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Review of Sustainability Measures for spiny rock lobster (CRA 1) for 2023/24

Introduction

1. This is a submission on the review of sustainability measures for the Northland red or spiny rock lobster fishery (**CRA 1**) for 2023/24 as set out in Fisheries New Zealand Discussion Paper No 2023/01 (**Discussion Paper**).

2. The Environmental Defence Society (**EDS**) is an independent not-for-profit organisation conducting interdisciplinary policy research and litigation. It was established in 1971 with the purpose of improving environmental outcomes in Aotearoa New Zealand.

3. EDS has a special interest in the marine environment and recently completed the first phase of a multi-year project looking at options for future reform of the oceans management system.[1] This included, among other things, fisheries management. In 2018, EDS led an in-depth review of the national fisheries management system and published findings in a report entitled *Voices from the Sea: Managing New Zealand's Fisheries*.[2] It has also sought to improve fisheries decision-making by submitting on proposals to set sustainability measures for the management of various wild fish stocks.[3]

[1] Greg Severinsen and others, 2002, *The Breaking Wave: Oceans Reform in Aotearoa New Zealand*, Environmental Defence Society, Auckland, available from www.eds.org.nz
[2] Raewyn Peart, 2018, *Voices from the Sea: Managing New Zealand's Fisheries*, Environmental Defence Society, Auckland, available from www.eds.org.nz
[3] Copies of EDS's recent submissions on a range of wild fish stocks are available from www.eds.org.nz

Summary of submission

4. EDS is very concerned about the depleted biomass levels of CRA 1. Available information suggests rock lobsters have been removed from most shallow reefs in Northland. The implications of this for the stock and for rocky reef ecosystems are significant. An urgent and careful management approach is required to support the recovery of the stock and kelp reef systems.

5. EDS supports the need to reduce the current Total Allowable Catch (**TAC**) in CRA 1, and in this respect Option 4 is preferred above the other less precautionary options (Options 1, 2 and 3). However, even Option 4 does not go far enough to restore the stock to sustainable levels, or to address the cumulative effects of rock lobster harvest on the wider marine environment. Stronger protective measures are required. These include:

    a. A reduction in the TAC of at least 50%, pending the establishment of an appropriate management target for CRA 1;

    b. The establishment of an ecosystem-based management target for CRA 1 that addresses the vulnerability of rocky reef ecosystems along the north-east coast to fishing-induced trophic cascades;

    c. Restrictions on the maximum size of male and female rock lobsters that can be harvested in CRA 1;

    d. A prohibition on the commercial and recreational harvest of rock lobster within the 15 metre depth limit in CRA 1 ("**the urchin barrens zone**");

    e. Permanent area-based restrictions to protect important kelp forest habitat; and

    f. The development of an ecosystem monitoring plan to track the status of kelp forest habitat over time.

Management of Northland rock lobster CRA 1 stock

6. The red or spiny rock lobster (*Jasus edwardsii*) (**rock lobster**) is highly valued by commercial, recreational and customary fishers in Aotearoa New Zealand. Rock lobsters support one of the most valuable national inshore commercial fisheries, with exports generating $362 million in revenue in 2021.[4] Rock lobsters are of historic and cultural significance for Māori, and are recognised as a taonga species by tangata whenua. Historic records show rock lobsters were an important food source for Māori in the 1700s, being harvested by hand or using tāruke (wicker traps).[5] Out of concern about widespread declines in rock lobster availability and associated degradation of the marine environment, in recent years iwi and hapū in areas of Northland and the Hauraki Gulf have taken action to protect rock lobsters from harvest in shallow coastal areas.[6]

[4] Ministry for Primary Industries, 2021, *Situation and Outlook for Primary Industries – December 2021*, page 64, available from www.mpi.govt

[5] MacDiarmid, AB., Freeman, D., and Kelly, S., 2013, *Rock lobster biology and ecology: contributions to understanding through the Leigh Marine Laboratory 1962-2012*, New Zealand Journal of Marine and Freshwater Research, 47:3, 313-333, https://doi.org/10.1080/00288330.2013.810651

[6] In 2017, Te Whanau Moana me Te Rorohuri placed a rāhui covering 384 ha at Maitai Bay, near Karikari Peninsula. More recently, Ngāti Pāoa placed a rāhui on the waters surrounding Waiheke Island and requested a two-year temporary closure of this area under the Fisheries Act 1996, which was approved by the Minister for Oceans and Fisheries

7. CRA 1 encompasses coastal waters to the north of Kaipara Harbour on the west coast, running all the way around North Cape, and down to Te Arai Point on the east coast. CRA 1 also includes the waters surrounding the offshore Three Kings Islands, which are approximately 55 kilometres to the northwest of North Cape.

8. Information in the Discussion Paper suggests the abundance of legally harvestable rock lobster has declined by 85% since 1945, while the spawning biomass has declined by 63%.[7] Model-derived estimates of vulnerable biomass show the CRA 1 stock reached an initial low point in 1974, increased slightly until the 1980s, and decreased to a historic low point in 1992. Since 1993, the vulnerable biomass has fluctuated around a level that is only marginally higher than the lowest historic point. Within this historic context, the current biomass levels are the lowest they have ever been, and any further declines in vulnerable biomass would be unprecedented.

9. Due to depletion, commercial fishers have more recently had to move to deeper waters in the north-eastern parts of CRA 1 to find suitable rock lobsters to harvest.[8] In 2019, some members of the commercial rock lobster fishery were questioning whether it was necessary to voluntarily shelve some of their quota to facilitate the recovery of the CRA 1 stock.[9]

10. There is limited understanding of settlement levels and recruitment in CRA 1. In 2000, settlement monitoring frames were installed in Houhora Bay, Taupiri Bay (near the Bay of Islands), and Home Point (Whangarei Harbour), but settlement levels were too low to obtain reliable estimates for the fishery.[10] At other sites, subsequent monitoring has confirmed there is generally very low levels of recruitment of juveniles to reefs in north-eastern Aotearoa New Zealand.[11] This means the stock is particularly vulnerable to declines in breeding success or settlement levels, this also constrains their capacity to recover from fluctuations in prevailing environmental conditions or cumulative stressors.

11. The impacts of climate change on marine ecosystems will create additional pressure for rock lobster populations in north-eastern Aotearoa New Zealand. Gradual increases in sea surface temperature, coupled with more frequent pulses of warm water during 'marine heatwaves', are anticipated to occur in coastal waters around the country.[12] Satellite data has already recorded an average increase of 0.2°C per decade since 1981, and there are frequently years where the sea surface temperature exceeds the long-term average.[13]

12. All the above means that a cautious approach is required to management of the CRA 1 and, in particular, to the setting of the TAC.

13. Under section 13 of the Fisheries Act 1996, the Minister is required to set a TAC that maintains the CRA 1 stock **at or above a level that can produce the MSY**, having regard to the interdependence of stocks. Under section 11(1(a) of that Act, when setting or varying any TAC,

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[7] At pages 6 and 7

[8] National Rock Lobster Working Group (NRLWG), 2019, Agreed minutes from 13 November 2019, page 3, available from www.mpi.govt.nz

[9] Ibid

[10] Booth, J.D., Porman, J.S., Stotter, D.R, Bradford, E., 2001, *Settlement indices for 1999, and 1999-2000 juvenile abundance of the red rock lobster, Jasus edwardsii*, New Zealand Fisheries Assessment Report ZOOl/28, available from www.webcat.niwa.co.nz

[11] MacDiarmid, AB., Freeman, D., and Kelly, S., 2013, *Rock Lobster biology and ecology: contributions to understanding through the Leigh Marine Laboratory 1962-2012*, New Zealand Journal of Marine and Freshwater Research, 47:3, 313-333, 320

[12] Ministry for the Environment & Stats NZ, 2019, *New Zealand's Environmental Reporting Series: Our marine environment 2019*, 6, available from www.mfe.govt.nz and www.stats.govt.nz

[13] Ibid

the Minister must take into account "**any effects of fishing of any stock on the aquatic environment**".

14. **No management target for CRA 1 has been set by the Minister, although a management reference level ("interim target") was accepted by the Science Working Group process in 2021.[14] The interim target is 454 tonnes of "vulnerable biomass" (comprising 14.4% of the unfished reference level (URL)).[15]** This interim target is based on a narrow set of considerations. It does not take into account localised depletion or the role that rock lobster plays in the food web. In particular, it does not take into account the impacts of fishing down the stock on the widespread development of 'kina barrens' along the north-east coast (see below).

15. **The management target for CRA1 will need to be considerably larger (in terms of biomass) than the interim target in order to ensure the rock lobster population is of sufficient size to avoid devastating trophic cascade impacts.** The setting of any sustainability measure needs to take this into account and not assume that meeting the interim target will be sufficient or meet the requirements of the Fisheries Act.

Status of CRA 1 stock

16. The latest stock assessments of CRA 1 were undertaken in 2019 (full stock assessment), 2021 (rapid assessment update) and 2022 (rapid assessment update). A rapid assessment generates estimates of biomass based on updated catch and effort information, recreational harvest estimates, and information about stock characteristics (e.g., growth-frequency data) in the years between full stock assessments.

2010

17. The 2019 assessment indicated that the biomass of legally harvestable adult rock lobsters ("vulnerable biomass") was 15.5% of the URL; the total biomass was 25.6% of the URL; and the spawning biomass was 37% of the URL. The 2019 assessment predicted future declines in vulnerable and total biomass levels under the existing management settings.

18. As a result of these findings the TAC was reduced from 273 to 203 tonnes (a 16% reduction), the recreational allowance was reduced from 50 to 32 tonnes (a 36% reduction) and the allowance for other sources of fishing mortality was reduced from 72 to 41 tonnes (a 43% reduction). The TACC was reduced from 130 tonnes to 110 tonnes (a 15% reduction).

2021

19. The 2021 rapid assessment found the vulnerable biomass had reduced to 14.6% of the URL and the spawning biomass to 36.3% of the URL. An estimate of total biomass was not reported. Following the 2021 rapid update, the TAC was further reduced by 5% from 203 to 193 tonnes. The recreational allowance was reduced from 32 to 27 tonnes (a 16% reduction) and the TACC was reduced from 110 to 105 tonnes (a 5% reduction).

2022

[14]Fisheries New Zealand, 2023, *Review of sustainability measures for spiny rock lobster (CRA 1) for 2023/24*, Fisheries New Zealand Discussion Paper 2023/01, 4

[15] "Vulnerable" biomass is the biomass of rock lobster that can be legally harvested. The URL is the estimated biomass in 1945, prior to mass harvesting

20. The 2022 rapid update found that, despite the reductions in TAC, the vulnerable biomass had further reduced to 14.4% of URL (462 tonnes) but with the spawning biomass (breeding females) slightly increasing to 36.8% (543 tonnes). The size of the vulnerable biomass is sitting on the interim target, which as outlined above is far below where the management target needs to be. This means that the stock needs to be substantially rebuilt, requiring a substantial decrease in the TAC.

Recent High Court decision

21. In November 2022, the High Court concluded that the Minister's 2021 and 2022 decisions on sustainability measures for CRA 1 involved errors of law and directed that the Minister reconsider the 2022/23 decision in accordance with the findings of its judgement.[16] This was on the basis that the:

> *"The scientific information provided to the Minister misleadingly conflated the information in relation to kina barrens and trophic cascade in the subject area with the situation pertaining to the rest of New Zealand."*[17]

22. As a result of the deficiencies in the information provided to the Minister, "his decisions did not comply with the **mandatory environmental principles**" in section 10 of the Fisheries Act.[18] In its decision, the High Court made the following findings regarding the application of the Fisheries Act:

    a. "The purpose of the Act therefore is **broadly to create an environmental 'bottom line' of sustainability"**.[19]

    b. "… the key lever in ensuring sustainability is the administration of the QMS, through the **setting of the TAC, with sustainability as the 'guiding criterion'**."[20]

    c. "The ecosystem approach requires **decision-makers to incorporate wider ecosystem effects into fisheries management**, instead of considering sustainability with a single-species focus. This approach is acknowledged in the requirement for the Minister to consider the interdependence of species when making a decision on the TAC, as well as through ss 9 and 11."[21]

23. The upshot of the High Court decision is that it is now legally clear that the Fisheries Act provides an environmental bottom line, the setting of the TAC is a key tool to meet that bottom line, and a decision on the TAC needs to factor in the wider ecosystem effects of fishing.

24. In its decision, the High Court also made the following findings in terms of the impact of rock lobster harvest on the marine ecosystem and particularly on the development kina barrens in CRA 1 (and CRA 2):[22]

    a. Rock lobsters have an important ecological role in coastal ecosystems;
    b. Their primary ecological role is as a predator in shallow water areas;

[16] *The Environmental Law Initiative v Minister for Oceans and Fisheries* [2022] NZHC 2969 [11 November 2022]
[17] Ibid at [115]
[18] Ibid at [118]
[19] Ibid at [11]
[20] Ibid at [11]
[21] Ibid at [16]
[22] Ibid at [69]

c. In New Zealand, rock lobsters prey upon sea urchins/kina;
d. Kina are an important herbivore on rocky reefs in north-eastern New Zealand because they can consume entire kelp forests and other seaweeds;
e. Generally, the ecological role of rock lobsters, as a predator, influences the ecological role of the species they prey on;
f. There are fewer rock lobsters, there is an increased population of kina, thereby increasing the grazing activity of kina, and resulting in the loss of strands of seaweed, particularly kelp forests, in coastal areas, described as a "trophic cascade";
g. Trophic cascade has been reported in New Zealand, and areas affected by it are described as 'kina barrens', which take decades to reverse;
h. Loss of kelp forests is ecologically damaging for surrounding coastal systems, in fisheries production, biodiversity and ocean carbon sequestration;
i. There is strong evidence that trophic cascade has significantly contributed to the presence of kina barrens in the north-east of New Zealand, within both CRA1 and CRA2;
j. There are other factors, such as water temperature, water depth, storm damage, sediment and kelp disease that may impact on the prevalence of kina barrens; and
k. There is a lack of evidence as to this relationship around the remainder of New Zealand.

25. The implication of these findings is that the CRA 1 stock needs to be managed cautiously to avoid the development of kina barrens, which has a devastating effect on kelp ecosystems, and to enable the kelp forest to recover where kina barrens have already developed.

Extent and impact of kina barrens

26. Available information demonstrates that widespread transitions from kelp forest to urchin barrens have occurred across most of the shallow reef habitats in Northland. For example, Kerr and Grace (2005) mapped the rocky reef habitat within Mimiwhangata Marine Park, and recorded the occurrence of extensive kina barrens across the depth range of 6 to 15 metres.[23] Using aerial photography, the authors investigated long-term changes in the extent of algal forest between 1973 and 2003. They found the shallow mixed-weed zone had shrunk upwards towards the low-water mark during this period, while the upper limit of kelp had progressively deepened. The aerial images show there has been a continuous gradual decline in kelp forest habitat since 1950.[24]

27. In the course of their investigations, Kerr and Grace interviewed a number of Ngatiwai hapū, who traditionally fished the reefs of the Mimiwhangata area. The authors advised:

> "*They expressed considerable concern that what they saw happening there now was definitely not consistent with the ebb and flow of the algal forest and extent of kina barrens they had observed*…"; and
>
> "*They had no memory or historical knowledge of the extent of the kina barrens ever being similar to the condition that exists today*".

28. A report by Booth (2016) describes the loss of kelp from most shallow reefs (≤ 6 m depth) in the main basin of the Bay of Islands.[25] The author used aerial imagery to compare the extent of

[23] Kerr, V.C and Grace, R.V, 2005, *Intertidal and subtidal habitats of Mimiwhangata Marine Park and adjacent shelf*, *DOC Research and Development Series 201*, available from www.doc.govt.nz
[24] Kerr, V.C and Grace, R.V, 2005, *Intertidal and subtidal habitats of Mimiwhangata Marine Park and adjacent shelf*, *DOC Research and Development Series 201*, available from www.doc.govt.nz
[25] Booth, J., 2016, *Wrecked Reefs*, *Russell Review 2016-2017*, available from www.fishforever.org.nz

macroalgal cover in the 1950s/1960s and in 2009, and found there were significant declines in kelp cover during this period. The study suggests declines were evident by the 1970s and there have been no signs of kelp recovery since 2009.

a. Kerr and Grace (2017) estimated the spatial extent of urchin barrens at a regional scale using ground-truthed habitat maps. The study area extended from Ahipara in the Far North District to Tāwharanui in the Auckland Region and covers most of the eastern part of CRA 1. The authors estimated that urchin barrens cover 5,500 ha (17%) of the rocky reef system within the 30 m depth limit. Accounting for the preferred depth range of urchins (<15 metres), the authors estimated that urchin barrens occupied between 25% and 40% of shallow rocky reef system in the study area.[26]

b. Stakeholders are becoming increasingly concerned at expansion of persistent urchin barrens across shallow reefs in Northland. Available information shows urchin barrens are prolific on reefs along the Tutukaka Coast, the Bay of Islands, the Karikari Peninsula, and on rocky reefs surrounding the Mokohinau Islands (which are approximately 50 kilometres offshore).[27] A marine scientist recently observed "*finding an area on the coast that is not kina barrens is unusual. It's a sad situation*."[28]

c. The widespread loss of kelp forest habitat in Northland represents a significant threat to the CRA 1 stock as well as broader marine biodiversity and ecosystem functioning. Kelp forests are an important facilitator of rock lobster puerulus settlement onto rocky reefs after larval transition, with the physical structure and chemical cues emitted by them having a positive effect on settlement and recruitment levels.[29] Scientists have recorded significantly higher survival rates of juvenile rock lobster (40%) in kelp habitat versus in urchin barren habitat (10%). The differences in survivorship were attributed to increased predation of juvenile rock lobster, due to exposure in urchin barrens habitats that were devoid of shelter.

d. Macroalgal forests fulfil a variety of other important functions. The following characteristics are described in a review by Teagle et al. (2017), and draw on a large body of scientific research.[30] Many kelp species are adapted to tolerate vigorous water movement and turbulence, which promotes high levels of nutrient uptake, photosynthesis and growth. In turn, the carbon produced by kelp during photosynthesis fuels marine food webs through the primary production of tissues and secondary production of detritus. Macroalgal forests are structurally complex and provide habitat for finfish and invertebrates. Studies have shown that kelp canopies reduce light intensity on the reef surface beneath, which creates favourable conditions for small encrusting animals. In addition, they modulate wave energy, maintain water clarity, and prevent sediment movement.

[26] Kerr, V.C., and Grace, R.V., 2017, *Estimated extent of urchin barrens on shallow reefs of Northland's east coast. A report prepared for Motiti Rohe Moana Trust*, Kerr & Associates, Whangarei, available from www.kerrandassociates.co.nz
[27] Frankham, J., 2022, *A tragedy of the commons,* New Zealand Geographic, Issue 73, Jan-Feb 2022, available from www.nzgeo.com
[28] Ibid
[29] Hinojoa, I.A., Green, B.S., Gardner, C., and Jeffs, A., 2015, *Settlement and early survival of southern rock lobster, Jasus edwardsii, under climate-driven of kelp habitats*, ICES Journal of Marine Science, 72(Supplement 1), doi:10.1093/icesjms/fsu199
[30] See review by Teagle, H., Hawkins, S.J., Moore, P.J., and Smale, D.A, 2017, *The role of kelp species as biogenic habitat formers in coastal marine ecosystems*, *Journal of Experimental Marine Biology and Ecology*, 492, 81-98

e. Research has also identified that kelp forests provide an essential food source for at least four fish species, and a critical habitat for crested weedfish and triplefin fish species in the region. These species-habitat associations represent a "*strict dependence*" relationship, which means the localised loss of kelp forest habitat could drive these species to extinction.[31]

f. In contrast, urchin barrens represent a significant decline in primary productivity and structural complexity.[32] It is widely accepted that urchin barrens are an indicator of significant ecosystem degradation.[33]

EDS's preferred management option

29. The Discussion Paper proposes four options for sustainability measures:

    a. **Option 1** which is the status quo: the vulnerable biomass is expected to increase to 18% and the spawning biomass to 40% of the URL over the next four years.

    b. **Option 2** which would reduce the TAC by 11 tonnes to 182 tonnes (5.7% reduction): the vulnerable biomass is expected to increase to 19% and the spawning biomass to 41% of the URL over the next four years.

    c. **Option 3** which would reduce the TAC by 21 tonnes to 172 tonnes (10.9% reduction): the vulnerable biomass is expected to increase to 21% and the spawning biomass to 42% of the URL over the next four years.

    d. **Option 4** which would reduce the TAC by 42 tonnes to 151 tonnes (22% reduction): the vulnerable biomass is expected to increase to 23% and the spawning biomass to 43% of the URL over the next four years.

30. The Discussion Paper notes that Option 4 provides the most certainty that rock lobster biomass will increase to an as yet unknown level, that in combination with other measures, will allow them to play their part in controlling kina populations in the shortest, but still unknown timeframe. For this reason, **out of the four options, EDS prefers Option 4**.

31. However, EDS does not consider any of the options are sufficiently cautious to address the adverse cumulative effects of rock lobster harvest on kelp forest habitat. There is a need to significantly reduce fishing pressure on Northland rock lobster populations until they recover to more sustainable levels. There is also a need to remedy the cumulative effects of fishing impacts on kelp forest habitat by protecting and restoring shallow coastal reefs that are vulnerable to the formation and expansion of urchin barrens habitat.

32. A precautionary approach requires the inclusion of stronger protective measures to achieve these outcomes. EDS considers a sufficiently cautious evidence-based approach to managing CRA 1 would comprise:

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[31] See review by Jones, G.P., 2013, *Ecology of rocky reef fish of northeastern New Zealand: 50 years on*, New Zealand Journal of Marine and Freshwater Research, 47:3, 334-359, doi: 10.1080/00288330.2013.812569

[32] As evident in the results reported by Babcock, R.C., Kelly, S., Shears, N.T., Walker, J.W., and Willis, T.J., 1999, *Changes in community structure in temperate marine reserves*, Mar Ecol Prog Ser 189: 125−134 which found increased productivity following the recovery of kelp forests in a marine reserve off the coast of northeastern Aotearoa New Zealand

[33] See Filbee-Dexter, K. and Schiebling, R.E., 2014, *Sea urchin barrens as alternative stable states of collapsed kelp ecosystems*, *Mar Ecol Prog Ser*, 495:1-25 and Ling, S.D., et al., 2015, *Global regime shift dynamics of catastrophic sea urchin overgrazing*, *Phil. Trans R Soc. B*, 370:20130269

a. A reduction in the TAC of at least 50%, pending the establishment of an appropriate management target for CRA 1, when the TAC could be further reviewed;

b. The establishment of an ecosystem-based management target for CRA 1 that addresses the vulnerability of rocky reef ecosystems along the north-east coast to fishing-induced trophic cascades;

c. Restrictions on the maximum size of male and female rock lobsters that can be harvested in CRA 1;

d. A prohibition on the commercial and recreational harvest of rock lobster within the 15-metre depth limit in CRA 1 (the urchin barrens zone);

e. Permanent area-based restrictions to protect important kelp forest habitat; and

f. The development of an ecosystem monitoring plan to track the status of kelp forest habitat over time.

33. EDS considers the maximum size limits will improve the functional capacity of the stock by retaining rock lobster with the greatest reproductive capacity; and the greatest capacity to consume large urchins that are capable of exerting the most destructive force on kelp forests.

34. A prohibition on the harvest of rock lobster across the depth band that has been identified as most vulnerable to the formation and expansion of urchin barrens, will support the return of rock lobster to these areas and promote the recovery of kelp forest habitat.

35. EDS considers permanent area-based restrictions on the harvest of rock lobster (and other reef predators like snapper) will be necessary to ensure the sustainability of the stock and marine environment under expected future environmental conditions. A proactive and cautious approach is required to protect the kelp habitat that remains and to restore areas where widespread degradation has already occurred.