agree that the following biogenic habitats are present within the proposed protection areas. Those marked with an asterisk trigger requirements for protection under NZCPS policy 11(a):

- Seagrass meadows*
- Rhodolith beds*
- Large shellfish beds*
- Macro-algae beds on reefs
- Macro-algae beds on soft sediments*
- Sponge aggregations*
- Gorgonian and coral species and aggregations*
- Bryozoans.

Seabird habitats

17. Which and where are the ecologically important seabird habitats within the areas covered by the proposal?

Dr Stirnemann advised that

(a) The entire area is within an area designation as a globally Important Bird Area (IBAs) for seabird conservation. Both threatened and at-risk species are found feeding in the area and utilise all parts though different species will favour various areas over others. Motukokako and Cape Brett is an important upwelling zone which attracts shoaling fish (work ups) and these in turn attract seabirds.

(b) The islands provide safe breeding opportunities for various seabirds. Motukokako and Moturua are important breeding sites for various petrel species. At risk species breeding in the area include Red Billed Gull (various rock stacks e.g Bird Rock, Black Rocks, Tapeka Point, and on Cape Brett below the light house), white fronted tern breed on various rock stacks and cliffs. Gannets breed on the Nine Pin. Little Blue Penguin (at risk) breed along the coast. Little Blue Penguins are an inshore forager, and their range is limited during the nesting period. Inshore fish provisions are important during this period.

The other experts accept Dr Stirnemann's expertise in this matter.

18. Are seabirds in the proposed marine protected areas affected by fishing? To what extent and how are they affected by fishing?

The experts agree that seabirds in the proposed marine protected areas are affected by fishing.

Dr Stirnemann advised that:

(a) Direct mortality

Bycatch during fishing activity is a threat to some seabird species, including two threatened species found in Areas C – Black petrels and Flesh-footed shearwater. Black petrels in particular remain at very high risk from commercial fisheries. It is the only species categorised in the very high-risk category (Fisheries NZ Commission threat categories). Flesh-footed shearwater are in the second highest category (Fisheries NZ Commission). The current risk assessment estimated that the greatest risk to the black petrel is from inshore trawl fisheries (Fisheries NZ Commission).

(b) Loss of food resources

A range of commercial fisheries target aggregations of surface shoaling fish. Purse seining is commonly used to capture these fish schools. The dense fish schools create a phenomenon known as fish workups. These fish drive up prey items to the sea surface making them accessible for seabirds and thus form an important ecological system for gaining food source for a range of seabird species e.g. Flesh-footed shearwater (Threatened) and Black petrel (Threatened),

Red billed Gull (At risk) and White Fronted Terns (At risk) are some of the species utilizing these food sources. Red Billed Gulls and White Fronted Tern will be limited in foraging distance during breeding. During this time workups are particularly important for these species.

These fish workups have declined in size and number and as a result seabirds reliant on this ecological system process are adversely affected. Reduced food availability can affect breeding success, adult bird survival and the probability of populations persisting.

The other experts accept Dr Stirnemann's expertise in this matter.

Rhodolith beds / Seagrass meadows

19. Which rhodolith beds and seagrass meadows in the Bay of Islands are likely to be vulnerable to, or threatened by, physical impacts such as non-commercial dredging?

(a) The experts agree that the two known Rhodolith beds and any as yet unknown beds, and seagrass meadows will be damaged by any non-commercial dredging.

(b) In addition, other sensitive habitats will be damaged by non-commercial dredging e.g. sponge gardens, algal turf beds on soft sediments, horse mussel beds, bryozoan mounds, tube worm mounds, dense bivalve (shellfish) beds.

Sedimentation

20. Do high sedimentation rates and turbidity affect some habitats more than others?

(a) The experts agree that high sedimentation rates and turbidity affect some habitats more than others.

(b) The experts agree that in Areas C, shallow reefs are not significantly affected by sedimentation. On the deeper reefs there is evidence of sediment deposition, but rates and origins are unknown.

(c) The experts agree that in terms of sedimentation generally, the greatest effects occur in harbours and estuaries, to varying extents, that is, closest to the main inflows to the marine environment.

(d) Regardless of potential sedimentation effects, the experts support controls on fishing as proposed to the extent stated above.

Trophic cascades

21. What are the trends and state of snapper and crayfish populations in east Northland and specifically the BOI-Mimiwhangata sub-region?

(a) The experts agree the biomass of snapper and crayfish are seriously depleted and are well below MPI management targets.

22. To what extent is it plausible that the prevalence of kina barrens in east Northland is unrelated to predator abundance?

The experts agree that:

(a) A kina barren is a rocky reef community that is dominated by kina (*Evechinus chloroticus*) and devoid of large brown seaweeds (kelp).

(b) Kina eat kelp and other macro algae.

(c) Species such as snapper and crayfish act as predators and eat kina.

(d) A reduced abundance and size of predators allows kina numbers to increase and form barrens, but a number of factors influence where kina barrens occur and their extent.

(e) Prior to 1960, there is evidence that kina barrens were not a natural part of the shallow rocky reef community of east Northland.

(f) When natural densities and size range of predators exist, significant areas of kina barrens do not occur.

(g) Recovery of kelp forest can take significantly longer than the reappearance of a healthy predator population.

(h) The prevalence of kina barrens in east Northland is primarily inversely related to predator abundance and size.

(i) That also in the absence of predators, other factors may limit the formation of kina barrens in some situations.

23. Where and how significant a threat to biodiversity is sedimentation within the areas covered by the proposals? What actions have been taken, including those relating to the proposed Northland Regional Plan processes, to mitigate those threats?

(a) The first sentence is addressed above. The second sentence is outside the scope of ecology experts.

24. How much have diurnal and seasonal sea temperatures changed in east Northland as a consequence of climate change, and what impact has this had upon marine biodiversity?

(a) Dr Shears stated that rates of warming in east Northland are relatively low compared to other parts of New Zealand and the western Pacific. The other experts accepted his knowledge on sea level warming.

(b) None of the experts is aware of any changes in biodiversity clearly related to warming water temperatures except as noted in (c) below.

(c) There is concern that a subtropical sea urchin *Centrostephanus rodgersii* is increasing in abundance in the area, possibly in response to warmer temperatures. This species has been identified in museum specimens dating back to 1897. This species tends to form barrens in deeper water than kina. The experts agree that the presence of natural densities and size distribution of predators, in particular rock lobster, would help prevent the increase in *Centrostephanus rodgersii* abundance and associated adverse effects.

25. What evidence is there that the trophic cascade model can be applied to the Bay of Islands?

Refer above

26. Are barrens and kelp forest stable or dynamic communities?

(a) The experts consider these to be alternate stable states. The experts agree that where large kina barrens occur, they are commonly stable over decades. However, there are also areas where kina barrens are in transition to or from kelp forests.

Effects of fishing

27. What are the effects of fishing activities on ecological values within the proposed marine protection areas (in particular, fishing activities known to have occurred within these areas within the past 10 years)?

The experts addressed the general effects of fishing elsewhere in this document. These effects apply to the proposed marine protection areas. The experts agree that notable effects in these areas include:

(a) Scallop populations in the area have collapsed in the last decade.

(b) Greenlipped mussels beds have sequentially disappeared from the eastern Bay of Islands over the last decade.

(c) Hapuku have significantly reduced in numbers over large areas and vanished from shallow water areas.

(d) The size and number of workups have declined.

(e) Other species (e.g. some birds, mammals, and marine species) have declined but the reasons are not fully understood.

Effects of proposed marine protected areas

28. What will be the likely effects of the proposed marine protected areas on biodiversity (benthic, birds, fish, other marine species and habitats), taking into account:

- size of proposed areas;
- activities that would be prevented in the proposed marine protected areas; and
- recovery timeframes.

The experts agree that:

(a) The proposed rahui tapu areas (Area A's) are of sufficient size and have appropriate management controls such that the experts would expect them to have similar effects on biodiversity as that seen in existing no-take MPAs in northeastern New Zealand.

(b) No-take MPAs have been shown to be effective at protecting exploited species, allowing recovery of the abundance and size of such species. The extent of recovery is dependent on MPAs being large enough to encompass both longshore and offshore movements of these species. The recovery of exploited species such as snapper and crayfish generally occur within 5-10 years (Babcock et al 2010). For example, snapper biomass increased by 818% in 4 years following no-take protection at the Poor Knights (Denny et al 2004). Rates of crayfish recovery are more variable as it is dependent on the supply of larvae, which is notably variable (Freeman et al 2011).

(c) The recovery of ecosystems in MPAs takes considerably longer than the recovery of exploited species. For example, the decline in kina barrens and recovery of kelp forests in no-take MPAs at Leigh and Tawharanui took between 15 and 25 years (Shears and Babcock 2003, Babcock et al 2010). This is primarily because it takes predators a long time to reduce kina numbers below the density threshold required to maintain barrens. The recovery of kelp forests in

MPAs is dependent on effective protection of predators, in particular the presence of large individuals that are more effective predators of kina.

(d) Longer lived slow growing species such as corals and gorgonian species take considerably longer to recover.

(e) The direct effects of fishing on seabirds will be reduced. There are also likely to be benefits to seabirds in terms of food availability and associated survival and reproductive success.