Fisheries New Zealand
Tini a Tangaroa

Review of sustainability measures for spiny rock lobster (CRA 7) for 2024/25

Fisheries New Zealand Discussion Paper No: 2024/31
ISBN: 978-1-991330-53-6 (online)
ISSN: 2624-0165 (online)

December 2024

Contents

Guide to this discussion document and consultation

We are consulting on changes to the catch limits and allowances for spiny rock lobster in CRA 7 under the Fisheries Act 1996 (**the Act**). We welcome your feedback on the proposed options for this stock and any alternatives. Your feedback will be incorporated into our final advice to the Minister for Oceans and Fisheries and will help to inform their decisions on any changes.

Further information

If you are interested in the evidence used to develop the proposals, you can refer to the Fisheries Assessment Plenary.

Sending us your views

Submissions on these proposals will be received by Fisheries New Zealand through to **5pm on Wednesday 29 January 2025**, by email to FMSubmissions@mpi.govt.nz. More information about how to send us feedback is on page 6 of this document.

Spiny rock lobster / Crayfish, Kōura papatea (CRA 7) – Otago

Part 1: Overview

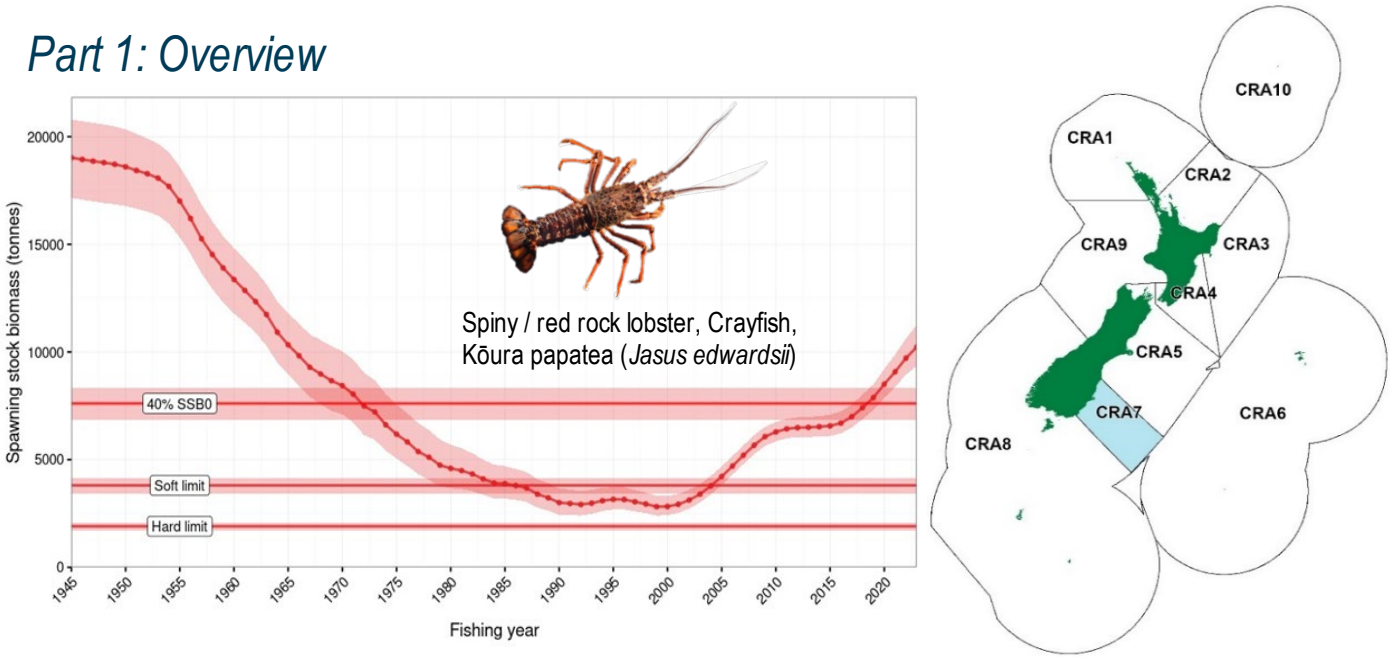


Figure 1: Quota management areas for spiny rock lobster, with CRA 7 highlighted, and modelled spawning stock biomass (in tonnes) for the combined CRA 7 & CRA 8 (Southern) stocks between 1945 and 2023.

Rationale for review

1. Fisheries New Zealand (**FNZ**) is reviewing sustainability measures for spiny rock lobster (*Jasus edwardsii,* referred to as **rock lobster**) in the CRA 7 (Otago) quota management area for the 1 April 2025 fishing year (Figure 1).
2. CRA 7 is assessed with CRA 8 (Stewart Island, Southland, Fiordland & Auckland Islands) because they are considered to be part of the same biological stock. In 2023, rapid assessment updates and updated catch-per-unit-effort (**CPUE**) time series were accepted for both CRA 7 and CRA 8 by the Fisheries Assessment Plenary. The 2023 assessments indicated that combined biomass of the stocks had increased to around 54% SSB_0,[1] very likely (>90% probability) to be above the interim management target of 40% SSB_0. CRA 8 individually was estimated to be at 62% SSB_0. Stock status for CRA 7 could not be reliably estimated independently from CRA 8. However, CPUE data suggested that biomass had also increased substantially in CRA 7 within the last few decades.
3. Based on the 2023 rapid assessment update results and outputs from updated CPUE-based management procedures,[2] in 2024 the Minister decided to increase the Total Allowable Catch (**TAC**) of CRA 8 from 1,453 to 1,601 tonnes. The TAC of CRA 7 was not reviewed for any changes from 2024, as recommended by its management procedure.
4. Rapid assessment updates for CRA 7 and CRA 8 were not carried out in 2024. However, the accepted CPUE series for both stocks have been updated to include new data up to September 2024, and this data has been incorporated into the management procedures of both stocks to produce new outputs. The new data shows that CPUE for CRA 7 has increased in 2024 (Figure 2), and on this basis the CRA 7 management procedure has recommended a Total Allowable Commercial Catch (**TACC**) increase of 11.5 tonnes (~9%) for 2025. For CRA 8, CPUE decreased slightly in 2024, but the management procedure did not recommend any change for 2025.
5. Based on this new information, FNZ is reviewing a potential increase to the TAC of CRA 7 from 1 April 2025, under section 13(2A) of the Fisheries Act 1996 (**the Act**). Within this, FNZ is reviewing a small increase to the allowance for other sources of mortality to align with best available information, and an increase to the TACC in line with the management procedure recommendation (Table 1). FNZ is not reviewing any TAC change for CRA 8 as part of this round, as the current settings appear to remain appropriate.

[1] SSB_0, the level of unfished (virgin) spawning stock biomass of a fish stock, is the theoretical carrying capacity of a fish stock. It represents the level of biomass a fish population would eventually return to if fishing was halted.

[2] A management procedure is a set of 'decision rules' that can be used to guide the setting of commercial catch limits (TACCs) based on changes in abundance (in this case measured by changes in CPUE). The use of management procedures allows FNZ to respond more quickly to changes in stock abundance on an annual basis because there is a more settled approach of how to respond to different levels of abundance. More information on the management procedure for CRA 7 can be found in Part 3 under *'CRA 7 management procedure'*.

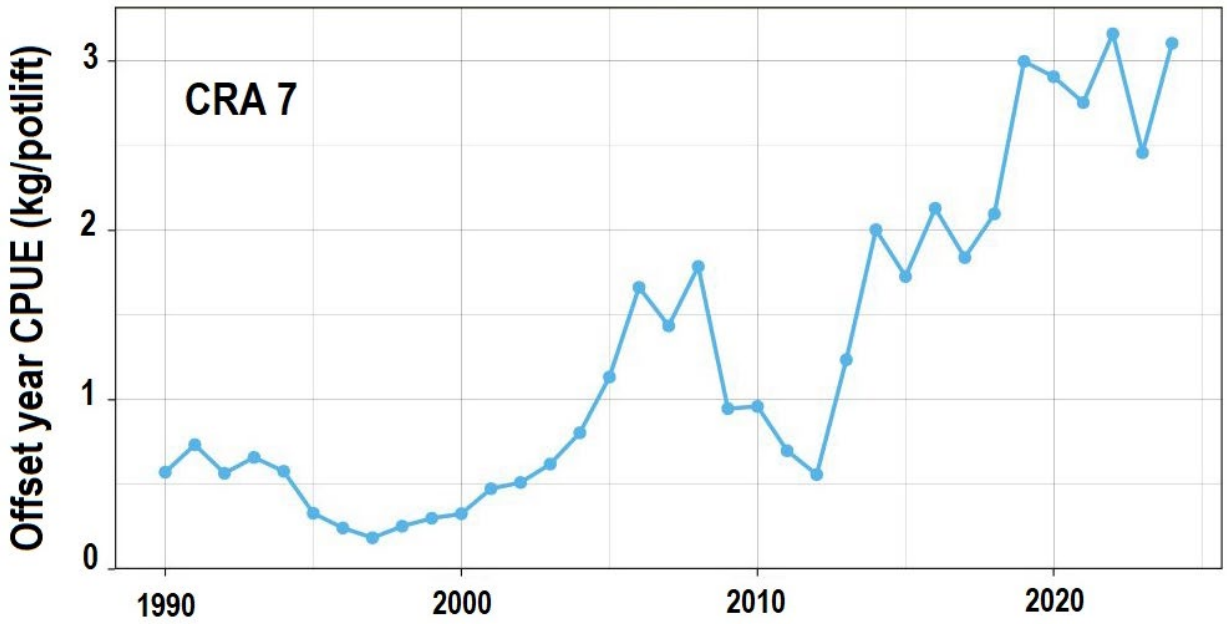


Figure 2: CRA 7 (Otago) offset[3] year CPUE in kg per potlift from the 1990/91 to the 2023/24 fishing year, based on data from the Catch, Effort, and Landings Returns (CELR) until 2019 and from the Electronic Reporting System (ERS) from 2020.

Proposed options

Table 1: Proposed management options (in tonnes) for CRA 7 from 1 April 2025.

Option	TAC	TACC	Allowances		
			Customary Māori	Recreational	All other mortality caused by fishing
Current settings	*134.5*	*111.5*	*10*	*5*	*8*
Option 1	137.5 (↑ 3)	111.5	10	5	11 (↑ 3)
Option 2	150 (↑ 15.5)	123 (↑ 11.5)	10	5	12 (↑ 4)

6. FNZ is satisfied that the current deemed value rates for rock lobster stocks (including CRA 7) provide sufficient incentives for fishers to balance their catch with ACE, consistent with section 75(2)(a) of the Act and FNZ's Deemed Value Guidelines. Therefore, no changes are proposed to the deemed value rates of CRA 7 at this time. However, FNZ welcomes any feedback on these settings.

7. For more information on the current management settings for CRA 7, see the Fisheries Infosite. For general information about fisheries management in New Zealand, see our fisheries management webpage, and our webpage about the Quota Management System (QMS).

Analysis of options

8. The *status quo* is not proposed as an option in this review for CRA 7. FNZ considers that maintaining the current allowance for other sources of mortality caused by fishing would not be appropriate because it does not align with the best available information about other mortality occurring in the fishery.

9. The current allowance of eight tonnes was set in 2022 based on estimates of illegal catch and handling mortality from the 2020/21 fishing year. Since the last TAC review, the combined estimate for illegal catch and handling mortality has increased to 11 tonnes. FNZ therefore considers that the allowance should be set at a minimum of 11 tonnes.

[3] While CRA 7 is managed under an April fishing year, CPUE is 'offset' to an October fishing year, to enable timely information to inform the management procedure and TACC changes (i.e. results of the first half of the current fishing year will be included when determining a TACC for the future year).

Option 1 – Modified status quo (2% TAC increase)

This option would disregard the CRA 7 management procedure and would set a modified status quo, with a small three-tonne increase to the allowance for other sources of mortality caused by fishing, to better reflect the current best available information on other mortality occurring in the fishery. It would not alter the customary Māori and recreational allowances, which appear to remain appropriate based on current harvest levels (see Table 2 below).

Benefits	Risks
• This option reflects a cautious approach, noting that the status of CRA 7 in relation to B_{MSY} cannot be reliably estimated (independently from CRA 8). • It would maintain current commercial utilisation and carries a lower sustainability risk than Option 2, including broader environmental and ecosystem impacts. • A panel of independent scientists who recently reviewed rock lobster assessment processes recommended that TACCs should not be increased based solely on CPUE-based management procedures (see '*Independent review of rock lobster assessment processes*'; in Part 3 for more information). This option places more weight on this recommendation.	• The option constrains commercial utilisation opportunities. It places little weight on the observed increase in CPUE and the combined assessment of CRA 7 and CRA 8 which suggests the stock is likely to be in period of high abundance. • The option disregards the CRA 7 management procedure, which the Minister agreed should be utilised from this year. This could diminish some stakeholders' confidence in the established management approach for the stock.

Option 2 – Implement management procedure (11.5% TAC increase)

This option would increase the TAC of CRA 7 by 15.5 tonnes. This includes a four tonne increase to the other sources of mortality allowance to align with best available information on other mortality occurring, and a 11.5-tonne increase to the TACC which aligns with the 2025 recommendation of the CPUE-based management procedure. This option would not alter the customary Māori or recreational allowances, which appear to remain appropriate based on current harvest levels (see Table 2 below).

Benefits	Risks
• The combined CRA 7 and CRA 8 stock was estimated in 2023 to be at 54% SSB_0 and assessed as very likely to be above the interim target of 40% SSB_0. This option places more weight on this estimate being above the interim target. • This increase reflects that there has been a recent increase in CPUE (Figure 2), and that the Fisheries Assessment Plenary has accepted this CPUE series as being an informative indicator of abundance for the stock. • The TACC under this option is based on a 2024 output from the accepted CRA 7 management procedure. This management procedure was successfully used up until 2020/21, resulting in biomass increases over an eight-year period. This provides FNZ greater confidence in its continued use. • The TACC increase under this option has potential to provide $1.17 million more in commercial revenue, compared to the 2024/25 fishing year.[4] The increase in revenue is likely to have some downstream benefits to associated business and communities, but the extent of these benefits is uncertain.	• This option and the management procedure do not take into account the risk of increased relative fishing pressure in CRA 7 from displacement of ~5.1% commercial fishing effort[5] that could occur from implementation of potential marine reserves in the southeast South Island. There is uncertainty as to how this increase may impact fishing in areas outside of the marine reserves. However, the proposed TAC increase is considered small, and ongoing CPUE updates allow for timely management response. • Some ecosystem functions of rock lobster, such as predation of kina, may be diminished with increased fishing pressure enabled under this option (see '*Interdependence of stocks*' in Parts 2 and 3 for more analysis on this). • A panel of independent scientists has expressed concerns about using CPUE-based management procedures to increase catch settings for rock lobster stocks, due to the risk of relying on CPUE as an indicator of vulnerable biomass. This option would not align with the panel's recommendation that TACCs should not be increased based on CPUE-based management procedures.

[4] Calculated from the difference between the projected landing revenue (from the extra TACC allocation) using the 2024/25 CRA 7 port price ($101.97 per kilogram), and the projected landing revenue for the current (2024/25) fishing year from CRA 7 ($11.37 million). Note the annual process for determining port price is governed by the Fisheries (Cost Recovery) Rules 2001 (SR 2001/229), which are based on a surveyed price supplied voluntarily by LFRs. The quantities used to calculate landing revenue include wharf sales and exclude loss from holding pots. The future calculations assume the full TACC is landed and not exceeded. No economic flow-on effects are quantified, such as impacts on processing and retail.

[5] Department of Conservation advice to Minister of Conservation on proposed marine reserves – relevant data is available here.

Who will be affected by the proposed changes?

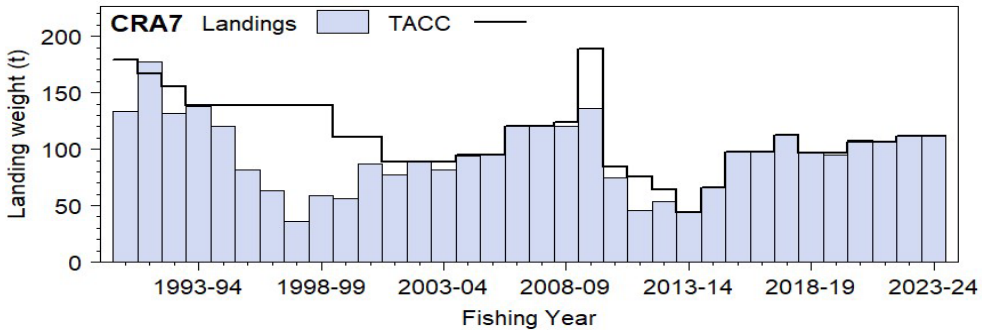
10. Rock lobster supports an important shared fishery in CRA 7. They are a taonga for tāngata whenua, a popular species for recreational fishers to catch, and support valuable export markets, regionally important industries, and employment.
11. Commercial interests include quota owners, vessel owner-operators and contract fishers in the catching sector, Licensed Fish Receivers (**LFR**s) (see Table 3 below) and retailers and exporters. The interests of these groups are represented through organisations such as the Otago Rock Lobster Industry Association (**ORLIA**) and the New Zealand Rock Lobster Industry Council (**NZ RLIC**).
12. Tāngata whenua have both commercial and customary interests in CRA 7. These interests are represented through Te Rūnanga o Ngāi Tahu, noting that the CRA 7 management area falls entirely within the rohe moana of Ngāi Tahu whānui. Ngāi Tahu is part of Te Waka a Māui me Ōna Toka Iwi Fisheries Forum and is also represented in the National Rock Lobster Management Group (**NRLMG**).[6]
13. Recreational interests in CRA 7 are represented by a range of individuals, groups such as the New Zealand Sport Fishing Council (**NZSFC**), Fish Mainland, and various local fishing clubs and associations.

Input and participation of tāngata whenua

14. The CRA 7 management area is relevant to the area of the Te Waka a Māui me Ōna Toka Iwi Fisheries Forum, and FNZ provided this forum with information on the proposed CRA 7 review. However, input and participation on the review was also sought directly from Ngāi Tahu whānui because the CRA 7 management area is entirely within the rohe moana of Ngāi Tahu.
15. Ngāi Tahu provided comments to FNZ expressing support for the management procedure, and Option 2, which is based on the management procedure's recommendation. Ngāi Tahu also noted that the proposed customary allowance of 10 tonnes (under all options) is appropriate and should adequately provide for customary take.
16. FNZ welcomes any further input from tāngata whenua on the proposed options.

Fishery characteristics and settings

Table 2: Fishery characteristics and settings for CRA 7.

Commercial (TACC)
17. The CRA 7 stock supports the sixth-largest rock lobster fishery nationally by catch volume (of nine stocks). The fishery extends from the Waitaki River south along the Otago coastline to Long Point (Figure 1). Commercially caught rock lobsters in CRA 7 are predominantly (>97%) caught in a targeted potting fishery. 18. During the current fishing year there was an event where more than a tonne of rock lobsters was caught by a commercial trawler. This was incidental catch and the lobsters were caught in an area they were not expected to be in, possibly during a migration event. 19. Landings of CRA 7 and the TACC since 1990 are shown in Figure 3 below.  **Figure 3: Annual commercial landings of CRA 7 (in tonnes) and the TACC since the 1990/91 fishing year.** 20. The CRA 7 TACC was set by the operation of various management procedures from the mid-1990s until the previous procedure from 2013 to 2020/21 (see *'History of the CRA 7 management procedure'* in Part 3 for more information). In the late 1990s, landings of CRA 7 were markedly lower than the TACC. The cause for this decline in landings is unknown, however climatic cycling (El Niño events) may have caused reduced

[6] The NRLMG is a national-level, multi-stakeholder group comprising representatives of customary, recreational and commercial fishing sectors, environmental interests, fisheries compliance, and FNZ.

recruitment. The COVID-19 outbreak, particularly the effective closure of the Chinese export market for a period, coupled with low prices for exports, also contributed to a slight under-catch of the TACC in 2019/20. In April 2022, following the results of the 2021 stock assessment, the TACC in CRA 7 was increased from 106.2 tonnes to 111.5 tonnes.

21. Table 3 below provides a summary of quota owners, permit holders, vessels, and LFRs who participate in the CRA 7 commercial fishery (as of the 2023/24 fishing year). This fishing year is lower than the 10-year average for all parts of the value chain except for the number of vessels landing the stock.

Table 3: Summary of quota owners, % settlement quota, permit holders, vessels landing the stock, and Licensed Fish Receivers (LFRs) involved with CRA 7 during the 2023/24 fishing year.

No. Quota owners	% of quota that is settlement quota	No. permit holders landing the stock	No. vessels landing the stock	No. LFRs landed to
25 (including 2 iwi entities)	10%	8	14	4

Customary Māori

22. Rock lobster (kōura papatea) is a taonga species for tāngata whenua. CRA 7 customary catch is provided for by the Fisheries (South Island Customary Fishing) Regulations 1999, through authorisations issued by appointed Tāngata Tiaki/Kaitiaki. Records of authorisations and catch are maintained and have been made available to FNZ up to 2020.

23. Based on information received from customary reports from the five years up to 2020, customary catch has fluctuated annually, with an average annual authorised amount of approximately 2,306 rock lobsters or 1.64 tonnes in CRA 7, using the average recreational weights for this area from the 2022/23 National Panel Survey. The current allowance for customary non-commercial fishing in CRA 7 is set above this level, at 10 tonnes.

24. FNZ considers that maintaining the allowance for CRA 7 at this level above current customary authorisations is appropriate. It considers that the current reported customary authorisations may not reflect the long-term needs of tāngata whenua, both for consumption and to provide for customary management objectives that express their exercise of kaitiakitanga, a consideration the Minister must give particular regard to when setting sustainability measures.

Recreational

25. The CRA 7 stock supports a small recreational fishery off the Otago coastline. Recreational fishers predominantly catch rock lobsters using targeted methods including hand-gathering by diving and potting. This can occur from shore-based diving, private vessels, Amateur Charter Vessels, or through recreational harvest taken by commercial vessels under section 111 of the Act. Most of the recreational catch is taken during the summer months, consistent with all other rock lobster stocks.

26. Recreational fishing is subject to a range of controls including gear restrictions (limits on the number of pots and escape apertures), a minimum legal size, prohibited states (it is illegal to collect females with eggs known as 'in berry' or soft-shell rock lobsters), daily limits, and area closures. The planned establishment of six new marine reserves on the southeast coast (currently subject to ongoing Judicial review) may also prohibit fishing in some recreationally important areas in CRA 7 in future. More information on these controls is provided in Part 2, Table 8 in the section on *'Existing controls'*.

27. Table 4 below provides the total estimated recreational harvest in CRA 7 from the last three years in which the National Panel Survey of Marine Recreational Fishers (**NPS**) was conducted.

Table 4: Summary of recreational catch information for CRA 7, including National Panel Survey (NPS) and Amateur Charter Vessel (ACV) catch estimates, and reported landings under section 111 (recreational catch landed by commercial fishers). Figures are in tonnes.

Year	NPS Estimate	ACV	Section 111	Total
2011/12	0.23 (CV=1.03)	-	0.08	-
2017/18	0.09 (CV=1.0)	-	0.53	-
2022/23	1.41 (CV=0.54)	0.03	2.24	**3.68**
2023/24	1.41 (CV=0.54) – based on 2022/23 estimate	0.08	2.42	**3.91**

29. Total recreational catch in 2023/24 was estimated to be 3.91 tonnes. This is based on the latest NPS estimate of recreational catch (for 2022/23) (Heinemann & Gray 2024) combined with reported Amateur Charter Vessel catch and section 111 data for 2023/24. It should be noted that there is a high level of uncertainty surrounding

the NPS estimate. While precision of the estimate has improved from previous surveys, uncertainty is still relatively high.

30. The current recreational allowance for CRA 7 is set at 5 tonnes, which is more than 1 tonne above the most recent estimate. FNZ considers that this allowance remains appropriate, but welcomes feedback on this view.

Other sources of mortality caused by fishing

31. Other sources of mortality caused by fishing in CRA 7 include illegal catch, handling mortality caused by the return of under-sized lobsters, berried female lobsters, and high-grading,[7] as well as predation on lobsters by predators within pots.

32. Fishers are required to report predation of lobsters in pots. While the reporting may underestimate quantities predated, overall mortality from predation in pots is expected to be negligible in CRA 7.

33. In 2024, the Rock Lobster Working Group (**RLWG**)[8] agreed to follow the 2020 stock assessment decision to model illegal catch in CRA 7 as 10% of the total commercial catch summed over the period 1945–1989, followed by 5% of the summed commercial catch from 1990 to 2019. Using this approach, the 2023 model estimated illegal catch in CRA 7 to be 3.9 tonnes. Handling mortality was estimated by the model to be 7 tonnes. Combined, this results in a total estimate of 10.9 tonnes for other sources of mortality caused by fishing.

34. The allowance for other sources of mortality caused by fishing in CRA 7 is currently set at 8 tonnes, having been increased from 5 tonnes in 2022. Given the most recent estimate of other mortality exceeds the allowance, FNZ is proposing that the allowance is adjusted under any TAC option to better reflect the current information. Under Option 1 (the modified status quo) this would mean setting the allowance at 11 tonnes, while under Option 2 it would increase slightly more to 12 tonnes in proportion to the proposed TACC increase under that option (noting that handling mortality is expected to increase accordingly).

Additional supporting information and legal context

35. In Parts 2 and 3 below there is additional information to support the above analysis and proposed options. Part 2 outlines our initial assessment of the proposed changes against provisions of the Fisheries Act 1996. Part 3 provides additional figures, and more detailed science and management information which informed our analysis in Parts 1 and 2.

36. In Part 2, the proposals have been assessed against sections 9, 10, 11, and 13 of the Act. There is also information on mātaitai reserves and other customary management tools which are relevant to the Minister's decision making under section 21(4).

37. For information on how the proposed changes meet the requirements of sections 5 (Application of international obligations and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992), and 8 (Purpose) of the Act, as well as detail on the statutory considerations relevant to TAC decisions, see the Legal Appendix on our consultation webpage.

How to have your say

38. We welcome your views on these proposals. Please provide detailed information and sources to support your views where possible.

- Which option do you support for revising the TAC and allowances of CRA 7? Why?
- If you do not support any of the options listed, what alternative(s) should be considered? Why?
- Are the allowances for customary Māori, recreational, and other sources of mortality appropriate? Why?
- Do you think these options adequately provide for social, economic, and cultural wellbeing?
- Do you have any concerns about potential impacts of the proposed options on the aquatic environment?
- Do you support the use of the management procedure in informing the TACC in CRA 7? Why?

39. FNZ invites you to make a submission on the proposals set out in this discussion document. Consultation closes at **5pm on Wednesday 29 January 2025**.

40. Please see the FNZ sustainability consultation webpage for related information, a helpful submission template, and information on how to submit your feedback. If you cannot access the webpage or require hard copies of documents or any other information, please email FMSubmissions@mpi.govt.nz.

[7] High-grading is the practice of selectively retaining fish so that only the best quality fish are landed to achieve the highest economic return. This means that some rock lobster which would be legal to land are returned to the water to maximise the quality of rock lobster that are landed.

[8] The Rock Lobster Working Group is a Science Working Group convened by FNZ. It includes input from fisheries scientists, subject matter experts and fisheries stakeholders.

Part 2: Initial assessment against relevant legal provisions

Overview

41. The tables below outline FNZ's initial assessment of the proposed changes against sections 9, 10, 11, and 13 of the Act. Information to support this assessment can be found in Part 3 (*Supporting information*). Information on kaitiakitanga, mātaitai reserves, and other customary management tools has also been provided – this is relevant to the Minister's decision making under sections 12(1)(b) and 21(4).

42. For information on how the proposed changes meet the requirements of sections 5 (Application of international obligations and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992), and 8 (Purpose) of the Act, as well as detail on the statutory considerations relevant to TAC decisions, see the Legal Appendix on our consultation webpage.

Initial assessment of the proposals against section 13 of the Act

43. Tables 5 below outlines FNZ's initial assessment of the proposed options for CRA 7 against section 13(2A) of the Act. This assessment has been informed by the best available information on the status of the stock (summarised in Part 1 under '*Rationale for review'* and detailed in Part 3 under *'Stock status information'*), and the information discussed in *'Information on biology, interdependence, and environmental factors'* within Part 3.

Table 5: Initial assessment of the proposed changes under section 13(2A) of the Act.

Section 13(2A)	44. Any change to the TAC of CRA 7 would be made under section 13(2A) of the Act. This is because it is not possible to reliably estimate the level of biomass required to support the maximum sustainable yield ($\mathbf{B_{MSY}}$) in CRA 7 independently of CRA 8. Adult rock lobster from CRA 7 migrate to CRA 8 soon after maturation, and the spawning capacity of this population is therefore not self-sustaining and dependent on that occurring in CRA 8. Due to this connectivity with the CRA 8 stock, an individual B_{MSY} target has not been agreed for CRA 7. 45. Under section 13(2A) of the Act the Minister is required to set a TAC for CRA 7 using best available information, and which is not inconsistent with the objective of maintaining the stock at or above B_{MSY}, while having regard to the interdependence of stocks, the biological characteristics of the stock, and any environmental conditions affecting the stock. 46. In the absence of a specific B_{MSY} target, the best available information on relative stock status for CRA 7 is the combined status of CRA 7 and CRA 8, and updated CRA 7 CPUE data (see Figure 2). The combined CRA 7 and CRA 8 stock was estimated to be at 54% SSB_0 in 2023, assessed as very likely to be above the interim target (40% SSB_0). The updated CPUE data suggests biomass in CRA 7 is increasing and shows that it is currently at a high level relative to the last three decades. Based on this information, FNZ's initial view is that both of the TAC options proposed for CRA 7, which would either maintain a modified status quo (Option 1) or apply a small increase to the TAC and TACC (Option 2), would not be inconsistent with the objective of maintaining the stock above B_{MSY}.
Harvest Strategy Standard	47. A management target has not been agreed for CRA 7. There is an interim target of 40% SSB_0 (unfished spawning stock biomass) and the default reference points of the Harvest Strategy Standard include a soft limit of 20% SSB_0 and a hard limit of 10% SSB_0. These reference points are used as interim limits for CRA 7; however, they have limited relevance given that there is no reliable estimate of B_{MSY} for CRA 7 and uncertainty as to where the biomass sits in relation to these default reference points.
Section 13(2A)(b) Interdependence of stocks	48. Rock lobsters are ecologically important predators in New Zealand's rocky reef ecosystems, where they can exert top-down regulation of prey populations such as molluscs, crustaceans, annelid worms, macroalgae, echinoderms, sponges, bryozoans, fish, foraminifera, and brachiopods.[9] **Urchin (kina) barrens** 49. There is evidence from northeastern New Zealand that reduced abundance of sea urchin predators (such as rock lobster) can contribute to the formation of urchin barrens[10]. However, it is uncertain whether the effects of fishing on sea urchin densities observed in northeastern New Zealand are as strong in the Otago region.

[9] MacDiarmid et al. (2013)

[10] urchin barrens are sea urchin dominated areas of rocky reef that would normally support healthy kelp forest but have little or no kelp due to overgrazing by sea urchins.

	50. Based on the limited information available, FNZ is unable to quantify the extent to which changes in rock lobster abundance in CRA 7 may affect the formation of urchin barrens and is unable to accurately quantify the risk of urchin barren formation relative to the proposed TAC options presented in this paper. However, while uncertain, this risk should be taken into account in setting the TAC. 51. A higher level of rock lobster biomass will provide greater confidence that the ecological role of rock lobster will be fulfilled, in the sense that higher biomass is likely to result in more kina predation by rock lobster. Logically, this means there would be less risk of ecological issues under Option 1 because rock lobster biomass would be maintained at a higher level. However, the difference in risk between the proposed options cannot be accurately quantified. 52. It should also be noted that the risk of urchin barren formation is unlikely to vary proportionally with changes in rock lobster abundance. There is reasonable evidence of ecological tipping points at which urchin barren formation occurs (but the biomass of rock lobster required to reach this tipping point is unknown). 53. Further information which has guided the above analysis regarding risk of urchin barrens can be found below in Part 3 under '*Urchin barrens and fisheries induced trophic cascades*'. **Interdependence between CRA 7 and CRA 8** 54. The movement of rock lobster between CRA 7 and CRA 8 requires consideration. Almost all of the mature females that support recruitment into CRA 7 are thought to be from the southern areas of CRA 8. Tagging data suggests that as juvenile lobsters in CRA 7 mature, they migrate back into the southern areas of CRA 8, and only a small proportion of the catch taken from CRA 7 is consequently comprised of mature females. 55. A TAC increase in CRA 7 could impact the CRA 8 fishery given that some migration of juvenile lobsters from CRA 7 to CRA 8 is thought to occur as they mature. However, the combined status of CRA 7 and CRA 8 is estimated to be well above the interim management target, and the increase to the CRA 7 TACC proposed under Option 2 is relatively small, so it is unlikely to have any significant impact for the CRA 8 stock (which supports a far higher TAC of 1,601 tonnes).
Section 13(2A)(b) Biological characteristics of the stock	56. Some biological characteristics of rock lobster (e.g. preference for specific habitat types required for settlement and adult life stages) make them more susceptible to environmental changes and fishing pressure. However, FNZ considers that the proposed TAC options (which would apply a modified status quo or small TAC increase) are sufficiently cautious considering these characteristics. FNZ also reiterates that biomass appears to be increasing in CRA 7.
Section 13(2A)(b) Environmental conditions	57. A variety of environmental factors are thought to influence the productivity of rock lobster populations, including water temperature, ocean currents, shelter availability, and food availability (see '*Environmental conditions affecting the stock*' in Part 3 below for more information).[11] 58. Preliminary analyses suggest that elevated water temperatures may have direct effects on rock lobster through temperature stress affecting their physiological condition[12] or indirect effects through impacts on associated habitats e.g., kelp forests. 59. Under the current environmental conditions, rock lobster stocks in CRA 7 and CRA 8 appear to be in a period of high recruitment (based on estimates in the rapid assessment update), and recruitment in CRA 7 is expected to remain high for at least the next few years. 60. If environmental changes occur in future and this affects recruitment in CRA 7, this will be reflected in the stock assessment. There are regular assessments (full assessments every five years and rapid assessment updates in between) in addition to the annual operation of the management procedure. These enable regular monitoring of the fishery and will allow for responsive changes to management measures if trends in recruitment or biomass of the stocks change.
Section 13(3) Factors to have regard to in considering the way and rate the stock is moved towards or above B_{MSY}	61. Section 13(3) is not considered relevant to the TAC decision for CRA 7 because the options only aim to maintain the stock at or above B_{MSY}. They are not intended to move the stock to a certain level in a certain way or rate.

[11] Linnane et al. (2010)
[12] Oellermann et al. (2020)

Kaitiakitanga

62. Information provided by forums, and iwi views on the management of fisheries resources and fish stocks, as set out in Iwi Fisheries Plans, are among the ways that tāngata whenua can exercise kaitiakitanga in respect of fish stocks.

63. Te Rūnanga o Ngāi Tahu does not have a fisheries plan; however, they have provided input into the fisheries plan of the Te Waka a Māui me Ōna Toka Iwi Forum. In this plan, rock lobster is listed as a taonga species. A few species that are bycaught in the CRA 7 fishery are also listed as a taonga species in the Forum's Fisheries Plan, these include octopus (wheke), conger eel (kōiro), and blue cod (rawaru).

64. The Te Waka a Māui me Ōna Toka Iwi Forum Fisheries Plan sets out objectives for management of fish stocks, objectives relevant to this review include:

    a) To create thriving customary non-commercial fisheries that support the cultural well-being of South Island Iwi and our whānau. This objective will be considered met when South Island Iwi are able to collect fisheries resources, according to their tikanga, throughout their takiwa/rohe.

    b) South Island Iwi are able to exercise kaitiakitanga. This objective will be considered met when the customary non-commercial fisheries legislative framework is implemented throughout the South Island in order to recognise and provide for the use and management practices of South Island Iwi, South Island Iwi are able to utilise their tikanga in the wider management of fisheries, and South Island Iwi Fisheries Settlement rights are actively protected by the Minister of Fisheries and FNZ.

    c) To develop environmentally responsible, productive, sustainable, and culturally appropriate commercial fisheries that create long-term commercial benefits and economic development opportunities for South Island iwi. This objective will be considered met when core commercial stocks are enhanced and sustained for future generations, development stocks are further advanced in order to provide broader commercial and economic development opportunities, and South Island Iwi support long-term development of Iwi fishers and implement succession planning initiatives for new Iwi fishers.

65. FNZ considers that the options proposed in this review contribute to progress towards the achievement of management objective (b) and are consistent with management objective (c) above.

66. As noted above, Ngāi Tahu expressed support for the management procedure and by extension, Option 2, suggesting that it aligns with their aspirations in relation to CRA 7. Ngāi Tahu also consider that the proposed customary allowance (under both options) is adequate to provide for customary needs.

67. FNZ is seeking further input from tāngata whenua on how the proposed options for CRA 7 may or may not provide for kaitiakitanga as exercised by tāngata whenua, and how tāngata whenua consider the proposal may affect their rights and interests in this stock.

Mātaitai reserves and other customary management tools

68. Section 21(4) of the Act requires that, when allowing for Māori customary non-commercial interests, the Minister must take into account any mātaitai reserve in CRA 7 that is declared by notice in the Gazette under regulations made for the purpose under section 186, and any area closure or any fishing method restriction or prohibition imposed under section 186A or 186B.

69. There are three mātaitai reserves and one taiāpure within CRA 7 (Table 6). Commercial fishing is not permitted in any of the mātaitai reserves in CRA 7. There are no bylaws in the mātaitai reserves to prohibit recreational or customary harvest of rock lobster.

70. There are no regulations in the East Otago Taiāpure relevant to rock lobster fishing.

Table 6: Mātaitai reserves and other customary management tools that apply to CRA 7.

Customary area	Management type
Moeraki Mātaitai Ōtākou Mātaitai Puna-wai-Toriki Mātaitai	**Mātaitai reserve** Commercial fishing is not permitted within mātaitai reserves unless regulations state otherwise.
East Otago Taiāpure	**Taiāpure** All types of fishing are permitted within a taiāpure. The management committee can recommend regulations to manage commercial, recreational, and customary fishing.

71. The TAC increase proposed under Option 2 for CRA 7 could result in increased commercial fishing effort. The effect of this on rock lobster abundance and availability in these customary areas is not known and cannot be reliably quantified. However, FNZ expects that any effect of the increase on availability of rock lobsters in these areas would be small given that the abundance in CRA 7 appears to be increasing, and the proposed TACC increase is modest.

Initial assessment of the proposals against section 9 of the Act

72. Table 7 below outlines FNZ's assessment of the proposed options for CRA 7 against the environmental principles in section 9 of the Act which the Minister must take into account when considering the TAC. This assessment has been informed by our knowledge of the current environmental impact of this fishery, which is discussed under *'Information on environmental impacts'* within Part 3 (*Supporting Information*).

Table 7: Initial assessment of the proposed changes under section 9 of the Act.

Associated or dependent species should be maintained above a level that ensures their long-term viability - Section 9(a) of the Act	73. The CRA 7 fishery has a low interaction rate with protected species such as seabirds, marine mammals, and benthic invertebrates due to the primary method being potting. 74. Potting fisheries can interact with marine mammals by entangling species such as humpback whales and orcas. However, no mammal interactions have been reported in the CRA 7 potting fishery in the last 10 years. Commercial fishers also have measures to avoid and reduce any impacts of potting for mammals (see '*Protected species*' in Part 3). In relation to seabirds, one decomposing shag was reported as caught in a rock lobster pot in CRA 7 in 2024/25. However, seabird interactions are very rare because pots are usually set too deep for seabirds to enter. 75. The most frequently reported incidental fish and invertebrate species caught as non-target catch in the CRA 7 target fishery are: carpet shark, octopus, conger eel, blue cod, banded wrasse, ling, sea perch, blue moki, wrasses, and red cod. Many of these species (blue cod, ling, red cod, sea perch, and blue moki) are managed under the QMS and are generally caught in small amounts that are unlikely to pose any sustainability concerns for those species (see further details in Part 3 under '*Fish and invertebrate bycatch*'). Carpet shark, octopus, conger eel, banded wrasse, and wrasses are not managed under the QMS. 76. Based on this available information, FNZ considers it highly unlikely that either TAC option for CRA 7 would threaten the long-term viability of any associated or dependent species.
Biological diversity of the aquatic environment should be maintained - Section 9(b) of the Act	77. The TAC options proposed for CRA 7 are unlikely to have a significant direct impact on biological diversity because the main fishing method used is potting, which is assumed to have very little direct effect on non-target species and the benthic environment. 78. However, as discussed under '*Interdependence of stocks',* rock lobster is an important rocky reef predator which can exert top-down regulation of prey populations, and fishing for rock lobster could therefore have indirect impacts for biological diversity. As noted above, in northeastern New Zealand it has also been demonstrated that fishing for predators such as rock lobster can contribute to the formation of urchin barrens, which are characterised as areas of lower biodiversity. This is discussed in more depth in Table 5 above and below in Part 3 under '*Interdependence of stocks'* and '*Biological diversity of the environment*'. 79. While the precise level of rock lobster biomass required to maintain biodiversity in this area is unknown, FNZ reiterates that rock lobster abundance in CRA 7 is at a high level relative to those over the last three decades and appears to be increasing at current fishing levels. It is expected that both proposed TAC options for CRA 7 would maintain abundance at a level that enables them to fulfil their important functional role in the environment.
Habitat of particular significance for fisheries management should be protected - Section 9(c) of the Act	80. There are three potential habitats of particular significance for fisheries management (**HoPS**) within the CRA 7 quota management area (described in Part 3 under '*Habitat of particular significance for fisheries management*'). However, rock lobster fishing is not known to overlap with any of these habitats. Rock lobster fishing is also primarily done via potting (and hand-gathering by diving for recreational fishing). Both methods are considered low benthic impact fishing methods, and FNZ has not identified any current adverse effects on these habitats caused by rock lobster fishing (so it is unlikely the TAC options proposed will impact them). 81. While FNZ does not currently have evidence available to support the identification of specific (spatially defined) areas of kelp-dominated habitat as habitat of particular significance for fisheries management, we recognise the likely importance of kelp-dominated habitat in supporting settlement, recruitment, and productivity of a number of species, including rock lobster.

Initial assessment of the proposals against section 11 of the Act

Table 8: Initial assessment of the proposed changes under section 11 of the Act.

The Minister must take into account:	
Effects of fishing on any stock and the aquatic environment – section 11(1)(a)	82. "*Effect*" is defined widely in the Act.[13] The direct effects of fishing for rock lobster need to be considered, as well as the indirect effects of this fishing on other species and the surrounding ecosystem. 83. Information about the direct effects of fishing for CRA 7 is described throughout this paper, particularly within Part 1 under '*Analysis of options*' and *'Fishery characteristics and settings'*. The direct effects of fishing for other stocks caught in the same fishery are summarised above in Table 7, and further detailed below in Part 3 under '*Fish and invertebrate bycatch'*. The indirect effects of fishing, for example, potential impacts of fishing on the food chain, are summarised under the '*Interdependence of stocks'* part of Table 5, and in the initial assessment of the proposed changes against section 9 of the Act in Table 7. Further background analysis about potential indirect effects is provided below in Part 3, under '*Interdependence of stocks'* and *'Information on environmental impacts'*. 84. The magnitude of the effects of fishing on CRA 7, associated stocks and species, and the wider environment, will vary depending on the CRA 7 TAC setting. Greater effects may occur under higher a TAC setting, and this is something the Minister must consider in their decision on this sustainability measure.
Existing controls that apply to the stock or area – section 11(1)(b)	85. A range of existing management controls apply to CRA 7. These are listed below and apply to recreational and commercial fishers unless noted otherwise. a. **Gear restrictions**: the use of spears for taking rock lobsters is prohibited. Recreational fishers are also prohibited from using spring loaded loops or lassos, or from using set or baited nets for taking rock lobster. b. **Number of pots (recreational only):** there is a maximum number of pots that may be used, set, or possessed in New Zealand fisheries waters on any day for recreational purposes. Recreational fishers are restricted to three pots. Two or more recreational fishers on a vessel are restricted to a combined total of six pots. c. **Escape apertures**: a fisher must not set, use, or possess on a vessel a rock lobster pot, unless the pot has at least two rectangular apertures (other than the mouth of the pot) through which undersize rock lobsters are able to escape. Each aperture must be wider than 54 mm and longer than 200 mm. d. **Must be measurable**: rock lobster must be possessed in a state that can be measured. e. **Size restrictions**: Commercial fishers can only take male and female rock lobsters at or above 127 mm tail length (approximately equivalent to 47 mm tail width for males and 48 mm tail width for females). Different size restrictions apply for recreational fishers; they can only take male lobsters with tails wider than 54 mm and females with tails wider than 60 mm. Further information on the differential MLS in CRA 7 can be found below in Part 3 under '*Differential minimum legal size (MLS)'*. f. **Prohibited states:** it is illegal to take or possess rock lobsters carrying external eggs (in berry), or rock lobsters in the soft-shell stage (post moulting). g. **Area closures:** There are several mātaitai reserves and a taiāpure within CRA 7 (see Table 6). Marine reserves are not fisheries management tools under the Act, but it is also worth noting that six marine reserves were recently approved in the South East Marine Protection Area which will affect fishing in CRA 7, particularly at Te Umukōau Marine Reserve. More information on these reserves can be found on the Department of Conservation (**DOC**) website here. The Minister of Conservation's decisions on these reserves are currently subject to ongoing judicial review. More information on the judicial review can be found on the DOC website here. h. **Daily limits (recreational only)**: no person may take or possess more than three spiny rock lobsters within the combined daily limit of six rock lobsters (spiny rock lobster and packhorse, *Sagmariasus verreauxii,* combined).

[13] Section 2(1) of the Act defines "effect" to mean the direct or indirect effect of fishing, and includes any positive, adverse, temporary, permanent, past, present, or future effect. It also includes any cumulative effect, regardless of the scale, intensity, duration, or frequency of the effect, and includes potential effects.

The natural variability of the stock – section 11(1)(c)	86. Rock lobster stocks generally have a high level of natural variability. Populations can fluctuate rapidly in response to changes in the environment, which can affect the recruitment, abundance, and availability of rock lobsters. This variability is taken into account in the stock assessments used to inform the development of TAC options. High levels of natural variability in abundance are also considered in broader management processes for rock lobster, with the use of management procedures and frequent assessment updates that enable responsive management changes. 87. Further information relevant to the natural variability of CRA 7 is described in Part 3 under '*Biological characteristics',* and environmental factors which can impact rock lobster abundance are discussed in Part 3 under '*Environmental conditions affecting the stock*'. 88. FNZ considers that both TAC options proposed for CRA 7 take into account the stock's natural variability, given that the options have been informed by an accepted stock assessment (combined assessment for CRA 7 and CRA 8) and CPUE data which has been accepted by the RLWG as an informative indicator of abundance.
Fisheries plans, and conservation and fisheries services – section 11(2A)	89. There are no fisheries plans approved under section 11(2A) specific to CRA 7, or of specific relevance to this review of the stock. **Fisheries and conservation services:** 90. Fisheries services of relevance to the options in this paper include the research used to monitor stock abundance, such as contracted projects for stock monitoring and stock assessment, tag deployment and recapture. In addition, fisheries services include the tools used to enforce compliance with management controls in the fishery. 91. FNZ notes that the CRA 7 fishery has not had historical observer or on-board camera coverage. However, there is some observer coverage underway in CRA 7 for the current fishing year. 92. Fisheries Compliance regularly monitors the area to ensure management controls are being adhered to.
The Minister must have regard to:	
Relevant statements, plans, strategies, provisions, and documents - section 11(2)	**Regional plans:** 93. The coastline within CRA 7 is within the jurisdiction of the Otago Regional Council. The Otago Regional Council has a policy statement and a regional plan; both of which are relevant to management of the coastal and freshwater environments within CRA 7, including terrestrial and coastal linkages, ecosystems, and habitats. 94. FNZ has reviewed the policy statement and regional plan, and the provisions that might be considered relevant can be found here. FNZ considers the proposed options for CRA 7 to be consistent with these provisions, which are of a general nature and focus mostly on maintaining the natural character and diversity of the Otago marine environment. There are no provisions specific to rock lobster.
Non-mandatory relevant considerations	
Other plans and strategies	Te Mana o te Taiao (Aotearoa New Zealand Biodiversity Strategy) 95. FNZ considers that the sustainability measures proposed for CRA 7 are generally consistent with relevant objectives of Te Mana o te Taiao – the Aotearoa New Zealand Biodiversity Strategy. This includes Objective 10, which is to ensure that ecosystems are protected, restored, resilient and connected from mountain tops to ocean depths; and Objective 12, which is to manage natural resources sustainably.

Information principles: section 10 of the Act

96. The best available information relevant to CRA 7 is presented throughout this paper, and uncertainties in the information have been highlighted where relevant. The table below provides an additional summary of the best available information and key areas of uncertainty, unreliability, or inadequacy in that information.

Table 9: Best available information and key areas of uncertainty for CRA 7.

Best available information
Stock status: 97. The best available information on stock status includes the 2021 stock assessment, the 2023 rapid assessment update, and the management procedure for this stock. **Customary, recreational, and illegal fishing estimates:** 98. The best available information regarding customary, recreational, and illegal fishing for rock lobster is presented in Table 2. Estimates of recreational catch are informed by three sources; reported section 111 catch for personal use by commercial fishers, reported catch from Amateur Charter Vessels for chartered recreational fishing, and the National Panel Survey (NPS) for 'private' recreational fishers. **Location and extent of urchin barrens:** 99. New Zealand Aquatic Environment and Biodiversity Chapter 13 '*Trophic and ecosystem-level effects*', and Report No. 324, *'Fishery-induced trophic cascades and sea urchin barrens in New Zealand: a review and discussion for management'* (Doheny et al, 2023), provide information on the role of fishing in the occurrence of urchin barrens in New Zealand.
Key areas of uncertainty, unreliability, or inadequacy
100. **Stock status/assessment**: A list of uncertainties that were noted at the time of the 2021 stock assessment are summarised in the 2024 November Plenary report, and are outlined as the following: a) Magnitude of early catch history and the distribution of early catch within two regions. b) The estimates of illegal catches and recreational catches for years without surveys are considered to be unreliable. c) The tag-based growth estimates provided by the model may not represent growth of the underlying population. d) A possible cryptic population of large males and mature females in Region 1.[14] e) The extent of movement between regions in the model is unknown. f) Selectivity in Region 1 is poorly known. 101. It is also not possible to reliably estimate B_{MSY} in CRA 7 independently of CRA 8, and as a result there is no agreed B_{MSY} target for CRA 7. **Customary, recreational, and illegal fishing estimates:** 102. There is a high level of uncertainty in the estimates of recreational and customary catch of CRA 7. The uncertainty in recreational catch is particularly high because the recreational fishery is small, and there are few participants from the fishery in the NPS survey. **Ecosystem impacts and urchin barrens:** 103. While rock lobsters are known to be ecologically important predators in New Zealand's rocky reef ecosystems which prey on a variety of different species groups, there is very little information regarding the strength of the associations between these species and relative influence of rock lobsters (and fishing for rock lobsters) on their abundance. 104. Based on the limited information available, FNZ is unable to quantify the extent to which changes in abundance in CRA 7 may affect the formation of urchin barrens, and unable to accurately quantify the risk of urchin barren formation relative to the proposed TAC options presented in this paper.

[14] However, there is currently no evidence to support the hypothesis that there is a substantive unexploited subpopulation of the stock elsewhere in CRA 7/Region 1.

Stock status information

105. The best available information for the status of CRA 7 consists of the last full CRA 7 and CRA 8 stock assessment conducted in 2021, a rapid update of the assessment conducted in 2023, and current CPUE data (Figure 2). A summary of the 2021 stock assessment and 2023 rapid update results is provided below. More detailed information on these results can be found within the 2024 November Fisheries Assessment Plenary.

2021 CRA 7 and CRA 8 full stock assessment

106. The full CRA 7 and CRA 8 stock assessment conducted in 2021 modelled CRA 7 and CRA 8 as one biological stock across two regions (Figure 4), because very few mature female lobsters are caught in CRA 7, with both sexes migrating from CRA 7 into CRA 8 as they become sexually mature. The two regions are defined in the assessment model as:

a) Region 1 (Otago/Southland): CRA 7 and statistical areas 922, 923, 924, and 925 of CRA 8; and

b) Region 2 (Fiordland): Statistical areas 926, 927, and 928 of CRA 8 (see Figure 4).

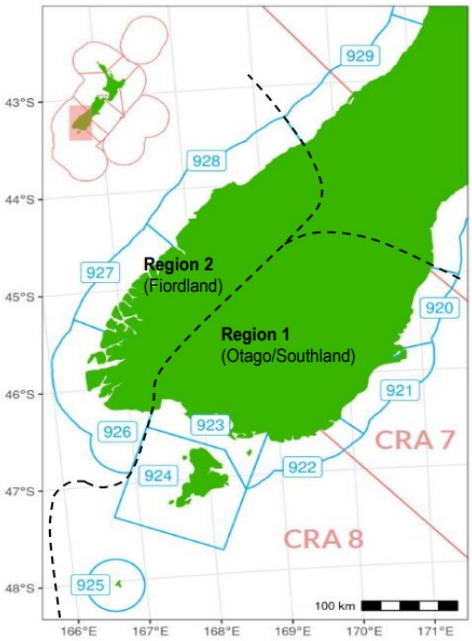


Figure 4: The CRA 7 (Otago) and CRA 8 (Southern) Quota Management Areas and statistical areas, showing approximate boundary of the two regions used in the 2021 CRA 7 and CRA 8 stock assessment model (black dashed lines).

107. The 2021 stock assessment suggested that, for the combined CRA 7 and CRA 8 fishery, the vulnerable biomass in both regions had increased substantially from the low levels experienced near the end of the 1990s. In 2021, the combined vulnerable biomass of CRA 7 and CRA 8 was estimated to be 146% (7,114 tonnes) of the B_{MSY} reference level (4,863 tonnes vulnerable biomass). The combined spawning stock biomass (**SSB**) in 2021 was estimated to be 48% of the unfished level (48% SSB_0).

2023 rapid assessment update

Background

108. The 2023 rapid assessment update for CRA 7 and CRA 8 incorporated a further two years of data into the 2021 stock assessment model. Stock status estimates from the 2023 rapid update were consistent with the projected estimates from the 2021 full assessment model. The rapid update indicated slightly higher biomass, attributable to higher than average recruitment in the years since the full assessment.

109. The best available information for the status of CRA 7 and CRA 8 changed in 2023; the November Plenary rejected the previous B_{MSY} target reference level (based on vulnerable biomass) estimate provided by the combined stock 2021 assessment, because it was not possible to calculate separate B_{MSY} reference level estimates for the CRA 7 and CRA 8 stocks from each other given the interdependent dynamics of these stocks in the 2021 full assessment model configuration. The B_{MSY} estimate for Region 1 (CRA 7 and some adjacent areas) was also considered to be implausibly low relative to levels estimated for other regions, and implausibly high for Region 2 (most of CRA 8).

110. In 2023, the November Plenary therefore recommended that the 40% SSB_0 default target (recommended by the Harvest Strategy Standard) should be used instead to provide some guidance on the status of the combined biological stock of CRA 7 and CRA 8, as well as CRA 8 individually. SSB_0 cannot be reliably estimated for the CRA 7 alone, because an unknown amount of adult lobster from this area migrate to CRA 8 soon after maturation. However, based on the status of the combined CRA 7 and CRA 8 stock, and considering that the biomass trajectory for each stock is similar, CRA 7 is considered likely to be at or above a level consistent with the management target.

Results

111. The 2023 rapid update estimated spawning biomass of the combined CRA 7 and CRA 8 stock to be 54% (10,232 tonnes) of unfished levels (19,026 tonnes) and very likely (>90% probability) to be above the 40% SSB_0 target (Figure 5).

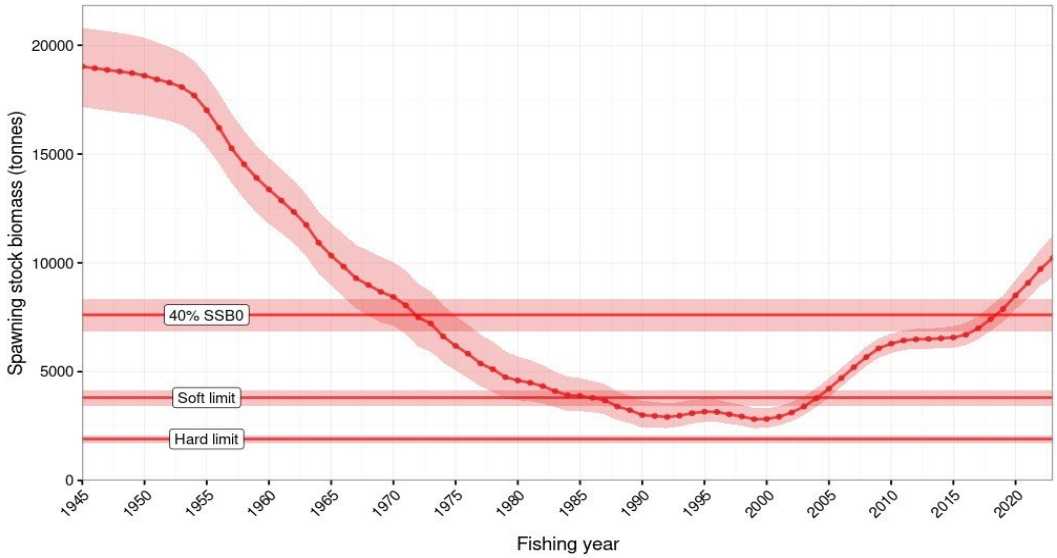


Figure 5: The 2023 rapid update estimates of trends in the spawning stock biomass (tonnes) in CRA 7 and CRA 8 since 1945. The solid line and points show the median and the shaded region indicates 90% credible intervals. The distributions of the interim target (40% SSB_0) and soft (20% SSB_0) and hard (10% SSB_0) limits are also shown.

112. The biomass of lobsters vulnerable to fishing (vulnerable biomass) was estimated to be 25% (8,367 tonnes) of the unfished level (33,942 tonnes) (see the Fisheries Assessment Plenary for relevant figure). As noted above, the current reference points for CRA 7 & 8 are based on spawning stock biomass rather than vulnerable biomass.

2024 Status of CRA 7 (Otago)

113. The biomass for CRA 7 cannot be reliably estimated separately from CRA 8, therefore, the best available information for the stock status of CRA 7 individually is standardised CPUE based on past Catch Effort Landing Return (**CELR**) and Electronic Reporting System (**ERS**) data.

114. The history of CRA 7 commercial CPUE is shown in Figure 2 (Part 1). The CPUE series uses offset year which is defined as the last six months of a fishing year combined with the first six months of the following year (1 October to 30 September). CPUE in CRA 7 has been increasing since a low point in the late 1990s. The overall trend since the 1990's suggests that abundance of rock lobster in CRA 7 has increased in the last decade and remains high compared to historical levels. Between 2008 and 2012, CPUE decreased but then increased over the following decade, reaching over 3.0 kg/potlift in 2022. In 2022/23, CPUE decreased to 2.5 kg/potlift. However, the most recent estimate in 2023/24 showed a further increase to 3.1 kg/potlift.

CRA 7 management procedure

115. As noted in the introduction of this paper, a management procedure (also known as a harvest control rule) is a set of 'decision rules' that can be used to guide the setting of commercial catch limits (TACCs) based on changes in abundance (in this case, measured by changes in commercial CPUE).

116. Management procedures do not automatically predetermine or decide the catch limit settings for stocks. They help to guide when, and how, catch limit reviews are considered. If a TAC or TACC change is required, this is still subject to the usual process of consultation, and the Minister is required to make a decision via a sustainability

round process. Following consultation, the Minister maintains discretion in deciding on catch limit settings that they consider meets the statutory requirements of the Act.

Background

117. Earlier this year, as part of the April 2024 sustainability round, the Minister agreed that FNZ should use a management procedure to guide setting of the TAC in the CRA 7 fishery (through to the 2027/28 fishing year).

118. This management procedure is an updated version of a previously accepted procedure that was used in management of the CRA 7 fishery between 2013/14 and 2020/21. The procedure is based on CPUE data that has been calculated following new and improved standardisation methods. The procedure uses annual offset-year CPUE estimates, which are calculated from fishery data reported between 1 October to 30 September each year. This data is offset ahead by six months from the statutory 1 April to 31 March fishing year, allowing the most recent six months of data of the active fishing year to be incorporated into the management procedure.

119. Specifications of this management procedure, including key assumptions of the model can be found within FNZ's 2024 advice on its application here.

History of the CRA 7 management procedure

120. Management procedures operated in the CRA 7 fishery from 1996/97 until the 2020/21 fishing year. During 2020, management procedures were halted for all rock lobster stocks following the implementation of electronic reporting of catch and effort information in 2019. In 2020, the Rock Lobster Working Group (RLWG) reviewed the data from the first year of electronic reporting (1 April 2019 to 31 March 2020) and compared the electronic reporting system data with that generated from the previous paper reporting system. The RLWG concluded that CPUE estimated under the new electronic reporting system was likely to differ from CPUE estimated under the paper form system and was not comparable. The reasons for this included data being collected on a different spatial and temporal scale, against a large number of new reporting codes, using different reporting platforms and some issues with operators incorrectly interpreting the new reporting requirements.

121. The disruption to the time series of CPUE data meant that previously used management procedures could not be operated, as they rely on a consistent time series of CPUE. In 2023, the November Plenary approved alternative CPUE series for the CRA 7 and CRA 8 fisheries, allowing the adoption of management procedures to be considered again in both fisheries. The Plenary agreed that the ERS CPUE series in CRA 7 was reliable due to the higher quality and consistency of reporting by fishers in this quota management area, allowing a further extension of the previously used CELR CPUE time series index.

122. Table 10 below provides a summary of the historical management procedure outputs for CRA 7, including CPUE estimates, management procedure results, and TAC and TACC settings for each fishing year.

123. FNZ notes that the management procedures were successfully used up until 2020/21, resulting in biomass increases over an eight-year period. This previous experience with the successful application of these procedures provides a greater degree of confidence in their continuing use to inform the management of the CRA 7 fishery.

Table 10: History of the CRA 7 management procedure. 'Rule result' is the result of the management procedure after operation of all its components.

Year of analysis	Applied to April fishing year	Offset year CPUE at time of analysis (kg/potlift)	Rule result TACC (tonnes)	TAC (tonnes) set by the Minister	TACC (tonnes) set by the Minister
2012	2013/14	0.625	43.96	64	44
	2014/15	1.356	66.00	86	66
2014	2015/16	2.304	97.7	117.7	97.7
2015	2016/17	2.212	97.7	117.7	97.7
2016	2017/18	2.766	112.5	132.5	112.5
2017	2018/19	2.328	98.5	117	97.0
2018	2019/20	2.292	97.3	117	97.0
2019	2020/21	2.567	106.2	126.2	106.2
2020	2021/22	-	-	126.2	106.2
2021	2022/23	-	-	134.5	111.5
2022	2023/24	-	-	134.5	111.5
2023	2024/25	2.503	111.5	134.5	111.5
2024	2025/26	3.105	123.4	-	-

Management procedure output for the 2025/26 fishing year

124. A graphic representation of the CRA 7 management procedure is provided below in Figure 6. The graph shows the proposed TACC for the next fishing year as a function of CPUE in the current year. Under this management

procedure, a CPUE of 3.1 kg/potlift in 2023/24 would indicate that the TACC for 2025/26 should be set to 123 tonnes, a recommended 11.5 tonne (~9%) increase to the current 111.5 tonne TACC. This is above the accepted minimum change threshold of 10%.

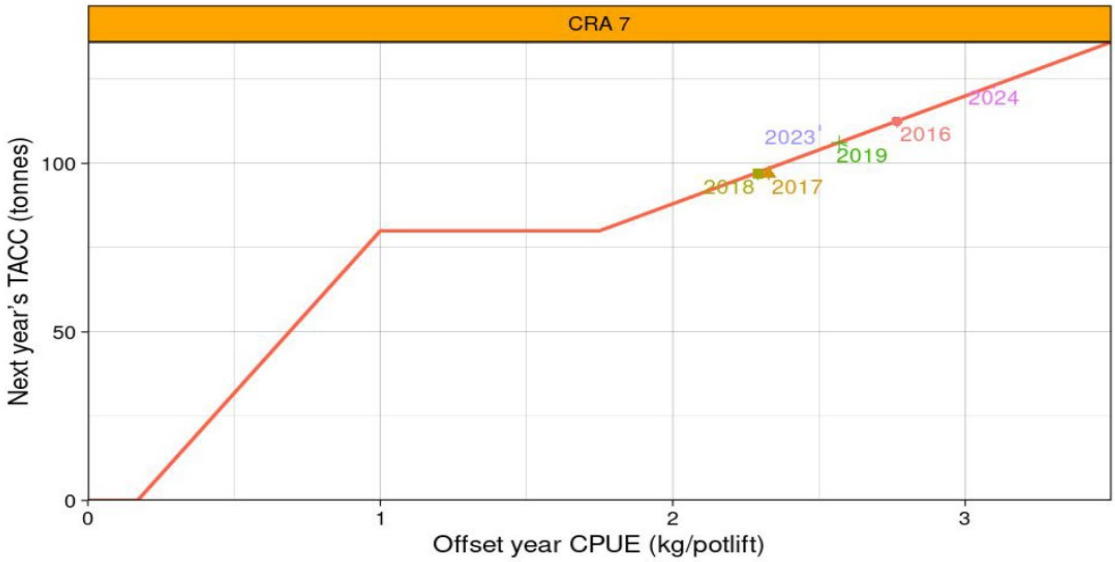


Figure 6: Graphic representation of the CRA 7 management procedure, showing the Total Allowable Commercial Catches (TACCs) resulting from evaluations performed since 2016 (shown as coloured shapes). The most recent evaluation in 2024 for the 2025/26 fishing year is shown in purple.

Independent review of rock lobster assessment processes

125. In 2024 an international, fully independent panel of three scientists met to evaluate the assessment methods and processes used to inform the management of rock lobster stocks in New Zealand. This included a review of the assessment models used, associated biological reference points, management procedures, and the use of rapid assessment updates. The panel established a series of 25 recommendations for future work to improve the assessment processes used. A full report with details of these recommendations was published in August 2024, and is available on MPI's website here.

126. FNZ is still working through the panel's recommendations and their potential implications for the assessment processes moving forward.

127. Some of the recommendations, particularly those which relate to the use of CPUE-based management procedures, are relevant to this review. The panel expressed concerns about current management procedures being reliant on CPUE and the assumption that increases in the CPUE are directly related to increases in the stock's vulnerable biomass. They viewed the use of these management procedures as inherently risky. They recommended that if using them, it should be demonstrated that increased risk is not occurring and suggested that they only be used to keep the TACC stable or to decrease it (i.e. not used for TACC increases). The panel also noted that management procedures based on rapid assessment updates would be preferred as a way of managing the resources in between full assessments, but that approach is not directly applicable to the CRA 7 stock on its own, as the most recent assessment for this area is for both CRA 7 and CRA 8 combined.

128. In this review, Option 2 for CRA 7 proposes to increase the TACC in line with the operating CPUE-based management procedure. FNZ acknowledges that this would be contrary to the panel's recommendation that procedures should only be used to keep the TACC stable or decrease it. FNZ has outlined this as a risk under Option 2, and recognises that it will need to be considered by the Minister in their CRA 7 TAC decision for 2025.

129. FNZ has not reached a final position on the management procedure, but notes that the previous successful operation reduces any sustainability risk that might occur from using a CPUE-based procedure.

Differential minimum legal size (MLS)

130. In CRA 7, differential Minimum Legal Sizes (**MLSs**) apply for commercial and recreational fishers. Commercial fishers can take male and female rock lobsters at or above 127 mm tail length (approximately equivalent to 47 mm tail width for males and 48 mm tail width for females) at any time of year. Recreational fishers can only take male lobsters with tails wider than 54 mm and females with tails wider than 60 mm.

131. In 2012, the previous Minister agreed to retain the commercial differential MLS in both CRA 7 and CRA 8, because the differentials were not considered to impact on stock sustainability (the sizes are taken into account in stock assessments), and because of the significant economic impact that any increase in size would have.

132. In 2014, the government then decided against allowing recreational fishers to take rock lobsters at the lower commercial minimum legal size in CRA 7 and CRA 8, because of compliance and enforcement challenges associated with a differential size regime for recreational fishers. However, at the time, the commercial sector (and NRLMG sector members) supported recreational fishers having access to the same MLS limited population as commercial fishers.

133. FNZ is not proposing to review the CRA 7 differential MLS at this time but welcomes feedback on the differential MLS.

Information on biology, interdependence, and environmental factors

134. This information supports FNZ's initial assessment of the proposals against section 13 of the Act in Part 2 (*Assessment against relevant legal provisions*). Information in this section was derived from the November 2024 Fisheries Assessment Plenary and the Aquatic Environment and Biodiversity Annual Review (**AEBAR**), except where cited otherwise.

Interdependence of stocks

135. Rock lobsters are ecologically important predators in New Zealand's rocky reef ecosystems, where they can exert top-down regulation of prey populations.[15] They consume a broad range of prey, including molluscs, crustaceans, annelid worms, macroalgae, echinoderms, sponges, bryozoans, fish, foraminifera, and brachiopods.[16] They strongly prefer soft-sediment bivalves over rocky reef prey and make nocturnal foraging movements away from the reef.[17] Their feeding rates vary seasonally in relation to moulting and reproductive cycles.[18]

136. There is evidence to suggest that predators, including rock lobsters, when at sufficient abundance and size structure can have a significant role in mitigating urchin barrens, which are less biologically diverse environments than the kelp forest habitats they replace. While rock lobsters prefer soft-sediment bivalves over urchins and consumption of kina varies seasonally, they are one of the few predators that can eat large kina.[19] Laboratory experiments found that predation on large sea urchins is limited to large rock lobsters.[20] The presence of rock lobster can also influence urchins indirectly. A study by Spyksma et al. (2017) in northern New Zealand found that increased presence of predators such as rock lobster and snapper inside marine reserves increases cryptic behaviour (hiding in crevices) by sea urchins. The relationship between rock lobster and urchin barrens in relation to CRA 7 is discussed further below under '*Urchin barrens and fisheries induced trophic cascades*'.

137. Predation on rock lobsters is known to occur from a variety of fish species. Published scientific observations support predation upon small to medium rock lobsters by octopus, rig, blue cod, grouper, southern dogfish, seals, and by other rock lobsters.[21] The relative influence of these predators is poorly understood, and the extent to which predation affects abundance in CRA 7 is not known. Harvests of rock lobster from fishing would reduce food availability for these predators. However, these species all have relatively broad diets, and it is unlikely that any of these species are entirely dependent on rock lobster as a food source.

Urchin barrens and fisheries induced trophic cascades

138. Much of the available information relating to urchin barrens comes from CRA 2 (Hauraki Gulf/Bay of Plenty). However, the studies from CRA 2 are not directly comparable to CRA 7 because of environmental differences between the regions.[22] In CRA 7, the environment is relatively turbid, productive, has high wave energy, and the predominant kelp is *Macrocystis spp.* and *Durvillaea antarctica* or bull kelp (rimurapa). On the other hand, CRA 2 is less exposed, has clearer water, and the predominant kelp is *Ecklonia radiata*.

139. It is also worth noting that along the Otago coast in CRA 7, kina have historically been uncommon, being found in isolated aggregations, possibly as a result of sporadic recruitment.[23] A survey of kina abundance was conducted in

[15] Pinkerton et al. (2008) and Pinkerton et al. (2015)
[16] MacDiarmid et al. (2013)
[17] Flood (2021)
[18] Kelly et al. (1999)
[19] Flood (2021) and Andrew & MacDiarmid (1991)
[20] Andrew & MacDiarmid (1991)
[21] MacDiarmid et al. (2013)
[22] Wing et al. (2022)
[23] Barker (2001)

2024 by fishers without formal scientific training.[24] The results of the study indicated possible high localised abundances of kina in regions of the north Otago coastline. This survey supported an increase to the TACC for the kina fishery on the south east coast of the South Island (SUR 3) in October 2024. FNZ noted at the time that there was uncertainty in the biomass estimates and that the survey design may have resulted in overestimation of kina biomass. In addition, there was conflict between the high biomass estimates from the survey and information from tāngata whenua, including the East Otago Taiāpure Committee which noted kina have become increasingly difficult to access.

140. The majority of literature on the causes of urchin barrens focuses on reefs in northern New Zealand where fishing effects on top predators of kina are considered a primary factor. The occurrence of urchin barrens may also be influenced by a range of other factors, such as environmental and climatic influences, species' demographics, and catchment-derived sedimentation. The extent of urchin barrens and relative importance of contributing factors varies regionally across New Zealand.[25] It should be noted that multiple causality or limited information specific to the CRA 7 region does not mean that effects that are manageable at this time should be ignored, i.e., the presence of other factors that may have a role to play, does not mean the impact of fishing can be disregarded.

141. Urchin barrens have been reported to occur in parts of southern New Zealand, although the majority of research has been done in Fiordland. Along the Otago coast (in CRA 7) bottom-up forces like marine heatwaves and land-based inputs may play a stronger role in controlling kelp cover than fishing-effects on the food web as observed in other parts of the South Island.[26] However, if environmental stressors such as marine heatwaves reduce kelp density (as they have in recent years in the South Island[27]) then a trophic cascade may be more likely to occur[28] and maintaining lobsters at high abundance could help support a more resilient ecosystem.

142. While there is uncertainty in the threshold of abundance and size structure of rock lobster required to reverse or prevent further spread of urchin barrens, the best available information suggests CRA 7 biomass has increased substantially over the past few decades.

Interdependence of CRA 7 and CRA 8

143. The CRA 7 and CRA 8 stocks are considered to comprise one biological stock. Almost all of the mature females that support recruitment into CRA 7 are thought to be from the southern areas of CRA 8. Tagging data suggests that as juvenile lobsters in CRA 7 mature, they to migrate back into the southern areas of CRA 8, and only a small proportion of the catch taken from CRA 7 is consequently comprised of mature females. CRA 7 and CRA 8 are assessed concurrently to account for this interdependence. FNZ recognises that a TAC decision for one of these two stocks can have an influence of the future stock status of its neighbouring stock.

Biological characteristics

Distribution and movement

144. Rock lobsters are mainly found on reef habitat and sometimes on sandy seafloor down to 200 m water depth.

145. Adult rock lobsters are generally considered to have a small home range once settled (i.e., less than 5 km). However, they also exhibit patterns of movement at various life stages. This includes movement into shallow water seasonally for moulting and mating, and females move to the edges of reefs to spawn their eggs. Some migrations consist of large numbers of rock lobsters moving together.

146. Long-distance migrations (>100 km) of rock lobsters have been observed within CRA 7 and CRA 8, between Otago and Stewart Island and Fiordland.[29] During spring and early summer, variable proportions of usually small males and immature females move against the current from the east and south coasts of the South Island towards Fiordland and south Westland (i.e., out of CRA 7 into western regions of CRA 8).[30] Tagging data suggests that females in CRA 7 migrate to CRA 8 Fiordland statistical areas prior to reaching maturity.[31] This is supported by the observation that mature females are absent from catches in CRA 7 and the Southland/Stewart Island statistical areas of CRA 8.[32]

[24] McKenzie et al. (2024)
[25] Schiel (2013) and Wing et al. (2022)
[26] Udy et al. (2019) and Wing et al. (2022)
[27] Tait et al. (2021) and Thomsen et al. (2019)
[28] Foster and Schiel (2010)
[29] Kendrick & Bentley (2003)
[30] Annala (1983)
[31] McKoy (1983)
[32] McKoy (1983)

Growth, maturity, and reproduction

147. Although there is currently no way of reliably estimating a rock lobsters' age, they are thought to be relatively long-lived. Individuals in Australia are considered to live at least 20 years.[33]

148. Female rock lobsters produce eggs once a year and can produce between 40,000 to 600,000 eggs in a single reproductive event, with larger females producing more eggs than smaller females.[34] Eggs incubate for 3 to 4 months on the underside of the female's tail, held in place by small hairs.[35]

149. Mating occurs in autumn, with the eggs hatching in spring. Larval development can last 12 to 24 months and occurs far offshore.[36] Because of the long larval life of rock lobsters, the origins of larvae are difficult to determine. Larvae hatched in one area may be retained in that area by local eddy systems, carried to other areas by currents, or lost to New Zealand entirely. For most areas, larvae may originate a considerable distance from the settlement site.

150. After the larval phase, puerulus settle on coastal rocky reef and less frequently on complex seaweeds and bryozoans. Rocky reef in shallow water less than 20 metres deep is critical settlement habitat for rock lobsters and provides the conditions and substrates key for kelp habitat in New Zealand.[37] Pueruli of rock lobsters use chemical cues associated with coastal waters to help locate settlement habitats.[38]

151. Evidence from Australia suggests that kelp habitat is important for rock lobster settlement, and that declines in kelp habitat could negatively affect rock lobster productivity.[39] For example, in Tasmania juvenile rock lobster showed increased recruitment and survival in kelp compared to long-spined urchin barren habitat[40] and larger reefs with kelp appear critical to the recruitment of rock lobsters.[41] Kelp increases structural complexity and provides habitat and food for prey species of rock lobster. Kelp is also consumed directly by rock lobster.[42]

152. In New Zealand, pueruli have been observed to detect and respond to both underwater sounds (acoustic cues) and substrate or chemical cues from different habitats, with seaweed and rock substrates increasing settlement and speeding up moulting.[43] Underwater sounds can provide orientation cues for pelagic crustacean larvae, expedite settlement and initiate settlement behaviour.[44]

153. Juvenile rock lobster are more vulnerable to predation in urchin barrens compared to kelp habitats during the day and potentially during dusk/dawn, but not during the night when they are typically active.[45] Kelp habitats also provide more of the preferred invertebrate prey for juvenile lobsters,[46] potentially increasing nutrition and growth, further research is required to confirm this relationship.

154. Recent analysis indicates a potential relationship between sea surface temperature and rock lobster recruitment, where relatively warm years were associated with poorer recruitment in northern regions.[47]

Environmental conditions affecting the stock

155. Various environmental factors are thought to influence the productivity of rock lobster populations, including water temperature, ocean currents, shelter availability, and food availability.[48] Rock lobster grow at different rates around New Zealand and female lobster mature at different sizes.[49]

156. Rock lobster spend an extended time in the planktonic larval phase, swimming and drifting in the ocean for up to 24 months. Therefore, larvae hatched in one area may be retained in that area by local eddy systems, carried to other areas by currents, or lost to New Zealand entirely. For most areas, larvae may originate a considerable distance from the settlement site. The number of 'puerulus', the final planktonic developmental phase of rock lobster, that settle to the sea floor varies among areas and from year to year.

[33] Linnane et al. (2020)
[34] Green et al. (2009)
[35] Kelly et al. (1999)
[36] Bradford et al. (2014); Chiswell & Booth (2008)
[37] Booth et al. (1991)
[38] Hinojosa et al. (2018)
[39] Hinojosa et al. (2015); Hinojosa et al. (2018); Shelamoff et al. (2022)
[40] Hinojosa et al. (2015)
[41] Shelamoff et al. (2022)
[42] MacDiarmid et al. (2013)
[43] Stanley et al. (2015)
[44] Stanley et al. (2012)
[45] Hesse et al. (2016)
[46] Taylor (1998)
[47] Roberts & Webber (2024)
[48] Linnane et al. (2010)
[49] Annala (1983)

157. Puerulus settlement may be affected by environmental factors such as the amount of suitable habitat available, the persistence of storms, prevailing ocean currents, sea temperature, food availability, and predation. Large numbers of puerulus larvae also die before reaching suitable habitat, which is due in part to predation, but may also be a result of unfavourable environmental conditions.

158. Evidence from Australia suggests that kelp habitat may be critical to the settlement success of rock lobster (*Jasus edwardsii*) pueruli, providing important settlement cues, food, and refuge.[50] The same relationship has yet to be observed in New Zealand[51] and further research is needed to test this. However, given the similarity between ecosystems in Tasmania and New Zealand these potential relationships are important to consider for the management of rock lobster. Kelp does support both food sources and shelter for later life stages of rock lobster in New Zealand,[52] suggesting the health of coastal kelp forests is likely tightly linked to the health of the rock lobster population.

159. Information on variability in rock lobster growth, size at maturity, available abundance, mortality, and recruitment is incorporated into the stock assessments that inform rock lobster management.

160. As noted above, rock lobsters in CRA 7 migrate to CRA 8 around the onset of maturity. Because of this migratory behaviour, lobsters in CRA 7 are a transient population and generally only remain in the fishery for two years. This means the abundance of rock lobster in CRA 7 is highly dependent on recruitment from other stocks. As a result, biomass in CRA 7 can vary with recruitment. Fluctuations in CPUE and historical landings over time are consistent with this trend. However, FNZ regularly monitors stocks to assess for variation in recruitment and abundance.

161. CRA 7 and CRA 8 appear to be in a period of high recruitment (based on data from puerulus settlement surveys and estimates in the rapid assessment update), and therefore abundance of both stocks is expected to remain high for at least the next few years. However, if recruitment were to decrease then the biomass in CRA 7 may in turn decrease. Annual biomass assessments (through full stock assessments and rapid assessment updates) and the annual operation of management procedures will provide regular monitoring of the fishery and allow for responsive changes to management if trends in recruitment or biomass of the stocks change.

Climate change

162. The ocean around New Zealand is, in some regions, warming at a rate well in excess of the global average.[53] While the extent to how this will impact the wider ecosystem is unknown, it can be expected that there will be an impact on rock lobster, including their spatial variability.

163. Recent assessment indicates a potentially negative relationship between sea surface temperature and rock lobster recruitment in northern New Zealand.[54] This work is preliminary and requires further investigation, however this could be a significant development.

164. Organisms such as rock lobsters are particularly susceptible to ocean acidification because it lessens their ability to lay down calcified body structures during each moult.[55]

165. Changes to ocean circulation patterns also have the potential to affect the recruitment of the rock lobster, given the extended larval stage.

166. Extended periods of extremely warm ocean temperatures known as marine heatwaves are increasing in intensity and frequency across the globe with trends predicted to accelerate under future climate change. New Zealand experienced several extended periods of marine heatwaves in recent years,[56] causing a range of impacts including temporary southern migrations of warm-water fish and loss of ecologically important seaweeds.[57] During the summer of 2022/23, the Otago Peninsula (in CRA 7) experienced sea surface temperatures that were more than 5°C above the long-term average. Marine heatwaves may have direct effects on rock lobster through temperature stress affecting their physiological condition[58] or indirect effects through impacts on associated habitats e.g., kelp forests.

167. Research from Tasmania suggests potential linkages between kelp forest quality and rock lobster recruitment and survival. Reduction in kelp habitat within CRA 7 from MHWs or sedimentation may negatively impact rock lobster productivity within CRA 7.

[50] Hinojosa et al. (2015), Hinojosa et al. (2018) and Shelamoff et al. (2022)
[51] Stanley et al. (2015) and Hesse et al. (2015)
[52] MacDiarmid et al. (2013)
[53] Sutton & Bowen (2019)
[54] Roberts & Webber (2024)
[55] Bell et al. (2023) and Hepburn et al. (2011)
[56] Salinger et al. (2019) and Bell et al. (2023)
[57] Thomsen et al. (2019), Salinger et al. (2020) and Thomsen et al. (2021)
[58] Oellermann et al. (2020)

Information on environmental impacts

168. This information supports FNZ's assessment of the proposals against section 9 of the Act in Part 2 (*Initial assessment against relevant legal provisions*).

Protected species

Seabirds

169. Management of seabird interactions with New Zealand's commercial fisheries is guided by the National Plan of Action - Seabirds 2020 (**NPOA-Seabirds**). The NPOA-Seabirds sets out the New Zealand government's commitment to reducing fishing-related captures and associated mortality of seabirds. The vision of the NPOA-Seabirds is that New Zealanders work towards zero fishing-related seabird mortalities. Management actions and research under the NPOA-Seabirds are guided and prioritised based on the seabird risk assessment that breaks down the risks to seabird population by fishery groups. The most recent seabird risk assessment was published in 2020.

170. In the last 10 years, one seabird (a decomposing shag) was reported as caught in a rock lobster pot in CRA 7 (during in the 2024/25 fishing year). Interactions with seabirds is generally low in the fishery due to the primary method being potting, with pots usually set too deep for seabirds to enter.

Mammals

171. In New Zealand waters, marine mammal entanglements with pot fishing gear have been documented since 1980. A recent study on cetacean interactions with pot fisheries found that from 1980 to the present, one to two entanglement events of cetaceans per year were reported on average.[59] However more recently, from 2010 – 2020, an average of four to five entanglement events per year have been recorded.

172. Nationally, the most recorded entanglements over time have involved humpback whales, followed by orca. In CRA 7, there have been no interactions reported in the last 10 years.

173. Guidance for commercial pot fishers has been distributed by the New Zealand Rock Lobster Industry Council (**NZ RLIC**). This guidance includes proactive approaches to reduce the risk of cetacean entanglements with fishing gear, providing information on whale identification, best practise approaches to mitigation and reporting requirements.

174. The Hector's and Maui dolphin Threat Management Plan 2020 guides management approaches for addressing both non-fishing and fishing-related impacts on Hector's and Māui dolphins. To date, with regard to the rock lobster fishery, there have been no reported interactions with Hector's or Maui dolphins in CRA 7. The residual risk to the Hector's and Māui dolphin from potting in CRA 7 is also considered to be low.

Fish and invertebrate bycatch

175. When rock lobsters were targeted in CRA 7 from the 2019/20 fishing years until now, the ten most frequently reported incidental species caught in the CRA 7 target fishery were: carpet shark, octopus, conger eel, blue cod, banded wrasse, ling, sea perch, blue moki, wrasses, and red cod. BCO 3, LIN 3, RCO 3, SPE 3, and MOK 3 are managed under the QMS. BCO 3 is very unlikely to be at or below the target. Over the last 5 fishing years, about 800 kg of BCO 3 has been reported as bycaught per year in the CRA 7 fishery. LIN 3 and RCO 3 are considered to be sustainable under current catch levels. The status of SPE 3 in relation to management targets is unknown, however only an average of 126 kg of SPE 3 has been reported as bycaught in CRA 7 annually since 2019/20. In 2017, MOK 3 was estimated very likely to be below target and only 145 kg has been reported on average annually as bycatch in CRA 7 since 2019/20. Carpet shark, octopus, conger eel, banded wrasse, and wrasses are not managed under the QMS.

Biological diversity of the environment

176. Potting is the main method of targeting spiny rock lobster commercially and is assumed to have very little direct effect on non-target species. FNZ is not aware of any information that exists regarding the benthic effects of potting in New Zealand.

177. A study on the effects of lobster pots on the benthic environment was completed in a report on the South Australian rock lobster fisheries.[60] This fishery is likely to be the most comparable with New Zealand because the lobster species is the same (*Jasus edwardsii*) and many of the same species are present, although pots and how

[59] Pierre et al. (2022)
[60] Casement and Svane (1999)

they are fished may differ. This report concluded that the amount of algae removed by pots (due to entanglement) probably has no ecological significance.

178. Fishing for predators such as rock lobsters has the potential to indirectly impact biological diversity of the aquatic environment because of the relationship between predator abundance and sea urchins (e.g. kina) which graze on kelp (see '*Interdependence of stocks'* above).

179. As outlined in the 2023 Aquatic Environment and Biodiversity Report No. 324 , kelp provides a wide and diverse range of services, including:

a) Providing energy and organic matter to rocky reef ecosystems as well as adjacent intertidal and deepwater ecosystems;
b) Providing complex three dimensional structures which support high levels of biodiversity through both shelter and food subsidies; and
c) Cultural ecosystem services through harvestable food and materials as well as recreational and tourism opportunities.

180. It is important to note that kelp is indirectly affected by fishing for predators. The removal of predators, including rock lobster, can reduce predatory control of the abundance of kina, which graze on kelp. The magnitude of this relationship depends on many factors that vary regionally. Biotic factors include (but are not limited to) fishing pressure, population dynamics of predators, prey and kelp and ecosystem resilience. Abiotic factors in include temperature, turbidity and chemistry (among others)).[61] An over-abundance of kina and the over grazing of kelp systems can result in kina barrens. Kelp forests are an important habitat and food source for many rocky reef dwelling species. Therefore, in making a decision, the Minister must give consideration to the indirect impacts of rock lobster fishing on species that directly rely on kelp.

181. Kelp habitats are likely to be important for a range of harvested and non-harvested species, and any reduction in such habitats is therefore likely to be adverse to rock lobster and other species that rely on kelp for shelter or food.[62]

182. Fishing-induced trophic cascades, kelp grazers (e.g., butterfish),[63] and other impacts on the ecosystem due to fishing, sedimentation, and climate change can have long term impacts on kelp abundance and distribution. In turn, this could potentially negatively impact the suitability of rocky reef habitat for juvenile and adult rock lobsters as a refuge for settlement, as well as the availability of their prey species.[64]

Habitat of particular significance for fisheries management

183. Three potential habitats of particular significance for fisheries management (**HoPS**) have been identified within the CRA 7 quota management area. These include:

- Biogenic reefs on Otago shelf (blue cod nursery);
- Blueskin Bay (elephantfish nursery); and
- Hay Paddocks (tarakihi nursery).

184. Rock lobster fishing in CRA 7 is not known to overlap with any of these habitats.

[61] Doheny et al. (2023)
[62] Dayton (1985)
[63] Shears et al. (2008)
[64] Stanley et al. (2015)

References

Andrew, N. L. & MacDiarmid, A. B. (1991). Interrelations between sea urchins and spiny lobsters in northeastern New Zealand. Marine Ecology Progress Series, 70, 211–222. https://doi.org/10.3354/meps070211

Annala, J. (1983) New Zealand rock lobsters: biology and fishery. Fisheries Research Division Occasional Publication No. 42. New Zealand Ministry of Agriculture and Fisheries, Wellington. 36 p.

Barker, M. F. (2001). The ecology of Evechinus chloroticus. In Developments in Aquaculture and Fisheries Science (Vol. 32, pp. 245-260). Elsevier.

Bell, J. J., Smith, R. O., Micaroni, V., Strano, F., Balemi, C. A., Caiger, P. E., & Shears, N. T. (2023). Marine heat waves drive bleaching and necrosis of temperate sponges. Current Biology, 33(1), 158-163.

Booth J.D., Carruthers, A.D., Bolt, C.D., and Stewart, R.A. (1991). Measuring depth of settlement in the red rock lobster, Jasus edwardsii. New Zealand Journal of Marine and Freshwater Research, 25, (2), 123-132. DOI: 10.1080/00288330.1991.9516462

Bradford R.W., Griffin D., Bruce B.D. (2014). Estimating the duration of the pelagic phyllosoma phase of the southern rock lobster, Jasus edwardsii (Hutton). Marine and Freshwater Research 66(3):213-219.

Casement, D., Svane, I. (1999). Direct Effects of Rock Lobster Pots on Temperate Shallow Rocky Reefs in South Australia: a study report to the South Australian Rock Lobster Industry. South Australian Research & Development Institute. 24 p.

Chiswell, S. M., and Booth, J. D. (2008). Sources and sinks of larval settlement in Jasus edwardsii around New Zealand: where do larvae come from and where do they go? Marine Ecology Progress Series, 354, 201-217.

Dayton, P. K. (1985). Ecology of kelp communities. Annual review of ecology and systematics, 215- 245.

Department of Conservation and Fisheries New Zealand. (2020a). Hector's and Māui Dolphin Threat Management Plan. Latest review accessible at: https://www.mpi.govt.nz/consultations/hectors-and-maui-dolphins-threat-management-plan-review/

Department of Conservation and Fisheries New Zealand. (2020b). National Plan of Action — Seabirds 2020. Accessible at: https://www.mpi.govt.nz/dmsdocument/40652-National-Plan-Of-Action-Seabirds-2020-Report.

Doheny, B., Davis, J.P., and Miller , B. (2023). Fishery-induced trophic cascades and sea urchin barrens in New Zealand: a review and discussion for management. New Zealand Aquatic Environment and Biodiversity Report No. 324. 110 p. Accessible at: AEBR 324 Fishery-induced trophic cascades and sea urchin barrens in New Zealand: a review and discussion for management

Fisheries New Zealand (2011) Operational Guidelines for New Zealand's Harvest Strategy Standard. Accessible at: https://www.mpi.govt.nz/dmsdocument/19706-OPERATIONAL-GUIDELINES-FOR-NEW-ZEALANDS-HARVEST-STRATEGY-STANDARD

Fisheries New Zealand (2022) Aquatic Environment and Biodiversity Annual Review 2021. Compiled by the Aquatic Environment Team, Fisheries Science and Information, Fisheries New Zealand, Wellington New Zealand. 779 p.

Fisheries New Zealand. (2023). Fisheries Assessment Plenary, November 2023: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. 689.p

Fisheries New Zealand (2024). Fisheries Assessment Plenary, November 2024: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. Accessible at: https://www.mpi.govt.nz/dmsdocument/66321#page=456.

Fisheries New Zealand. (2024). Aquatic Environment and Biodiversity Annual Review. Chapter 13: Trophic and Ecosystem Level Effects. Accessible at: Aquatic Environment and Biodiversity Annual Review 2019-20.

Flood, A. S. (2021). Gut Instincts: Feeding behaviour of the rock lobster, Jasus edwardsii [Doctor of Philosophy]. The University of Auckland.

Foster, M. S., & Schiel, D. R. (2010). Loss of predators and the collapse of southern California kelp forests (?): Alternatives, explanations and generalizations. Journal of Experimental Marine Biology and Ecology, 393(1-2), 59-70.

Green, B. S., Gardner, C., & Kennedy, R. B. (2009). Generalised linear modelling of fecundity at length in southern rock lobsters, Jasus edwardsii. Marine Biology, 156, 1941-1947.

Heinemann, A.; Gray, A. (2024). National Panel Survey of Marine Recreational Fishers 2022– 2023. New Zealand Fisheries Assessment Report 2024/51. 116 p.

Hepburn, C. D., Pritchard, D. W., Cornwall, C. E., McLeod, R. J., Beardall, J., Raven, J. A., & Hurd, C.L. (2011). Diversity of carbon use strategies in a kelp forest community: implications for a high CO2 ocean. Global Change Biology, 17(7), 2488-2497

Hesse J., Stanley J.A., Jeffs G. (2015). Do changes in reef habitats influence relative predation risk on the juvenile Australasian spiny lobster Jasus edwardsii (Hutton, 1875). Brill 88:7-8

Hesse, J., Stanley, J., & Jeffs, A. (2016). Relative predation risk in two types of habitat for juvenile Australasian spiny lobsters, Jasus edwardsii, Marine Biology Research, 12:9, 895-906, DOI: 10.1080/17451000.2016.1236200

Hinojosa, I.A., Green, B., Gardner, C., Jeffs, A. (2015). Settlement and early survival of southern rock lobster, Jasus edwardsii, under climate-driven decline of kelp habitats. ICES J Mar Sci. 72(Supplement 1): i59-i68.

Hinojosa, I.A., Gardner, C., Green, B.S., Jeffs, A.G. (2018). Coastal chemical cues for settlement of the southern rock lobster, Jasus edwardsii. Bulletin of Marine Science. 94:619-634.

Kelly, S., MacDiarmid, A. B., & Babcock, R. C. (1999). Characteristics of spiny lobster, Jasus edwardsii, aggregations in exposed reef and sandy areas. Marine and Freshwater Research, 50(5), 409-416

Kendrick, T., & Bentley, N. (2003). Movements of rock lobsters (Jasus edwardsii) tagged by commercial fishers around the coast of New Zealand from 1993.

de Lestang, S.; Haddon, M.; Hoyle, S. (2024). Review of Red Rock Lobster Stock Assessment Modelling and the Determination of Management Reference Points. New Zealand Fisheries Science Review 2024/01. 28 p.

Linnane, A., Gardner, C., Hobday, D., Punt, A., McGarvey, R., Feenstra, J., ... & Green, B. (2010). Evidence of large-scale spatial declines in recruitment patterns of southern rock lobster Jasus edwardsii, across south-eastern Australia. Fisheries Research, 105(3), 163-171.

Linnane, A; McGarvey, R; Gardner, C; Hartmann, K; De Lestang, S (2020) Status of Australian Fish Stocks Report Southern rock lobster (2020). Fisheries Research and Development Corporation, Canberra. 6 p. Accessible at: SAFS Report - Prod.

MacDiarmid, A. B., Freeman, D., & 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

McKenzie, A., Anderson, O., & MacKay, K. (2024) Kina abundance estimation for two sub-areas within SUR 3. NIWA client report prepared for Sustainable Fisheries Development Limited. (Unpublished report held by NIWA, Wellington and Sustainable Fisheries Development Limited). Accessible at: https://bestfile.io/3i3GCVwDSohtFKL/file

McKoy, J. L. (1983). Movements of rock lobsters, Jasus edwardsii (Decapoda: Palinuridae), tagged near Stewart Island, New Zealand. New Zealand Journal of Marine and Freshwater Research, 17(4), 357-366.

Oellermann, M., Hickey, A. J., Fitzgibbon, Q. P., & Smith, G. (2020). Thermal sensitivity links to cellular cardiac decline in three spiny lobsters. Scientific reports, 10(1), 202.

Pierre, J. P., How, J. R., & Dunn, A. (2022). Whale entanglements with New Zealand pot fisheries: characterisation and opportunities for management.

Pinkerton, M., C. Lundquist, C. Duffy, and D. Freeman. (2008). Trophic modelling of a New Zealand rocky reef ecosystem using simultaneous adjustment of diet, biomass and energetic parameters. Journal of Experimental Marine Biology and Ecology 367:189-203.

Pinkerton, M., A. MacDiarmid, J. Beaumont, J. Bradford-Grieve, M. Francis, E. Jones, C. Lalas, C. Lundquist, A. McKenzie, S. Nodder, L. Paul, J. Stenton-Dozey, D. Thompson, and J. Zeldish. (2015). Changes to the food-web of the Hauraki Gulf during the period of human occupation: a mass-balance model approach. New Zealand Aquatic Environment and Biodiversity Report 160

Roberts, J.O.; Webber, D.N. (2024). Review of red rock lobster (Jasus edwardsii) recruitment processes and the puerulus collector programme. New Zealand Fisheries Assessment Report 2024/68. 108 p. Accessible at: FAR 2024/68 Review of red rock lobster (Jasus edwardsii) recruitment processes and the puerulus collector programme

Salinger, M. J., Renwick, J., Behrens, E., Mullan, A. B., Diamond, H. J., Sirguey, P., ... & Sutton, P. J. (2019). The unprecedented, coupled ocean-atmosphere summer heatwave in the New Zealand region 2017/18: drivers, mechanisms and impacts. Environmental Research Letters, 14(4), 044023.

Salinger, M. J., Diamond, H. J., Behrens, E., Fernandez, D., Fitzharris, B. B., Herold, N., ... & Trought, M. C. (2020). Unparalleled coupled ocean-atmosphere summer heatwaves in the New Zealand region: drivers, mechanisms and impacts. Climatic Change, 162, 485-506.

Schiel, D.R. (2013). The other 93%: trophic cascades, stressors and managing coastlines in non-marine protected areas. New Zealand Journal of Marine and Freshwater Research 47 (3): 374–391.

Shears, N.T.; Babcock, R.C.; Salomon, A.K. (2008). Context-dependent effects of fishing: variation in trophic cascades across environmental gradients. Ecological Applications 18 (8): 1860–1873.

Shelamoff, V., Layton, C., Tatsumi, M., Cameron, M.J., Wright, J.T., and Johnson, C.R. (2022). Restored kelp facilitates lobster recruitment but not other mid-trophic macroinvertebrates. Aquatic Conservation: Marine and Freshwater Ecosystems. 32: 1 115-1125.

Spyksma, A. J., Taylor, R. B., & Shears, N. T. (2017). Predation cues rather than resource availability promote cryptic behaviour in a habitat-forming sea urchin. Oecologia, 183, 821-829.

Stanley, J.A., Radford, C.A., Jeffs, A.G. (2012). Location, location, location: finding a suitable home among the noise. Proceedings of the Royal Society B: Biological Sciences 279: 3622-3631.

Stanley, J.A., Hesse, J., Hinojosa, I.A. et al., (2015). Inducers of settlement and moulting in post-larval spiny lobster. Oecologia 178, 685–697

Sutton, P. J., & Bowen, M. (2019). Ocean temperature change around New Zealand over the last 36 years. New Zealand Journal of Marine and Freshwater Research, 53(3), 305-326.

Tait, L.W., Thoral, F., Pinkerton, M.H., Thomsen, M.S. and Schiel, D.R., 2021. Loss of giant kelp, Macrocystis pyrifera, driven by marine heatwaves and exacerbated by poor water clarity in New Zealand. Frontiers in Marine Science, 8, p.721087.

Taylor R. B. (1998). Density, biomass and productivity of animals in four subtidal rocky reef habitats: the importance of small mobile invertebrates. Marine Ecology Progress Series.172: 37-51. doi: 10.3354/meps172037.

Thomsen, M.S., Mondardini, L., Alestra, T., Gerrity, S., Tait, L., South, P.M., Lilley, S.A. and Schiel, D.R., 2019. Local extinction of bull kelp (Durvillaea spp.) due to a marine heatwave. Frontiers in Marine Science, 6, p.84.

Thomsen, M. S., Mondardini, L., Thoral, F., Gerber, D., Montie, S., South, P. M., ... & Schiel, D. R. (2021). Cascading impacts of earthquakes and extreme heatwaves have destroyed populations of an iconic marine foundation species. Diversity and Distributions, 27(12), 2369-2383.

Udy, J., Wing, S., O'Connell-Milne, S., Kolodzey, S., McMullin, R., Durante, L., & Frew, R. (2019). Organic matter derived from kelp supports a large proportion of biomass in temperate rocky reef fish communities: Implications for ecosystem-based management. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(9), 1503-1519.

Wing, S. R., Shears, N. T., Tait, L. W., & Schiel, D. R. (2022). The legacies of land clearance and trophic downgrading accumulate to affect structure and function of kelp forests. Ecosphere, 13(12).

Wynne-Jones, J.; Gray, A.; Hill, L.; Heinemann, A. (2014). National Panel Survey Of Marine Recreational Fishers 2011–12: Harvest Estimates.

Wynne-Jones, J.; Gray, A.; Heinemann, A.; Hill, L; Walton, L. (2019). National Panel Survey of Marine Recreational Fishers 2017–2018. New Zealand Fisheries Assessment Report 2019/24. 104 p.