Fisheries New Zealand
Tini a Tangaroa

Management target fisheries plans for spiny rock lobster (CRA 2 and CRA 4)

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Executive summary

1. Fisheries New Zealand (FNZ) is consulting on draft fisheries plans under section 11A of the Fisheries Act 1996 to manage the CRA 2 (Hauraki Gulf/Bay of Plenty) and CRA 4 (Wairarapa/Wellington) spiny rock lobster stocks at a higher level of abundance. The plans propose setting management targets— the biomass level that the fishery is aimed to be managed around—and thresholds to trigger management action if biomass declines.
2. Currently the default management target is B_{MSY} (the biomass which provides for the maximum sustainable yield). FNZ is considering higher targets to better reflect ecosystem health, customary values, and stakeholder aspirations. Higher management targets would likely require reductions to catch limits but would be expected to improve stock resilience, ecological function, and fishing efficiency.
3. The biomass of both CRA 2 and CRA 4 is currently above the default B_{MSY} target for each stock. FNZ proposes three management target options for each stock (see the table below), ranging from B_{MSY} to 3.5x B_{MSY}.
4. Higher biomass may help contribute to mitigating urchin barrens—areas degraded by overgrazing of kelp by sea urchins—particularly in CRA 2, where rock lobster are key predators of sea urchins. However, it's important to note there is uncertainty in predicting ecological outcomes.
5. You are invited to provide feedback on your preferred targets, thresholds, and the draft fisheries plans by 8 September 2025 by emailing FMSubmissions@mpi.govt.nz.

Table 1. Proposed management target options for CRA 2 and CRA 4

Management Target	Relative to B_{MSY}	Approx % of unfished exploitable biomass	Approx. % of unfished spawning stock biomass	Approx. % of total biomass
CRA 2				
Default B_{MSY}	1 x B_{MSY}	13%	39%	27%
Option 1	1.75 x B_{MSY}	21%	49%	35%
Option 2	2.5 x B_{MSY}	30%	58%	44%
Option 3	3.5 x B_{MSY}	42%	71%	55%
CRA 4				
Default B_{MSY}	1 x B_{MSY}	16.6%	62%	52%
Option 1	1.75 x B_{MSY}	33%	70%	61%
Option 2	2.5 x B_{MSY}	41%	72%	64%
Option 3	3.5 x B_{MSY}	50%	75%	69%

Table 2. Proposed threshold options for CRA 2 and CRA 4

Threshold	% of unfished exploitable biomass
CRA 2	
Option A (50% of target Option 1)	10.5%
Option B (50% of target Option 2)	15%
Option C (50% of target Option 3)	21%
Option D (B_{MSY})	13%
CRA 4	
Option A (50% of target Option 1)	16.5%
Option B (50% of target Option 2)	20.5%
Option C (50% of target Option 3)	25%
Option D (B_{MSY})	16.6%

Part One: Overview

6. Fisheries New Zealand (FNZ) is consulting on draft fisheries plans to implement management targets to manage some spiny rock lobster (*Jasus edwardsii*; kōura, crayfish) stocks at a higher level of abundance. These fisheries plans would be approved under section 11A of the Fisheries Act 1996 (the Act). The current spiny rock lobster stocks being considered for these plans include the Hauraki Gulf/Bay of Plenty (CRA 2) and the Wairarapa/Wellington (CRA 4) fisheries. Other rock lobster stocks may be considered in the future.

7. The final fisheries plans to be approved by the Minister for Oceans and Fisheries (the Minister) will contain one management target per stock. In the draft versions attached in this document, the management target is blank because FNZ intends to use your feedback to help determine an appropriate target. FNZ will provide the feedback from the consultation process to the Minister to inform his decision on the management target and fisheries plan for each stock.

8. We encourage you to provide your feedback on which management target should be progressed for each stock and the draft fisheries plans using the submission form on our website: Submission form

9. Send your feedback via email to: FMSubmissions@mpi.govt.nz. Consultation closes at 5pm on Monday 8 September 2025.

What is a management target and why are we proposing them?

10. A management target is the amount of fish that we aim to maintain in a fishery. This is generally a measure of biomass (size of the stock in weight). The management target influences the level of catch that can be taken from a fishery. If a stock is below the target, FNZ may recommend management actions to rebuild the population or, if a stock is above the target, FNZ may recommend options to increase catch.

11. The current default management target is the biomass that allows for the maximum sustainable yield (B_{MSY}[1]), which is the largest amount of fish that can be taken each year without compromising the ability for the fishery to replenish. While the default target is theoretically sustainable for each rock lobster stock, it has limited consideration of the needs of tāngata whenua and stakeholders for the fishery or the wider ecosystem.

12. At higher targets, greater restrictions on fishing would be required to maintain a higher rock lobster biomass. This would be expected to have impacts on commercial fishers and the wider community. However, at higher biomass levels it would be expected to be easier to catch rock lobster and there would be more large lobster. In addition, the fishery would be expected to be more resilient to change and rock lobster would be expected to better fulfil their role in the environment as predator and prey.

What is a section 11A fisheries plan?

13. Under section 11A of the Act, the Minister may approve a fisheries plan which sets out fisheries management objectives, and strategies to achieve those objectives. These plans are

[1] The estimate for BMSY that is referred to here is derived from constant catch tonnage and constant exploitation rate model simulations that have been undertaken to estimate the maximum long-term yield that can be taken under current condition given these two constant catch strategies. The BMSY estimate produced from these simulations is a more conservative estimate than that produced when calculating a theoretical BMSY estimate, because risk constraints have been applied to identify situations where the stock biomass falls below an unsustainable level given the variability in recruitment that has been experienced over the past 20 years. For a more detailed description of these methods, see Rudd et al. 2021.

then taken into account by Ministers when making sustainability decisions for those stocks or areas.

14. The benefits of managing to higher targets are best realised after managing at the target for some time, it is therefore useful for the target to be in place long term. Defining the management targets in a fisheries plan is intended to help to ensure the targets are enduring while allowing flexibility in future management.

15. Additionally, the plans can be amended to ensure the management targets remain appropriate.

Biological reference points

16. Biological reference points are benchmarks to determine stock performance. These reference points can be management targets, thresholds, or limits depending on their intended use.

Management targets

17. Management targets can be based on measures of biomass, fishing mortality (or harvest rates), or metrics like catch-per-unit effort (CPUE). For most finfish fisheries, management targets are based on a measure of the part of a stock that is sexually mature (spawning stock biomass of male and female fish; SSB).

18. For rock lobster stocks, however, management targets are expressed in terms of an "exploitable biomass' (also referred to as 'vulnerable biomass') rather than in terms of the spawning stock biomass, because:
    - Reproductively mature female rock lobster are legally protected from exploitation when they are in an egg bearing state.
    - It is not possible to externally identify when a male rock lobster is reproductively mature.
    - An estimate of the population that is potentially exploitable can be calculated as the combined biomass of males that are larger than the MLS and biomass of females that are larger than the MLS but are not egg bearing at the beginning of the fishing year.

19. The proportion of the rock lobster population that can be legally fished varies around New Zealand due to variation in the biology of each population. Therefore, the management target for each stock is tailored to account for the stock's unique biological properties. Figure 1 indicates the portions of rock lobster populations that are included in the different biomass metrics.

Limits

20. Limits can be defined in addition to management targets. A limit is a biomass or fishing mortality that should be avoided with high probability because the sustainability of the stock would be at risk if the biomass went below the limit.

21. There are two limits for rock lobster fisheries that we manage against. The soft limit is 20% of unfished[2] female SSB and the hard limit is 10% unfished female SSB, as recommended in the Harvest Strategy Standard (HSS).[3] When a stock falls below the soft limit a rebuild plan is

[2] Unfished biomass refers to biomass at the beginning of the modelled period in stock assessments. It does not reflect the longstanding utilisation by Māori prior to commercial fishing

[3] The Harvest Strategy Standard is a policy statement of best practice in relation to the setting of fishery and stock targets and limits for fish stocks in New Zealand's Quota Management System.

suggested, and if a stock falls below the hard limit it is recommended to consider closing the fishery.

22. Some stakeholders have suggested that the existing SSB limits may not be appropriate for rock lobster stocks because:

- More of the commercial catch is based on males in autumn and winter when mature females are carrying eggs.
- A relationship between SSB and recruitment (the amount of young lobster that enter the fishery each year) has not been demonstrated for rock lobster stocks.[4]
- The current target and limits are based on metrics that measure different parts of the rock lobster population (see Figure 1). Concurrent estimates of a stock's status relative to its target and limits are not therefore directly relatable.

23. FNZ's initial view is that the current limits for CRA 2 and CRA 4 are appropriate and should not be reviewed at this time. Acknowledging the uncertainties, FNZ considers it is important to retain a limit based on SSB to protect spawning ability of each stock and to better ensure long term sustainability of each stock and at a national scale.

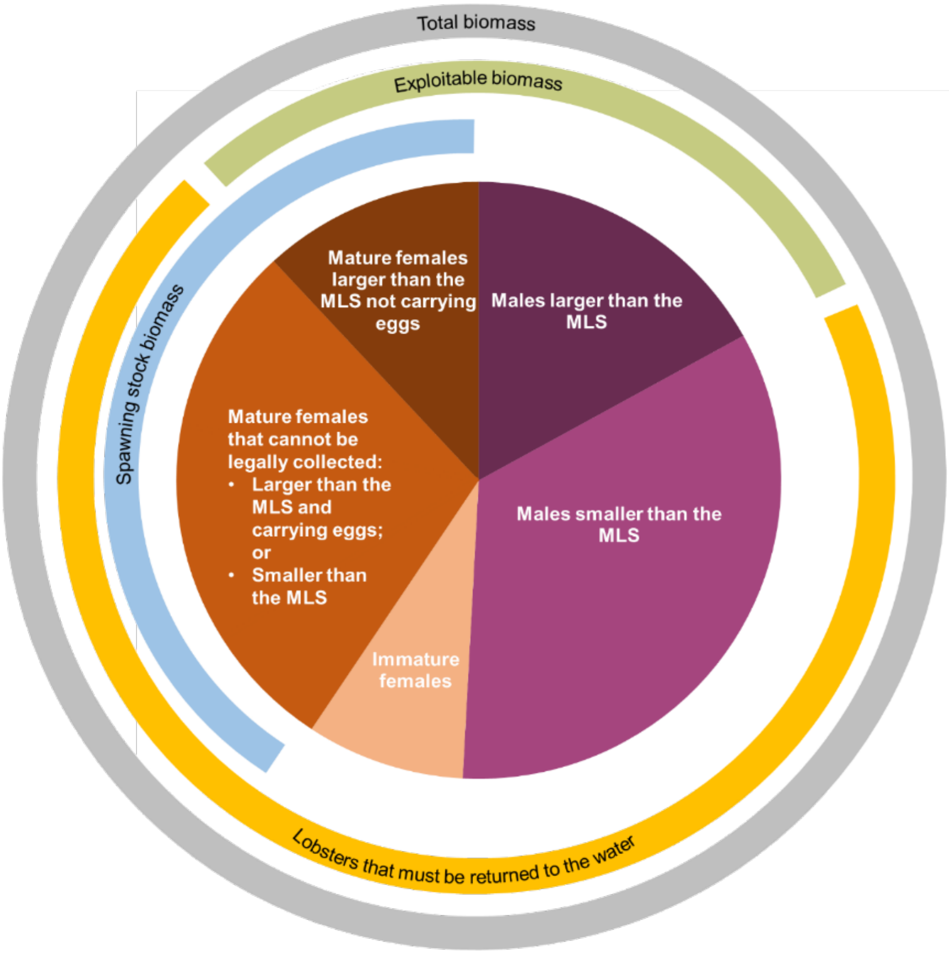

Figure 1. Conceptual example of the portions of rock lobster populations that are included in estimates of exploitable biomass, spawning stock biomass, and total biomass. The proportion of each part of the population varies between rock lobster stocks and seasons. 'MLS' is the minimum legal size. Requirements to return prohibited state lobster do not apply to authorised customary fishing. Soft shell lobsters also need to be returned to the water but their biomass cannot be reliably estimated.

[4] New Zealand Fisheries Assessment Report 2022/50. Accessible at: https://www.mpi.govt.nz/dmsdocument/53830/direct/

Thresholds

24. FNZ is considering the introduction of a new exploitable biomass threshold for CRA 2 and CRA 4 because the current soft limit is defined in relation to spawning stock biomass and is not directly relatable to the proposed exploitable biomass management target options. A threshold is a biological reference point that raises a 'red flag' for management by indicating biomass has fallen below the target to the extent that management action may be required to prevent the stock from declining further.
25. Thresholds are not currently used in New Zealand fisheries. FNZ is proposing to introduce thresholds through the section 11A fisheries plans to help ensure the stocks remain near the management targets. The proposed thresholds are based on exploitable biomass so that they can relate to the management target (i.e., they can indicate if the stock is dropping below the target and further management action should be considered to correct the trend).

General considerations for management targets

26. Setting a management target is important for managing fisheries as it reflects aspirations for the fishery and influences fisheries management decisions. Different stakeholders may prioritise different aspects of the fishery, some factors that may be influenced by a management target include:
    - Resilience of the fishery to climate change and environmental changes.
    - Customary use and management practices.
    - The catch available from the fishery on a sustainable basis
    - Fishing experience for recreational fishers (a reasonable expectation of finding rock lobster and the size range of lobster available).
    - Ecological role of rock lobster on coastal reefs (including their role along with other predators and other factors in urchin barren formation).
    - Profitability and efficiency of the commercial fishery, export returns, employment, and regional economic activity.
27. An analysis of how the proposed target options are expected to influence some of these factors is provided in Table 5 (for CRA 2) and Table 8 (for CRA 4).

General impact on catch limits:

28. Managing to a higher target would require recreational and commercial users to forgo catch for the stock to reach a higher biomass.
29. Economic and social impacts will be determined by the actions and timeframes used to move the stock to the desired target. Moving the stock to a higher target more quickly will require a greater restriction on catch. In contrast, moving the stock to a higher biomass over a longer time frame would likely less restrictions on fishing.
30. The Minister will consider the way and rate to manage towards a target during catch limits reviews.

Table 3. Expected general trade-offs when considering outcome of managing stocks using different targets over time

General trade-offs when varying management target level	
At targets closer to B_{MSY} we expect:	**At targets further beyond B_{MSY} we expect:**
• Greater utilisation opportunities • Economic benefits for commercial and customary- commercial users, and wider communities, export returns, employment, regional economic activity	• Lower catch limits for recreational and commercial fishers • Higher catch rates • More efficient fishing (lower costs and carbon outputs) • Greater abundance of lobster and large lobsters • Increased reproductive potential • Better enables lobsters to fulfil their ecological role • More stable catches between years

Urchin, or kina, barrens

31. 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'.

32. Urchin barrens have been identified in a number of locations within the CRA 2 fishery (notably the Hauraki Gulf and the eastern Bay of Plenty). They were first documented in the Hauraki Gulf in the 1960s. Urchin barrens are understood to be less prevalent in CRA 4 and the role of rock lobster fishing in urchin barren persistence and formation in CRA 4 is less well understood than for CRA 2.

33. Rock lobster are an important part of the ecological health and biodiversity of coastal rocky reefs in north-eastern New Zealand, and among other species are predators that feed on urchins. There has been extensive discussion, across various sectors and users of the fishery, regarding the need to increase the abundance of large rock lobster (and other urchin predators, such as large snapper and packhorse rock lobster) in the CRA 2 area to contribute to controlling urchin populations and reduce the prevalence of urchin barrens. Managing to higher management targets is expected to contribute to increasing the abundance of lobster overall and large lobster, one part of the solution to addressing urchin barrens.

34. Bringing the rock lobster population (as only one of a few known predators of large urchins) back to levels nearer to the biomass found in the ecosystem prior to the spread of urchin barrens may help contribute to controlling urchin populations. However, there is no way to reliably estimate the level of rock lobster abundance that would be required to achieve urchin barren control alongside the contribution of other urchin predator species and other factors that have contributed to loss of kelp, under current but changing environmental conditions. Consequently, it is possible that managing rock lobster to a higher biomass on its own may not prevent the formation of new urchin barrens or reduce the extent of existing urchin barrens in CRA 2. While there is currently little information to identify the level of rock lobster abundance that would be required to reduce or reverse the spread of urchin barrens alongside the contribution of other urchin predator species and other factors, it is likely to be higher than the number of large lobster currently present in urchin barren dominated habitats.

35. Other factors influencing the persistence of urchin barrens are the abundance, size, and distribution of other urchin predators including snapper and reef fish and environmental conditions (water temperature and sedimentation). Further analysis is provided in Part 2 later in this document.

Management targets for CRA 2

Fishery characteristics

36. The CRA 2 fishery extends from Te Arai Point through the Hauraki Gulf, the Coromandel and the Bay of Plenty to the East Cape. CRA 2 supports an important shared fishery with customary, recreational, and commercial interests.

37. The extent of this fishery overlaps with the rohe moana of iwi and hapū that are represented by the Mai i Ngā Kuri a Whārei ki Tihirau and Ngā Hapū o Ngāti Porou Iwi Fisheries Forums, as well as the rohe moana of Hauraki and Tāmaki iwi.

38. Based on the last three complete fishing years within the CRA 2 fishery, there have been on average 43 quota owners and 16 permit holders landing spiny rock lobster to seven LFRs. Over the same time period, there were between 17 and 18 vessels landing spiny rock lobster from CRA 2 annually. This is lower than the 29 to 40 vessels operating annually over the previous three decades.

Latest stock status and 2025 management decisions

Stock status:

39. The latest stock status estimate for CRA 2 is from 2024. At that time, exploitable biomass in CRA 2 was estimated to be at 20% of unfished levels, well above the default B_{MSY} target of approximately 13% of unfished exploitable biomass (the biomass of lobsters that can be legally retained). The default B_{MSY} target for CRA 2 equates to approximately 37% of unfished SSB (similar to the default B_{MSY} target of 40% unfished SSB used in finfish). While there is evidence of a long-term decline in the productivity of the CRA 2 stock, biomass is projected to increase over the next five years under current catch levels.

40. A new stock assessment for CRA 2 is under development this year which may result in a different B_{MSY} estimate.

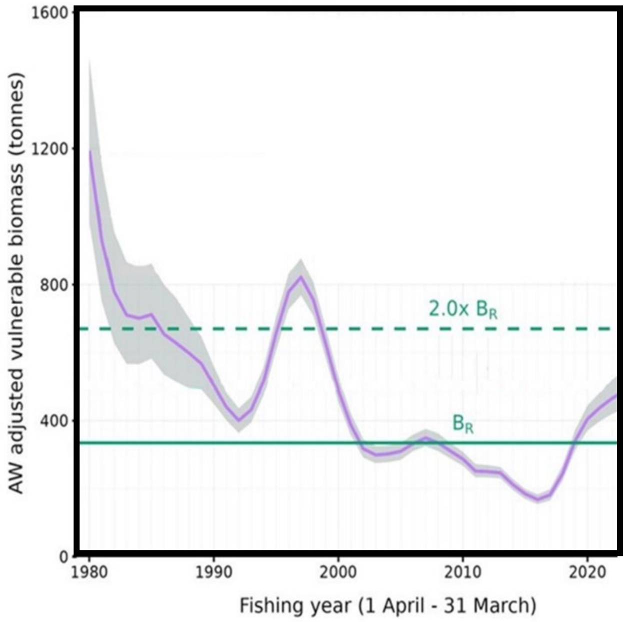

Figure 2. Exploitable biomass in CRA 2 as estimated in 2024. The B_{MSY} default target is shown as a solid green line. The interim target of 2 times B_{MSY} is shown as a dashed green line.

The 2025 review:

41. The catch settings for CRA 2 were reviewed in early 2025 for consideration of an increase to catch settings given the stock was well above the current default B_{MSY} target. The Minister decided to retain the existing catch settings in order to:
    - Address concerns of localised depletion in areas of CRA 2, particularly in parts of the Hauraki Gulf.
    - Take into account the role of rock lobster fishing in the formation and persistence of urchin barrens in areas of CRA 2.
    - Move CRA 2 towards an interim management target of 2 x B_{MSY}, (interim target = 2 x default B_{MSY} target; approximately 26% of the unfished exploitable biomass).
42. The Minister also decided to close the inner Hauraki Gulf (from Cape Rodney to Port Jackson) to recreational and commercial spiny rock lobster fishing south of the line between Cape Rodney to Port Jackson region in CRA 2.
43. Stakeholder feedback was sought during consultation on a range of target options ranging from the default B_{MSY} target up to 3.5 x B_{MSY}. At the time, commercial stakeholders supported a target between 1.75 x B_{MSY} and 2 x B_{MSY} (Option 1 in this document) because the balance in forgone catch and increased CPUE at this target provides preferable economic outcomes. Environmental groups supported a target greater than 3 x B_{MSY} (Option 3 in this document) because it related to a historical period prior to the formation of urchin barrens in CRA 2, which these stakeholders considered indicated an abundance of rock lobster that better provided for ecosystem function. More information on this review and the Minister's decisions are available here: Review of sustainability measures for fisheries – April 2025 round | NZ Government.

Range of management targets being considered

44. FNZ is proposing three options for management targets for CRA 2 (see Table 3 below). Table 5 provides an initial cost and benefit analysis for managing CRA 2 at these options. This analysis

was informed by modelling undertaken during 2024, more information on this modelling can be found in Part 3 'Supporting Information' later in this document.

Table 3. Management targets options for inclusion in proposed CRA 2 section 11A plan

Target	Relative to B_{MSY}	Approx. % of unfished exploitable biomass	Approx. % of unfished spawning stock biomass	Approx. % of total biomass
Default B_{MSY}	1 x B_{MSY}	13%	39%	27%
Option 1	1.75 x B_{MSY}	21%	49%	35%
Option 2	2.5x B_{MSY}	30%	58%	44%
Option 3	3.5x B_{MSY}	42%	71%	55%

Thresholds

45. FNZ is considering introducing a threshold which if reached it would prompt a stock review to assess catch reductions to move the stock back towards the management target. FNZ considers the threshold could be the existing default B_{MSY} target or 50% of one of the new proposed higher management targets (Table 4).

Table 4. Threshold options for inclusion in proposed CRA 2 section 11A plan.

Threshold	Approx. % of unfished exploitable biomass
Option A (50% of target Option 1)	10.5%
Option B (50% of target Option 2)	15%
Option C (50% of target Option 3)	21%
Option D (B_{MSY})	13%

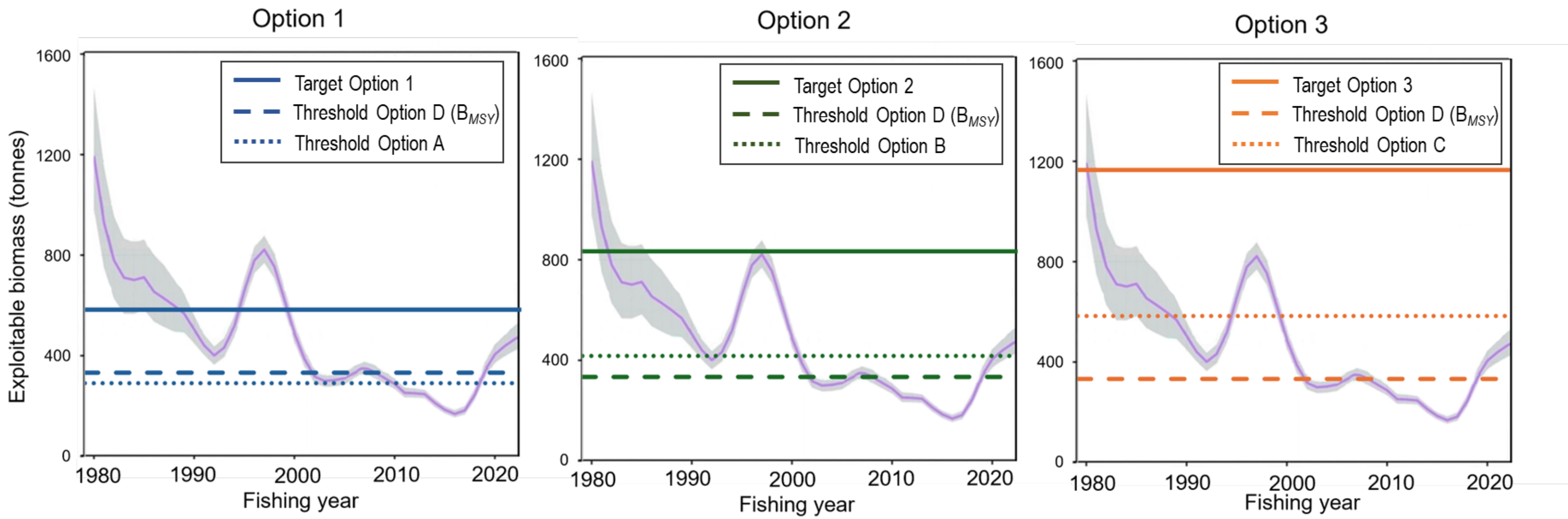

Figure 3. Estimates of CRA 2 exploitable biomass (purple) from 1980 to 2024 and indicative exploitable biomass levels for each of the management target options (solid lines) and management thresholds (dotted and dashed lines) for Option 1 (right), Option 2 (centre), and Option 3 (left). The dotted lines indicate the threshold options; Option A, B or C, a threshold of 50% of the biomass for that target option and, Option D, the dashed lines indicate a threshold based on B_{MSY}.

Potential short-term impacts on catch limits

46. The management target modelling FNZ used to assess impacts from managing at higher biomass indicates impacts on catch over the long term. This does not indicate how catch limits for the next few years may be set. Based on 2024 estimates of stock status, CRA 2 biomass would need to increase to reach any of the management target levels.

47. Increasing the biomass of CRA 2 to reach a new higher target level may require catch limit reductions. The extent of any catch reduction that may be required depends on the chosen management target, timeframe and management approach. Moving the stock to a higher target over a shorter time frame will require a higher rate of biomass increase, with a greater restriction on catch. In contrast, moving the stock to the same biomass level over a longer time frame would likely require a lower rate of biomass increase, which would likely require less restrictions on fishing. The way and rate that the Minister chooses to manage towards a target will be considered during resulting catch limit reviews.

48. It is important to note that CRA 2 is a shared fishery valued by customary, recreational, and commercial fishers. Deciding how potential catch reductions are shared across sectors would be a key part of the Minister's future sustainability decisions for CRA 2.

49. Stock dynamics will also influence the magnitude of catch limit reductions required to increase CRA 2 biomass. Rock lobster stocks can naturally vary in abundance and it is difficult to predict the future abundance of the stock because recruitment (the volume of young lobster that join the fishery each year) is highly variable. High recruitment years may support natural growth in biomass, while low recruitment years could slow or reverse any increase in biomass.

Potential long-term impacts of managing at alternative targets

50. Managing to a higher target may involve short-term costs for recreational and commercial fishers. In the long-term some benefits would be expected, however this would require some costs and the trade-off between costs and benefits would depend on the management target. FNZ commissioned modelling to assess potential future impacts (Table 5), but this does not reflect potential interim costs for stakeholders while biomass increases. Long-term trade-offs may include reduced catch limits to maintain a higher abundance, but benefits like increased lobster size, abundance, and catch rate would be expected. For example, targeting 1.75x B_{MSY} could require initial catch reductions (not indicated in Table 5), but once achieved, annual catch limits may be 23 tonnes lower than at the default B_{MSY} target, while CPUE and the number of lobsters above the MLS could be 1.5 times higher, with three times more male lobsters capable of preying on the largest urchins (Table 5).

51. **Uncertainty in long term impacts:**

Table 5 should be interpreted with caution, as it relies on assumptions (e.g., future management decisions, constant stock productivity, and abundance trends) that may not be valid over the long term. While the modelling helps illustrate broad impacts of managing at target levels, exact outcomes are uncertain. The model outputs are useful for understanding broad impacts of managing at certain target levels, but it should not be expected that these exact outcomes would be realised. Further details on modelling uncertainty are provided in Part 2 later in this document.

52. **Estimating economic impacts:**

Table 5 is based on long term model projections of biomass and provides an indication of expected changes in long term landed revenue associated with each target option. The estimated valuations are based on port price for rock lobster in the latest survey period (2023/24 fishing year). Uncertainties included in this analysis:

- Does not account for increased fishing efficiency (catching quota quicker uses less bait and fuel) which would be expected to provide economic benefits or possible changes in market demand due to the increasing size of lobsters caught in the fishery.
- Assumes that required catch reductions at higher targets are applied only to the Total Allowable Commercial Catch.
- Relies on continued market demand and market access and maintaining a port price of $101.97 per kg.
- Indicates potential outcomes expected once biomass has reached the management target. If biomass needs to increase to reach the management target, then more severe costs may be experienced in the interim.

53. **Estimating environmental impacts:**

Table 5 uses three metrics to understand potential environmental impacts; the change in overall abundance of rock lobster, the change in abundance of ‘large lobster’, and approximate periods in the past with similar biomass levels. This analysis indicates potential outcomes after managing at the target for a period of time (~20 years). ‘Large lobster’ in Table 5 refers to rock lobster with a carapace length (body length) greater than 130mm because research indicates lobsters above this size are large enough to feed on urchins of all sizes. It is important to note that there is no definitive knowledge of the threshold of rock lobster abundance or size distribution required to avoid, remedy, or mitigate adverse impacts on the aquatic environment.

Target options	Environmental impacts	Economic and fishery impacts			
Relative to B_{MSY} (% of unfished exploitable biomass)	**Potential environmental impact metrics** (total biomass and size of large lobster defined as lobster with a carapace length of 130 mm or larger) **compared to managing at B_{MSY}.**	**Average catch for all sectors at target after 20+ years** (arrows indicate the change from 2025)	**Change in landed revenue compared to 2025 settings** (if all applied to TACC, not including cost efficiencies).	**Fishing experience metrics** (catch rates and abundance of legal-size lobster) **compared to managing at B_{MSY}.**	**Potential impacts on commercial fishery compared to managing at B_{MSY}** (dependent on apportionment of catch allowances and realised after managing at the target level for 20+ years).
Default B_{MSY} target: 13%	-	236 t (↑ 36%)	↑ $6.42M	• Predicted CPUE of approximately 1.03 lobsters per potlift.	-
Option 1: 1.75x B_{MSY} (21%) (approx. 49% unfished SSB and 36% unfished total biomass)	• Total biomass is moderately higher (30% increase). • 3x more male and 6x more female lobster capable of preying on largest kina. • Uncertainty in environmental impacts. Lowest likelihood of mitigating adverse environmental impacts of the options presented. • Biomass similar to 1995/mid 1980s.	213 t (↑ 23%)	↑ $4.08M	• About 1.5x increase in commercial CPUE. • There are moderately more lobsters above the MLS which are available to recreational and commercial fishers (about 1.5 times more). • Increased total biomass may increase availability of lobster within customary fishing areas.	• Improved lobster abundance should lead to higher CPUE, which is likely to increase fishing efficiency and reduce costs (e.g., fuel and bait). However, more large lobsters may lead to increased size grading, as they are less preferred in the market, which could reduce some gains in fishing efficiency. • A wider size range of lobsters allows fishers to better match catch to market demand, improving flexibility and work-life balance. • Increased stock resilience and stable abundance are expected to support more consistent catch levels and limits year to year. • A long-term catch reduction of ~23 tonnes across all sectors (compared to B_{MSY}) is unlikely to significantly affect the current number of operators given the likely increase in long-term catch compared to 2025 catch. • Higher profitability may help offset income losses from reduced ACE.
Option 2: 2.5x B_{MSY} (30%) (approx. 58% unfished SSB and 44% unfished total biomass)	• Total biomass is higher (60% increase). • 5x more male and to 12x more female lobster capable of preying on largest kina. • Uncertainty in environmental impacts. Moderate likelihood of mitigating adverse environmental impacts of the options presented. • Biomass similar to 1997/early 1980s.	186 t (↑ 8%)	↑ $1.32M	• About 2x increase in commercial CPUE. • There are more lobsters above the MLS which are available to recreational and commercial fishers (about 2 times more). • Increased total biomass may increase availability of lobster within customary fishing areas.	• Option 2 is expected to result in a greater increase in larger lobster abundance and resulting CPUE than Option 1, leading to more efficiency gains. However, size grading may also increase which may be a disadvantage to fishers. • Stock resilience and more stable abundance are expected, supporting consistent catches and limits over time. • Approximately 27 tonne reduction in long term average catch compared to Option 1 and ~ 50 tonne reduction compared to managing at B_{MSY}. • Given the similarity in average catch compared to the 2025 catch settings, this is unlikely to significantly affect the current number of operators.
Option 3: 3.5x B_{MSY} (42%) (approx. 71% unfished SSB and 55% unfished total biomass)	• Total biomass is double. • 8x more male to 19x more female lobster capable of preying on largest kina. • Uncertainty in environmental impacts. Highest likelihood of mitigating adverse environmental impacts of the options presented. • Biomass similar to late 1970s/early 1980s.	148 t (↓ 14%)	↓ $2.55M	• About 2.5x increase in commercial CPUE. • The number of lobsters above the MLS which are available to recreational and commercial fishers is about 2x more female and 2.5x more male lobster. • Increased total biomass may increase availability of lobster within customary fishing areas.	• The reduction in long term average catch compared to managing at B_{MSY} (~ 89 tonnes reduction) at this target is likely to have significant economic impacts on the industry. • This may result in vessels and operators leaving the industry because the ACE is too limited to support the current number of operators. • The higher CPUE under this option is expected to provide increases in cost efficiencies for operators that are still able to operate and have benefits for work life balance. However, size grading may also increase which may be a disadvantage to fishers.

Table 5. Indicative trade-offs of managing CRA 2 to alternative management targets. This analysis indicates average impacts **once the target has been reached over the long term**, not the impacts while managing towards the target. Annual impact while reaching the target will depend on Minister's decisions for catch limits in the interim. The Minister has the discretion to choose different ways and rates to manage towards a target.

Management targets for CRA 4

Fishery characteristics

54. The CRA 4 fishery extends from Hawke's Bay, around Wellington, and up the Kapiti Coast. CRA 4 supports an important shared fishery with customary, recreational, and commercial interests.

55. The fishery overlaps with the rohe moana of iwi and hapū that are represented by the Te Tai Hauāuru and Mai Paritu tae atu ki Turakirae Iwi Fisheries Forums.

56. Based on the last three complete fishing years, within the CRA 4 fishery, there have been on average 95 quota owners, and 34 permit holders landing rock lobster to 12 LFRs. Over the same time period, there were between 35 and 41 vessels landing rock lobster from CRA 4 annually, this is lower than the 41 to 99 vessels operating annually over the previous three decades.

Latest stock status and management

57. The latest science on stock status is from the 2024 stock assessment. At that time, the exploitable biomass in CRA 4 was estimated to be at 33% of unfished exploitable biomass, well above the default B_{MSY} target of 16.6% of unfished exploitable biomass.

58. The default B_{MSY} target for CRA 4 equates to approximately 62% of unfished SSB which is well above the default B_{MSY} target of 40% unfished SSB used for finfish stocks. The stock was projected to increase over the next five years under current catch levels.

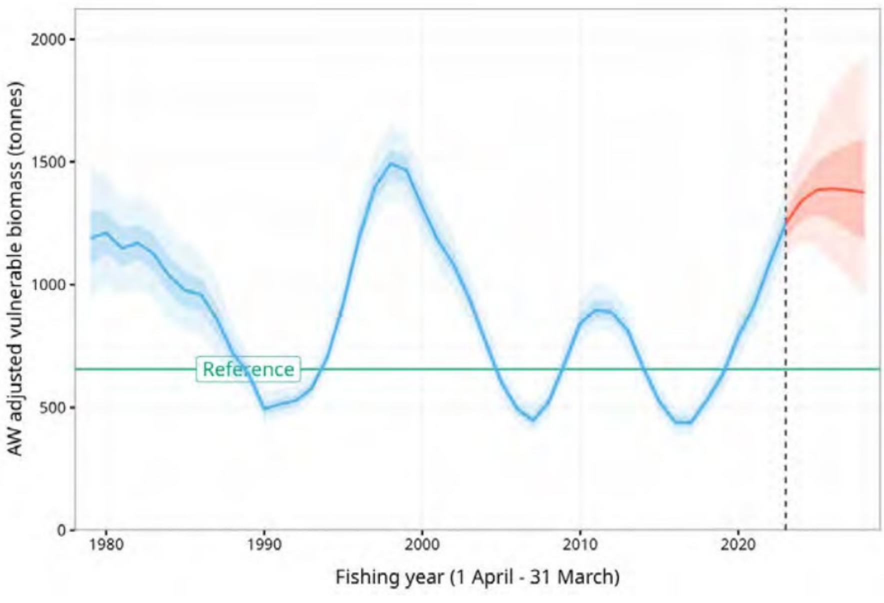

Figure 3. Exploitable biomass in CRA 4 as estimated up to 2024 (blue) with projections to 2028 (red). The B_{MSY} default target is shown as a solid green line

Range of management targets being considered

59. FNZ is proposing three options for management targets for CRA 4 (see Table 5 below). Table 8 provides an initial cost and benefit analysis for managing CRA 4 at these options. This analysis was informed by modelling undertaken during 2024, more information on this modelling can be found in Part 3 'Supporting information' later in this document.

Table 6. Management target options for inclusion in proposed CRA 4 section 11A plan

Target	Relative to B_{MSY}	% of unfished exploitable biomass	% of unfished spawning stock biomass (SSB)	% of total biomass
Default B_{MSY}	1.0x B_{MSY}	16.6%	62%	52%
Option 1	2.05x B_{MSY}	33%	70%	61%
Option 2	2.5x B_{MSY}	41%	72%	64%
Option 3	3.0x B_{MSY}	50%	75%	69%

Thresholds

60. FNZ is considering introducing a threshold which if reached it would prompt a stock review to assess catch reductions to move the stock back towards the management target. FNZ considers the threshold could be B_{MSY} or 50% of the target.

Table 7. Threshold options for inclusion in CRA 4 fish plan

Threshold	% of unfished exploitable biomass
Option A (50% of target Option 1)	16.5%
Option B (50% of target Option 2)	20.5%
Option C (50% of target Option 3)	25%
Option D (B_{MSY})	16.6%

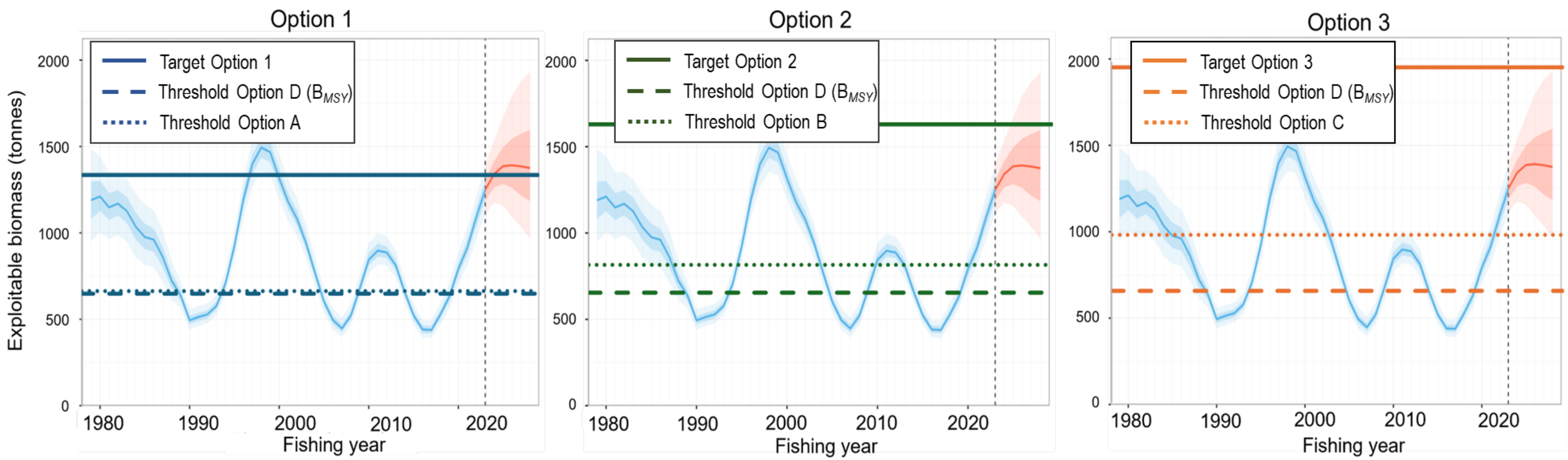

Figure 4. Estimates of CRA 4 exploitable biomass (light blue) from 1980 to 2024 and projections to 2028 under current catch levels (red). Indicative exploitable biomass levels are shown for each of the management target options (solid lines) and management thresholds (dotted and dashed lines) for Option 1 (right), Option 2 (centre), and Option 3 (left). The dotted lines indicate the threshold options; Option A, B or C, a threshold of 50% of the biomass for that target option and, Option D, the dashed lines indicate a threshold based on B_{MSY}.

Potential short-term impacts on CRA 4 catch limits

61. The management target modelling FNZ used to assess the implications of managing to higher biomass targets indicates impacts on catch over the long term. This does not indicate how catch limits for the next few years may be set. Based on 2024 estimates of stock status, CRA 4 biomass is near the target level for Option 1 and projected to increase slightly and then remain stable at current catch levels. Reductions to catch limits may be required to achieve higher biomass targets (Option 2 or Option 3).

62. The extent of any catch reductions depends on the chosen management target, timeframe and management approach. Moving the stock to a higher target over a shorter time frame will require a higher rate of biomass increase, with a greater restriction on catch. In contrast, moving the stock to a higher biomass over a longer time frame would likely require a lower rate of biomass increase, which would likely require less restrictions on fishing. The way and rate that the Minister chooses to manage towards a target will be considered during resulting catch limit reviews.

63. It is important to note that CRA 4 is a shared fishery valued by customary, recreational, and commercial fishers. Deciding how potential catch reductions are shared across sectors would be a key part of the Minister's future sustainability decisions for CRA 4.

64. Stock dynamics will also influence the magnitude of catch limit reductions required to increase CRA 4 biomass. Rock lobster stocks can naturally vary in abundance and it is difficult to predict the future abundance of the stock because recruitment (the volume of young lobster that join the fishery each year) is highly variable. High recruitment years may support natural growth in biomass, while low recruitment years could slow or reverse biomass increases.

Uncertainty in the impacts of managing at alternative targets

65. Managing to a higher target may involve short-term costs for recreational and commercial fishers. In the long-term some benefits would be expected, however this would require some costs and the trade-off between costs and benefits would depend on the management target. FNZ commissioned modelling to assess potential future impacts (Table 8), but this does not reflect potential interim costs for stakeholders while biomass increases. Long-term trade-offs may include reduced catch limits to maintain a higher abundance, but benefits like increased lobster size, abundance, and catch rate would be expected. For example, targeting 2.5x B_{MSY} could require initial catch reductions (not indicated in Table 8), but once achieved, annual catch limits may be 145 tonnes lower than at the default B_{MSY} target, while CPUE and the number of lobsters above the MLS could be about 1.8 times higher, with 25 times more male lobsters capable of preying on the largest kina (Table 8).

66. **Uncertainty in long term impacts**:

    Table 8 should be interpreted with caution, as it relies on assumptions (e.g., future management decisions, constant stock productivity, and abundance trends) that change over the long term. While the modelling helps illustrate broad impacts of managing at target levels, exact outcomes are uncertain. The model outputs are useful for understanding broad impacts of managing at certain target levels, but it should not be expected that these exact outcomes would be realised. Further details on modelling uncertainty are provided in Part 2 later in this document.

67. **Estimating economic impacts:**

    Table 8 is based on long term model projections of biomass and provides an indication of changes in long term landed revenue associated with each target option. The estimated valuations are based on port price for rock lobster in the latest survey period (2023/24 fishing year). Uncertainties in this analysis include:

- Does not account for increased fishing efficiency (catching quota quicker uses less bait and fuel) which would be expected to provide economic benefits or possible changes in market demand due to the increasing size of lobsters caught in the fishery.
- Assumes that required catch reductions at higher targets are applied only to the Total Allowable Commercial Catch.
- Relies on continued market demand and market access and maintaining a port price of $101.97 per kg.
- Indicates potential outcomes expected once biomass has reached the management target. If biomass needs to increase to reach the management target, then more severe costs may be experienced in the interim.

68. **Estimating environmental impacts:**

Urchin barrens are understood to be less prevalent in CRA 4 and the role of rock lobster fishing in urchin barren persistence and formation in CRA 4 is less well understood than for CRA 2. Table 8 uses three metrics to understand potential environmental impacts; the change in overall abundance of rock lobster, the change in abundance of 'large lobster', and approximate periods in the past with similar biomass levels. This analysis indicates potential outcomes after managing at the target for a period of time (~20 years). 'Large lobster' in Table 8 refers to rock lobster with a carapace length (body length) greater than 130 mm because research indicates lobsters above this size are large enough to feed on urchins of all sizes. It is important to note that there is no definitive knowledge of the threshold of rock lobster abundance or size distribution required to avoid, remedy, or mitigate adverse impacts on the aquatic environment.

Target options	Environmental impacts	Economic and fishery impacts			
Relative to B_{MSY} (% of unfished exploitable biomass)	**Potential environmental impact metrics** (total biomass and size of large lobsters defined as lobster with a carapace length of 130 mm or larger) **compared to managing at B_{MSY}.**	**Average catch for all sectors at target after 20+ years** (arrows indicate the change from 2025).	**Change in landed revenue compared to 2025 settings** (if all applied to TACC, not including cost efficiencies).	**Fishing experience metrics** (catch rates and abundance of legal-size lobster) **compared to managing at B_{MSY}.**	**Potential impacts on commercial fishery compared to managing at B_{MSY}** (dependent on apportionment of catch allowances and realised after managing at the target level for 20+ years).
Default B_{MSY} target: 16.6%	-	562 t (↑ 44%)	↑ $17.7M	• Predicted CPUE of approximately 2.75 lobsters per potlift.	-
Option 1: 2.05x B_{MSY} (33.4%) (approx. 70% unfished SSB and 61% unfished total biomass)	• Total biomass is about 18% higher. • 25x more male and 9x more female lobsters capable of preying on largest kina. • Uncertainty in environmental impacts. Lowest likelihood of mitigating adverse environmental impacts of the options presented. • Biomass similar to 2024/early 1980 biomass.	415 t (↑ 7%)	↑ $2.9M	• About 1.8x increase in commercial CPUE. • There are moderately more above the MLS which are available to recreational and commercial fishers (about 1.4x more female and 1.8x more male lobster). • Increased total biomass may increase availability of lobster within customary fishing areas.	• Improved lobster abundance should lead to higher CPUE, which is likely to increase fishing efficiency and reduce costs (e.g., fuel and bait). However, more large lobsters may lead to increased size grading, as they are less preferred in the market, which could reduce some gains in fishing efficiency. • A wider size range of lobsters allows fishers to better match catch to market demand, improving flexibility and work-life balance. • Increased stock resilience and stable abundance are expected to support more consistent catch levels and limits year to year. • A long term catch reduction of ~145 tonne across all sectors. This is similar to 2025 catch levels and may not result in a significant change to the current number of operators. • Higher profitability may help offset income losses from reduced ACE
Option 2: 2.5x B_{MSY} (41.2%) (approx. 72% unfished SSB and 64% unfished total biomass)	• Total biomass is about 25% higher. • 40x more male and 13x more female lobsters capable of preying on largest kina. • Uncertainty in environmental impacts. Moderate likelihood of mitigating adverse environmental impacts of the options presented. • Biomass similar to late 1990s and greater than in 1980.	356 t (↓ 8%)	↓ $3.2M	• About 2.2x increase in commercial CPUE. • There are more lobsters larger than the MLS which are available to recreational and commercial fishers (about 1.5x more female and 2x more male lobster). • Increased total biomass may increase availability of lobster within customary fishing areas.	• Option 2 is expected to result in a greater increase in larger lobster abundance and resulting CPUE than Option 1, leading to more efficiency gains. However, size grading may also increase which may be a disadvantage to fishers. • Stock resilience and more stable abundance are expected, supporting consistent catches and limits over time. • Approximately 59 tonne reduction in long term average catch compared to Option 1 and ~ 206 tonne reduction compared to managing at B_{MSY}.
Option 3: 3.0x B_{MSY} (49%) (approx. 75% unfished SSB and 69% unfished total biomass)	• Total biomass is about 33% higher. • Significantly more lobsters capable of preying on largest kina (19x more female and 64x more male). • Uncertainty in environmental impacts. Highest likelihood of mitigating adverse environmental impacts of the options presented. • Biomass greater than in 1980.	284 t (↓ 27%)	↓ $10.6M	• About 2.6x increase in commercial CPUE. • There are more lobsters larger than the MLS which are available to recreational and commercial fishers (about 1.6x more female and 2.4x more male lobster). • Increased total biomass may increase availability of lobster within customary fishing areas.	• The largest increases in CPUE and abundance of large lobster compared to Options 1 and 2. • The reduction in long term average catch compared to managing at B_{MSY} (~ 278 tonne reduction) is likely to have significant economic impacts on the industry. A number of vessels and operators may leave the industry because of limited ACE. • Higher CPUE under this option is expected to provide increases in cost efficiencies for operators that are still able to operate and have benefits for work life balance. However, size grading may also increase which may be a disadvantage to fishers.

Table 8. Indicative trade-offs of managing CRA 4 to alternative management targets. This analysis indicates average impacts **once the target has been reached over the long term**, not the impacts while managing toward the target. Annual impact while reaching the target will depend on Minister's decisions for catch limits in the interim. The Minister has the discretion to choose different ways and rates to manage towards a target.

How to provide feedback

69. We are seeking your feedback on both the management target that should be considered for each stock and the draft section 11A fisheries plans. A submission template is available here: Submission form

70. Send your feedback via email to: FMSubmissions@mpi.govt.nz. The deadline for feedback is 5pm on Monday 8 September 2025.

Key questions for providing feedback

71. Questions for the management target:
    - Which management target do you support for each stock and why? Do you support alternative targets not discussed in this paper?
    - How might the proposed management targets impact you?
    - What are your long-term aspirations for fisheries management and the stock level of each stock?

72. Questions for the management threshold:
    - Do you support implementing a management threshold to better support sustainable management?
    - Do you have a preferred management threshold option?
    - Do you support the management action recommended if the threshold is breached (management action d in the draft fisheries plan)?

73. Questions for the draft fisheries plan:
    - Do you consider additional management objectives, strategies, or performance criteria should be included in the future?
    - Do you agree that a review period of 10 years for the fisheries plans is recommended?
    - Do you agree that a probability of 50% is adequate for maintaining the stock around the target?

What happens after consultation?

74. FNZ will use the feedback from this consultation to determine a preferred management target for each stock to include in the draft fisheries plan. Feedback on the draft fisheries plans will be used to consider if further amendments to the plans are required.

75. FNZ will provide the Minister with a summary of feedback from consultation and ask the Minister to approve the final fisheries plans.

76. If approved, the fisheries plans will be considered by the Minister before deciding to set or vary a sustainability measure or make any decision or recommendation under the Act to regulate or control fishing. These may be used to inform catch setting reviews for 1 April 2026. The fisheries plans will operate for 10 years and then will be reviewed.

Part 2: Initial assessment against relevant legal provisions

Overview

77. The sections below outline Fisheries New Zealand's (**FNZ's**) initial assessment of the draft fisheries plans against sections 8, 9, and 10 of the Fisheries Act 1996 (**the Act**). Information on kaitiakitanga and input and participation of tangata whenua has also been provided – this is relevant to the Minister's decision making under section 12(1)(b).

78. The draft section 11A fisheries plans are specific to the management target and threshold for the CRA 2 and CRA 4 stocks. Therefore, the analysis against legal provisions below relates to the management target and threshold options outlined in Part One.

79. If approved, the Minister will be required to take into account the management target defined in the fisheries plan in any decisions on sustainability measures for these stocks. It should be noted, however, that the Minister would still have discretion to make decisions that do not align with this management target. When setting or varying sustainability measures, the Minister will still be required to assess their decisions on those measures against the purpose and principles of the Act, and would have discretion to choose measures that do not align with the target if they consider that would better meet the purpose and principles of the Act at that time.

Application of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 – section 5(b) of the Act

80. When deciding whether to approve a fisheries plan, the Minister must act in a manner consistent with the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (the Settlement Act). Section 5(b) of the Act requires that the Act be interpreted, and people making decisions under the Act to act, in a manner that is consistent with the Settlement Act. Section 10 of the Settlement Act provides that non-commercial customary fishing rights continue to be subject to the principles of the Treaty of Waitangi and give rise to Treaty obligations on the Crown.

81. Section 10 of the Settlement Act also requires the Minister to consult and develop policies and programmes to recognise and give effect to the use and management practices of tangata whenua in the exercise of non-commercial fishing. Consistent with this section, FNZ has worked with iwi to develop engagement processes that enable iwi to work together to reach a consensus where possible and to inform FNZ on how tangata whenua wish to exercise kaitiakitanga with respect to fish stocks in which they share rights and interests and how those rights and interests may be affected by sustainability measures proposed.

82. For information on input and participation of tangata whenua, see 'Input and participation of tangata whenua' below.

Application of international obligations – section 5(a) of the Act

83. When deciding whether to approve a fisheries plan, the Minister must also act in a manner consistent with New Zealand's international obligations relating to fishing. The international obligations FNZ considers most relevant are the United Nations Convention on the Law of the Sea (UNCLOS) and the United Nations Convention on Biological Diversity (Biodiversity Convention).

84. UNCLOS provides that States have the sovereign right to exploit their natural resources subject to an overriding duty to protect and preserve the marine environment (articles 192 and 193). Articles 61 and 62 of the UNCLOS are particularly relevant. It was recognised that these articles "drive the focus of the Fisheries Act on exploitation of fishery stocks within sustainability limits" by the Court of Appeal in the Sanford case. The requirements in Article 61, and the

general duty to protect and preserve the marine environment in article 192 have the effect of requiring the Minister to consider the effects of fishing on the wider ecosystem. These ecosystem considerations are also acknowledged in the Act (through sections 9, 11, and 13 of the Act).

85. The Biodiversity Convention is the international legal instrument for "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources". It sets out a range of obligations on its signatories. Although New Zealand gives effect to this convention in a variety of ways (including under other legislation), the Act specifically recognises the importance of biodiversity in section 9(b) of the Act and the requirement to ensure the sustainability of the aquatic environment (section 8 of the Act).

The purpose of the Act: section 8 of the Act

86. The purpose of the Act is to provide for the utilisation of fisheries resources while ensuring sustainability**.**

Ensuring sustainability is defined as:

a) *maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and*
b) *avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment.*

Utilisation is defined as: *conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural well-being.*

87. The sections below discuss the management target options against the dual purpose of providing for utilisation while ensuring sustainability.

Ensuring sustainability

88. Section 13 of the Act requires that the Minister set a Total Allowable Catch (TAC) that is consistent with managing the stock at or above a level that can produce the maximum sustainable yield (MSY). The biomass associated with managing for MSY is referred to as B_{MSY}. MSY is the largest long-term average catch or yield that can be taken from a stock under prevailing ecological and environmental conditions. It is the maximum use that a renewable resource can sustain without impairing its renewability through natural growth and reproduction. MSY is considered sustainable for a fishery from a single-stock perspective.

89. Managing to a target above B_{MSY} is more conservative and is expected to better ensure sustainability over the long term than managing for MSY. Managing above B_{MSY} is expected to better maintain the potential of the CRA 2 and CRA 4 fisheries to meet the reasonably foreseeable needs of future generations. Managing to a biomass higher than B_{MSY} may increase resilience of the stocks by creating a buffer for uncertainty. Relevant uncertainty includes that associated with the stock assessment estimates and the biological processes that are being modelled in response to changing environmental conditions (for example, ocean warming, ocean acidification, sedimentation, pollution, increased extreme weather events).[5]

90. Higher targets are expected to ensure sustainability with a higher likelihood than lower targets. From a sustainability perspective it broadens the size and age structure of the population to include a larger number of older, bigger lobster, and offers greater protection against environmental change that may impact spawning success. Managing to higher biomasses may increase competition or lead to density dependent effects but it is unlikely that

[5] Kemp et al. (2023)

this would lead to significant adverse effects on the stock at the levels proposed in the near future if at all.

91. Introducing a threshold to recommend management action if biomass reduces significantly below the management target is expected to better ensure sustainability of the CRA 2 and CRA 4 fisheries as it encourages responsive fisheries management.

92. The role of rock lobster fishing in urchin barren formation is an important consideration of 'ensuring sustainability' of the wider ecosystem because the formation of urchin barrens is considered an adverse effect of fishing on the aquatic environment. Initial analysis of how the management target options may influence the formation of urchin barrens is provided below under 'Urchin barrens'.

Providing for utilisation

93. Managing at higher targets is expected to come at the cost of forgone utilisation, this is because a catch limit lower than which could be achieved at MSY would be required to maintain the biomass at levels higher than B_{MSY}.

94. Commercial fishers in CRA 2 and CRA 4 have indicated that small reductions in commercial catch limits for the benefit of increased catch efficiency and stability is preferable to managing at B_{MSY}. Industry have indicated that their preferred options are Option 1 for CRA 2 and CRA 4.

95. Industry representative bodies have indicated that higher than Option 1 target options (Option 2 and Option 3) would overly constrain commercial utilisation. Option 3 for CRA 2 and CRA 4 would be expected to have significant economic impacts on commercial operators (fishers, Licensed Fish Receivers, and quota owners) because the reductions in total allowable commercial catch limits required to manage to these biomass levels would significantly reduce the annual catch entitlement (ACE) available to operators. This may result in some operators exiting the industry. Industry have indicated that an increase in the abundance of large rock lobster, which is expected when managing to higher targets, may result in increased size-grading[6] as these large lobster are not preferred by the market, this may counteract some of the benefits for efficiency realised through increased CPUE.

96. There are likely some benefits for commercial operators seen in increased catch efficiency at these higher target options (Option 2 and Option 3), however commercial fishers expect the economic return from higher ACE to outweigh the returns from increased catch efficiency. FNZ considers that Option 3 may not provide for the use of fisheries resources to enable people to provide for their economic well-being (referencing commercial fishers and the wider communities that they support). Option 1 is likely to better provide for economic well-being than Options 2 and 3.

97. While commercial utilisation is an important aspect to consider, there are also other aspects of utilisation that the Act defines including conserving, enhancing and developing fisheries to provide for social and cultural well-being. Income from the sale of ACE processing and fishing by iwi can provide for social and cultural well-being of Māori communities by funding education, health and welfare work, and housing programmes as well as cultural rejuvenation and environmental projects.

98. There are benefits in terms of increased availability of rock lobster including mitigating some of the impacts of localised depletion, as well as providing larger rock lobster which provides for greater recreational value.

[6] Size-grading (also known as 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.

Assessment of the proposals against section 9 of the Act

99. Table 9 below outlines FNZ's assessment of the management target options against the environmental principles in section 9 of the Act which the Minister must take into account when considering the section 11A fisheries plans. This assessment has been largely informed by our knowledge of the current environmental impact of this fishery.

Table 9: Initial assessment 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	100. Associated or dependent species means 'any non-harvested species taken or otherwise affected by the taking of any harvested species'. This includes protected species such as marine mammals and seabirds, and invertebrate species which are caught incidentally. 101. Potting is the primary method for rock lobster harvest in CRA 2 and CRA 4. Pots are considered to be set too deep for seabirds to enter; there have been no recorded seabird interactions within the CRA 2 and CRA 4 fishery over the last decade. 102. Potting fisheries can interact with marine mammals by entangling species such as humpback whales and orcas. However, these events are rare. Within the CRA 2 fishery there has been one mammal interaction reported with pot or trapping gear over the last decade. Within the CRA 4 fishery there have been no reported marine mammal interactions over the last decade. 103. It is unlikely that potential changes to fishing effort as a result of managing to higher biomasses would increase the probability of attributable interactions and/or any threat to the long-term viability of any associated or dependent species. 104. Some macroalgae are non-harvested species taken or otherwise affected by the taking of rock lobster (through the process of urchin barren formation), so can be considered associated or dependent species. Additionally, a range of species rely directly or indirectly on kelp forests and may be impacted by kelp loss as a result of rock lobster fishing. All options are intended to better provide for the ecosystem role of rock lobster compared to managing at the current default B_{MSY}. Analysis of the risk of urchin barren formation under each option is provided below in Part 3 under '*Urchin barrens'*.
Biological diversity of the aquatic environment should be maintained - Section 9(b) of the Act	105. Biological diversity means the variability among living organisms, including diversity within species, between species, and of ecosystems. 106. All of the options are expected to better provide for maintaining biological diversity relative to the current default target of B_{MSY}. This is because all of the target options intend to manage the stocks to higher biomass levels (i.e., to leave a greater portion of the population unfished). Higher abundances of rock lobster are expected to better maintain biological diversity within reef ecosystems. 107. Managing at higher targets is expected to support a greater abundance of rock lobster across different size ranges, therefore supporting greater functional diversity within the species. Rock lobster of different sizes exhibit different behaviour and play different roles in the ecosystem.[7] Large rock lobster (with a carapace length, **CL**, greater than 130 mm) can feed on all size classes of kina.[8] For CRA 2, Option 3 is expected to result in a greater increase in the number of large lobster (approximately 8 times more male lobster and 19 times more female lobster larger than 130mm CL after 20 year of managing at the target) compared to Option 2 (approximately 5 times more male and 12 times more female lobster larger than 130 mm CL) and Option 1 (approximately 3 times more male and 6

[7] MacDiarmid et al., (2013); Day et al., (2024)

[8] MacDiarmid et al., (2013)

	times more female lobster larger than 130 mm CL). For CRA 4, Option 3 is expected to result in a significantly greater increase in the number of large lobster (approximately 64 times more male lobster and 19 times more female lobster larger than 130 mm CL after 20 year of managing at the target) compared to Option 2 (approximately 40 times more male and 13 times more female lobster larger than 130 mm CL) and Option 1 (approximately 25 times more male and 9 times more female lobster larger than 130 mm CL).[9] 108. Relative to the kelp forests they replace, urchin barrens support a far lower level of biodiversity. In CRA 2, managing to a higher biomass is expected to contribute to increasing rock lobster abundance and may contribute to the restoration of kelp forests. This would be expected to maintain or increase biological diversity of the aquatic environment and biological diversity between species. Analysis of the risk of urchin barren formation under each option is provided below under *'Urchin barrens'.* 109. Kelp dominated habitat is important in supporting settlement, recruitment, and productivity of a number of species, including rock lobster.[10] The options proposed here have potential to support kelp recovery in the long term.
Habitat of particular significance for fisheries management should be protected - Section 9(c) of the Act	**CRA 2** 110. Using the best available information, FNZ have identified eight potential habitats of particular significance for fisheries management (**HoPS**) in CRA 2 (see Table 13 in Part 3). Only one of which overlap with areas where rock lobster fishing occurs, and none include kelp as a key species, meaning it is unlikely that the options for CRA 2 proposed here would result in a risk of adverse effects for any of these habitats. 111. Potting for rock lobster in one potential HoPS, Cradock Channel, is spatially localised, and occurs close to where snapper spawn over the summer months. However, we do not consider it likely that potting will have an adverse effect on the water column where snapper spawning occurs. **CRA 4** 112. Using the best available information, FNZ have identified two potential HoPS in CRA 4 (see Table 13 in Part 3). There is potential for overlap between these areas and where rock lobster fishing occurs. **Potential impacts from the management targets and draft fisheries plans** 113. Rock lobster fishing is primarily done through potting or hand-gathering by diving. 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. Work is ongoing to identify potential adverse effects of fishing activity to potential HoPS.

Information principles: section 10 of the Act

114. The best available information relevant to the management target and draft fisheries plans for CRA 2 and CRA 4 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.

[9] The CRA 4 fishery is expected to experience a greater increase in the abundance of large lobster when managing at management targets higher than B_{MSY}, compared to when managing to B_{MSY}, than the CRA 2 fishery. This difference is because of the biological characteristics of the two populations. This difference is primarily because CRA 4 fishery has a greater proportion of male lobster population below the MLS than in CRA 2, and reduced fishing intensity is therefore expected to allow a greater portion of small lobsters to grow through to larger sizes.

[10] Hinojosa et al., (2014); Eger et al., (2024)

Table 10. Best available information and key areas of uncertainty

Best available information	Key areas of uncertainty, unreliability, or inadequacy
Estimates of unfished biomass Estimated using the most recent fully quantitative stock assessments for each fishery.	• Unfished biomass is estimated by the stock assessment model and is defined as the biomass that would be attained if there were no fishing and recruitment was constant at its average level. Therefore, estimates of unfished biomass do not reflect historical biomass of the stock (such as biomass pre-European arrival or prior to industrial fishing). • Estimates of unfished biomass may not be accurate because catch statistics for the early years are poorly documented, and there are no estimates of recreational catch for most years. Therefore, there is uncertainty associated with the percentages of unfished exploitable, SSB, and total biomass associated with each option.
The long-term impacts of managing at alternative targets on key fisheries metrics (CPUE, total catch, abundance of lobster, size distribution of lobster). Modelling undertaken in 2024 (see *'Management target modelling'* in Part 3). This modelling was based on the most recent fully quantitative stock assessments for each fishery.	• There are sources of uncertainty with the most recent stock assessment that these analysis are based on, as noted in the November 2024 Plenary: Fisheries Assessment Plenary November 2024 Volume 1: Introductory sections and Albacore to Yellowfin Tuna • The modelling assumed that future levels of mean recruitment will be similar to those experienced on average over the last 20 years. • The estimates of the future abundance and composition of these stocks at differing levels of target biomass were obtained by finding the projected level of catch and exploitation rate that would result in the stock achieving each of the proposed target levels of biomass under equilibrium conditions, which may not reflect those that will be experienced in the future due to factors such as climate change. For example, there is evidence of a trend in declining recruitment in CRA 2. • It is uncertain how customary, recreational, and illegal catch of rock lobster may respond to changes in rock lobster abundance associated with managing at higher biomasses. This is because catch can be influenced by social factors and management of other harvest species which are difficult to predict. • A new stock assessment is currently being developed for CRA 2 which may provide appreciably different estimates of B_{MSY}-related target levels, recruitment, and productivity which would impact the predicted implications of managing at alternative targets.
The effect of fishing on urchin barren formation and the efficacy of marine reserves in reversing barrens and restoring kelp forest habitat: New Zealand Aquatic Environment and Biodiversity Chapter 13 *'Trophic and ecosystem-level effects'*, and Doheny et al. (2023).	Key information knowledge gaps pertaining to the relationship between rock lobster, other predators, and urchin barrens, as well as the management required to mitigate urchin barrens are outlined in pages 66-73 and 78 of Doheny et al. (2023). Information gaps most relevant to this fishery include: • The overall biomass threshold and abundance of large rock lobsters (as one of the few key urchin predators)

<table>
<tr><th>Best available information</th><th>Key areas of uncertainty, unreliability, or inadequacy</th></tr>
<tr><td></td><td>required to enable them to meaningfully contribute as rocky reef predators, including helping mitigate urchin barren formation.
• The relative importance of rock lobster to other urchin predators in reducing or reversing barren formation, e.g., how packhorse rock lobster contribute to urchin predation across urchin size classes in comparison to rock lobster.
• The extent to which the trophic effects of fishing interact with changing sea temperatures, ocean acidification, eutrophication, sedimentation, and invasive species needs to be further explored. This includes the future impact that climate change and marine heat waves will have on rock lobsters, and urchin and macroalgae abundance and distribution.</td></tr>
<tr><td>Distribution of urchin barrens:
Research project ZBD2023-03: Summarising and updating knowledge on the distribution of urchin barrens in key regions of New Zealand (DRAFT).
Estimating the extent of urchin barrens and kelp forest loss in northeastern Aotearoa, New Zealand (Kerr et al., 2024).
New Zealand Aquatic Environment and Biodiversity Chapter 13 ‘Trophic and ecosystem-level effects’ and Doheny et al. (2023).
The published studies summarised in Table 14.</td><td>Information for CRA 2
In 2024, FNZ contracted research project ZBD2023-03: Summarising and updating knowledge on the distribution of urchin barrens in key regions of New Zealand. Draft mapping results updating our understanding of the extent and location of urchin barrens on shallow reefs in CRA 2 have been included in this consultation (see ‘Urchin barrens‘ under Part 3). The final report will be published in later 2025. A final report and spatial layer will be reviewed and published by September 2025). Particular areas of uncertainty include:
• The abundance and distribution of kina and Centrostephanus rodgersii in urchin barren areas. Aerial mapping does not provide species-specific information.
• Information on urchin barrens in unmapped areas (see ‘Urchin barrens’ under Part 3). Unmapped areas indicates areas that could be suitable for urchin barrens but that could not be mapped due to poor imagery.
• The mapping describes urchin barrens visible in aerial and satellite imagery, thus it is limited to describing urchin barrens on shallow reefs. Urchin barrens on deeper reefs (> 20m) are not captured using this method.
Kerr et al. (2024) estimated the percentage of shallow rocky reef habitat that comprises urchin barrens at seven sites between Maitai Bay at the Northland Peninsula to Tāwharanui Peninsula in the Hauraki Gulf, then extrapolated this information to estimate the extent of urchin barrens across the region (30% urchin barren coverage) based on the extent of rocky reef habitat.
Other information on the location and extent of urchin barrens in CRA 2 is cited in Doheny et al. (2023). Particular areas of uncertainty in defining the percent cover of barrens for a given location relate to the depth cut off for</td></tr>
</table>

Best available information	Key areas of uncertainty, unreliability, or inadequacy
	shallow reefs, which can be different depending on the study. **Information for CRA 4** There is limited information on urchin barrens in the CRA 4 region. There is uncertainty about whether urchin barrens are present on parts of the coast.
Habitat of particular significance for fisheries management	**Information for CRA 4** The studies carried out in the Hawke Bay support medium confidence in the evidence for the nursery and spawning habitat for the potential HoPS in this area.

Input and participation of tangata whenua

115. Before approving a plan under section 11A(1), the Minister must provide for the input and participation of tangata whenua who have a non-commercial interest in the stock or an interest in the effects of fishing on the aquatic environment in the area concerned.

116. Input and participation of tangata whenua is provided mainly through Iwi Fisheries Forums, which have been established for that purpose. Each Iwi Fisheries Forum can develop an Iwi Fisheries Forum Plan that describes how the iwi in the Forum exercise kaitiakitanga over the fisheries of importance to them, and their objectives for the management of their interest in fisheries. Iwi Fisheries Forums may also be used as entities to consult iwi with an interest in fisheries.

117. Some iwi and hapū in the CRA 2 and CRA 4 areas are not currently part of an Iwi Fisheries Forums. For these iwi and hapū, FNZ work with the post-settlement governance entities to provide for input and participation.

118. The Ministry has worked with iwi to develop engagement processes that enable iwi to work together to reach a consensus where possible and to inform the Ministry of how tangata whenua wish to exercise kaitiakitanga with respect to fish stocks in which they share rights and interests, and how those rights and interests may be affected by decisions proposed by the Ministry.

119. The CRA 4 QMA overlaps with the rohe moana of iwi and hapū that are represented by the Mai Paritu tae atu ki Turakirae and Te Tai Hauāuru Iwi Fisheries Forums. The CRA 2 QMA overlaps with the rohe moana of iwi and hapū that are represented by the Mai i Ngā Kuri a Whārei ki Tihirau and Ngā Hapu o Ngāti Porou Iwi Fisheries Forums as well as the rohe moana of Hauraki and Tāmaki iwi.

120. In 2024 and 2025, FNZ provided material on managing to higher management targets to the Iwi Fisheries Forums and discussed this material at some Forum hui. FNZ invited feedback from the Forums and offered to provide more detailed information upon request. The draft fisheries plans were shared with the Iwi Fisheries Forums in July 2025 for their consideration. Input received by each Forum is provided in Table 11.

121. In July 2025, FNZ shared the draft fisheries plans and management target options more widely with iwi not engaged in the Iwi Fisheries Forums by sharing material with the relevant post-settlement governance entities. FNZ invited feedback from the post-settlement governance entities and offered to provide more detailed information upon request. No input has been received by post-settlement governance entities to date.

Table 11. Input received from Iwi Fisheries Forums

Iwi Fisheries Forums with rohe moana within CRA 4 QMA	
Mai Paritu tae atu ki Turakirae Iwi Fisheries Forum	No feedback received to date.
Te Tai Hauāuru Iwi Fisheries Forums	This forum is not currently meeting. Material was shared with previous forum members. FNZ has not received any feedback to date.
Iwi Fisheries Forums with rohe moana within CRA 2 QMA	
Hauraki/Tāmaki	This forum is not currently meeting. Material was shared with previous forum members. FNZ has not received any feedback to date.
Mai i Ngā Kuri a Whārei ki Tihirau Iwi Fisheries Forum	Following a previous hui in August 2024, when there was collective consensus to manage the stock to a higher biomass level so rock lobster can fulfil its role as a predator of urchins, some members considered managing the stock to a biomass level experienced in the mid-1990s (similar to Option 2) was appropriate.
Ngā Hapu o Ngāti Porou Iwi Fisheries Forum	This Forum provided input in October 2024. The Forum also expressed ongoing concern for the abundance of rock lobster in their customary fisheries, with some members expressing a view that there should not be a TAC increase at this time. There was collective consensus that the stock should be managed to a higher biomass level than it currently is.

Kaitiakitanga

122. In considering the views of tangata whenua, the Minister is required to have particular regard to kaitiakitanga. Information provided by Iwi Fisheries Forums, and iwi views on the management of fisheries resources and fish stocks, as set out in Iwi Fisheries Plans, are ways that tangata whenua can exercise kaitiakitanga in respect of fish stocks. The Iwi Fisheries Plans relevant to the CRA 2 and CRA 4 QMA are outlined in Table 12 below.

123. FNZ considers that the aim of managing to higher biomass through a section 11A fisheries plan for CRA 2 and CRA 4 generally contributes towards these objectives, as it aims to support sustainability of the fishery and the surrounding ecosystem. Additionally, managing these stocks to a higher biomass at the QMA scale may help to increase the availability of rock lobster within customary fishing areas, thus better providing for customary use and management practices.

124. FNZ is seeking input from tangata whenua on how the management targets and the draft fisheries plan for CRA 2 and CRA 4 may or may not provide for kaitiakitanga as exercised by tangata whenua, and how tangata whenua consider the target and draft fisheries plan may affect their rights and interests in these stocks.

Table 12. Iwi Fisheries Forum Plans relevant to CRA 2 and CRA 4

<table>
<tr><th colspan="2">Iwi Fisheries Forum Plans and Iwi Fisheries Plans relevant to the CRA 4 QMA</th></tr>
<tr><td>Mai Paritu tae atu ki Turakirae Iwi Fisheries Forum</td><td>125. The Forum is currently developing its Iwi Fisheries Plan. The forum considers rock lobster as taonga.</td></tr>
<tr><td>Te Tai Hauāuru Iwi Fisheries Forums</td><td>126. The Iwi Fisheries Forum Plan identifies rock lobster as a species of importance. The relevant management objectives are:
• Our customary non-commercial fisheries are healthy, sustainable and supports the cultural wellbeing of Te Tai Hauāuru Iwi.
• Our commercial fisheries are sustainable and support the economic wellbeing of Te Tai Hauāuru Iwi.
• Mana and rangatiratanga over our fisheries is restored, preserved and protected for future generations.
• Iwi collaborate in fisheries and environmental resource management to achieve iwi driven objectives.</td></tr>
<tr><td>Rangitaane (lower North Island)</td><td>127. The Iwi Fisheries Plan identifies kōura as a species with high customary value. The relevant management objectives are:
• Mana and rangatiratanga over Rangitaane (lower North Island) Fisheries is restored, preserved and protected for future generations.
• Collaborative iwi partnerships in fisheries and environmental resource management are realised.
• Rangitaane (lower North Island) have sufficient capacity to meet their individual and collective responsibilities as tiaki tangata/kaitiaki in partnership with others.
• Our customary non-commercial fisheries are healthy, sustainable and support the cultural wellbeing of Nga iwi o Rangitaane (lower North Island).
• Our commercial fisheries are sustainable and support the economic wellbeing of Rangitaane (lower North Island) hapū and whānau.</td></tr>
<tr><th colspan="2">Iwi Fisheries Forum Plans and Iwi Fisheries Plans relevant to the CRA 2 QMA</th></tr>
<tr><td>Mai i Ngā Kuri a Whārei ki Tihirau Iwi Fisheries Forum</td><td>128. The Iwi Fisheries Forum Plan lists rock lobster, kina, and kelp as taonga species. The plan also sets out objectives for management of fish stocks. Objectives relevant to this review include:
• Management Objective 1: Iwi fisheries management activities support the growth and wellbeing of our people.
• Management Objective 2: Iwi are actively engaged with others to increase their fisheries potential within environmental limits.
• Management Objective 3: The fisheries environment is healthy and supports a sustainable fishery.
• Management Objective 4: Tino rangatiratanga is advanced to ensure that iwi driven goals are achieved.</td></tr>
<tr><td>Ngā Hapu o Ngāti Porou Iwi Fisheries Forum</td><td>129. There are six hapū that affiliate with Ngā Hapū o Ngāti Porou and have rohe moana that overlap with the CRA 2 QMA, these hapū have developed Hapū Fisheries Plans, all of which list kōura (rock lobster) as a taonga species and have tikanga associated with kōura (rock lobster). The six hapū are: Te Whānau</td></tr>
</table>

	a Hunaara, Te Whānau a Tapaeururangi, Te Whānau a Tuwhakairiora, Te Whānau a Te Aotaki, Te Whānau a Hinerupe, and Te Whānau a Kahu.

Section 12 of the Act: Consultation

130. Under section 12 of the Act, the Minister is required to consult with such persons or organisations as the Minister considers are representative of those classes of persons having an interest in the stock or the effects of fishing on the aquatic environment in the area concerned, including Māori, environmental, commercial, and recreational interests.

Historic Treaty Settlement Agreements

131. A number of historic treaty settlements require FNZ to consult with post-settlement governance entities when initiating or making changes to national fisheries plans. FNZ have consulted with the appropriate post-settlement governance entities that have protocols or legislative recognition relating to fisheries plans with FNZ.

Ngā Rohe Moana o Ngā Hapū o Ngāti Porou Act 2019:

132. The Ngā Rohe Moana o Ngā Hapū o Ngāti Porou Act 2019 gives effect to the deed of agreement between ngā hapū o Ngāti Porou and the Crown. The CRA 2 QMA partially overlaps with the area that the Ngā Rohe Moana o Ngā Hapū o Ngāti Porou Act 2019 applies to.

133. A map of ngā rohe moana is attached to the section 11A fisheries plan for CRA 2 as required under section 14 of the Ngā Rohe Moana o Ngā Hapū o Ngāti Porou Act 2019.

Part 3: Supporting Information

Potential habitats of particular significance

Table 13: Potential habitat of particular significance for fisheries management relevant to CRA 2 and CRA 4 where rock lobster fishing may overlap with the habitat

<table>
<tr><th colspan="3">Potential habitats of particular significance for fisheries management relevant to CRA 2</th></tr>
<tr><td>Potential habitat of particular significance</td><td colspan="2">Cradock Channel</td></tr>
<tr><td>Attributes of habitat</td><td colspan="2">Water column to east of channel known for snapper spawning. Spawning takes place in spring/summer, is temperature dependent, and coincides with high levels of primary production in the water column (Zeldis and Francis 1998; Parsons et al., 2014, Jones et al., 2016).</td></tr>
<tr><td>Reasons for particular significance</td><td colspan="2">Spawning (snapper).</td></tr>
<tr><td>Risks/Threats</td><td colspan="2">Impacts of rock lobster fishing:
• Impact of potting on water column considered to be low.
Non-fishing impacts:
• Sedimentation from land-based practices (turbidity).
• Eutrophication from aquaculture.
• Nutrient enrichment and chemical pollutants from land-based practices.</td></tr>
<tr><td>Existing protection measures</td><td colspan="2">• Inshore precision seafood harvesting modular harvest system trawl net prohibited.
• Trawling and Danish seining prohibited.
• Pair trawling and pair Danish seining prohibited.</td></tr>
<tr><td>Evidence</td><td colspan="2">Zeldis and Francis, 1998. Parsons et al., 2014. Jones et al., 2016</td></tr>
<tr><th colspan="3">Potential habitats of particular significance for fisheries management relevant to CRA 4</th></tr>
<tr><td>Potential habitat of particular significance</td><td>Wairoa Hard – Hawke Bay</td><td>Clive Hard – Hawke Bay</td></tr>
<tr><td>Attributes of habitat</td><td>Nearshore mixed biogenic habitat comprising coarse sediments, occasional patches of cobbles and rocky outcrops and extensive areas of kelp.</td><td>Nearshore mixed habitat comprising gravel, small boulders, and kelp, surrounded by sandy mud and muddy substrates.</td></tr>
<tr><td>Reasons for particular significance</td><td>Important nursery ground for a variety of pelagic and benthic fish species including snapper.
Potentially important spawning ground for some fish species, including snapper.
Recognised as an area with significant conservation value in the coastal ecosystem in 1995.</td><td>Important nursery ground and potentially important spawning ground for some fish species, including snapper.</td></tr>
<tr><td>Risks/Threats</td><td colspan="2">Impacts of rock lobster fishing:
• Impact of potting on benthos considered to be low.</td></tr>
</table>

	• Hand gathering of rock lobster considered very unlikely to impact benthic habitats. **Other potential impacts:** • Vessels anchoring or trawling over sensitive benthic habitat. • Sedimentation from land-based practices (turbidity). • Eutrophication from land-based practices and aquaculture. • Nutrient enrichment and chemical pollutants from land-based practices.	
Existing protection measures	Several areas within shallower inshore waters of CRA 4 are closed to specific fishing methods, including Wairoa Hard, and may provide some protection to potential nursery habitats. Specifically: • Take of finfish from Wairoa Hard is prohibited under regulation. • Prohibition of paired trawling along parts of the North Island east coast. • Prohibition of Danish Seining around the lower North Island. • Hawke Bay Cable Protection Zones prohibit most fishing methods. The National Policy Statement on Freshwater Management and the National Environmental Standards for Freshwater, which came into effect on 3 September 2020, are intended to lead to improved water quality in shallow harbours and estuaries and other shallower inshore waters. FNZ engages with the RMA coastal planning processes to support marine management decisions to manage land-based impacts on habitat of particular significance for fisheries management.	
Evidence	Jones et al. (2016); Morrison et al. (2014); Fisheries New Zealand (2024); Hawke's Bay Regional Council (2020); Morrison per comms; Duffy per comms; Walsh et al. (2012)	Haggit and Wade (2016); Jones et al. (2016)

Urchin barrens

What are urchin barrens and how does rock lobster fishing impact them?

134. FNZ's working definition, for the purpose of identifying those areas that are of concern is "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".[11]

135. Rock lobsters are ecologically important predators in New Zealand's rocky reef ecosystems. The best available information indicates that predators, including rock lobsters, when present at sufficient abundance and size structure can have a significant role in mitigating sea urchin barrens, which are less biologically diverse environments than the kelp forest habitats they replace.

136. Evechinus chloroticus (kina) is the dominant barren-forming urchin species in New Zealand, although the subtropical urchin Centrostephanus rodgersii (long-spined urchin) has recently been reported as increasing in parts of northern New Zealand, forming extensive urchin barrens on offshore islands including in the Poor Knights Marine Reserve.[12] FNZ recognises that barrens caused by the long-spined urchin are an increasing issue and rock lobster and

[11] Doheny et al. (2023)

[12] Sweatman (2021)

packhorse rock lobster (Sagmariasus verreauxi) are potentially the only predators that can consume the largest long-spined urchins in New Zealand.[13]

137. Urchin barrens are not ubiquitous across rocky reefs and tend to be restricted to different depth zones determined by environmental conditions. On moderately exposed coasts, the shallow reef (0–3 m water depth) tends to be occupied by brown macroalgae,[14] intermediate depths (3–8 m water depth) are where urchin barrens normally occur (especially those caused by kina), and deeper reefs (>8 m water depth) are dominated by kelp forests (Ecklonia radiata).[15] Grazing of macroalgae and other invertebrates by the long-spined urchin tends to result in barrens forming at greater depths, commonly below 10-12 m water depth. On more exposed reefs, barrens form on deeper sections of reef (12–20 m water depth), while in more sheltered conditions barrens are restricted to shallower depths.[16] Urchin barrens tend to not form in very sheltered areas that experience high sediment loads, or areas with freshwater inputs or excessive wave action.

138. Multiple factors can cause kelp decline (including sedimentation, disease, and marine heatwaves). However, in northeastern New Zealand, fishing of top reef predators is considered to be a key factor behind the proliferation of kina, resulting in extensive kelp loss and the formation and expansion of urchin barrens.[17] Our understanding of this relationship is based on observations of the concurrent recovery of kelp and of urchin predators (including snapper, *Chrysophrys auratus*, and rock lobster) inside marine reserves in north-eastern New Zealand,[18] and the positive effect of protection from fishing on the abundance of kelp and predators inside seven marine reserves from the Three Kings Islands to the Bay of Plenty.[19]

139. The loss of kelp forests in coastal ecosystems negatively impacts fisheries productivity, biodiversity, and ocean carbon sequestration. Urchin barrens support a far lower level of biodiversity relative to kelp forests due to the loss of ecosystem services that macroalgae provides. These include providing complex three-dimensional habitat that fish and shellfish feed and shelter in and the provision of organic matter that contributes to productivity both on rocky reefs where kelp grows, and in non-reef habitats to which algal detritus is transported.[20] Furthermore, the loss of kelp forests and associated biodiversity may make these reefs less resilient to the impacts of climate change,[21] which would likely impact the productivity of marine ecosystems on the north-east coast of New Zealand.

140. Once established, urchin barrens are stable and persistent. Studies have shown that urchin abundance must be reduced to very low levels (<1 m2) for urchin barrens to revert to a kelp or macroalgae dominated habitat.[22]

Distribution of urchin barrens in CRA 2

141. An FNZ-funded research project has recently provided up to date, detailed information on the distribution of urchin barrens in shallow coastal waters from Cape Reinga to East Cape (Figure 5). The draft final report is still subject to FNZ review processes, but the mapping results have been subject to peer review via the FNZ science working group and are included in the consultation document as best available information on the location and extent of urchin barrens.

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[13] Balemi & Shears (2023)
[14] Fucalean algae which belongs to the order *Fucales* and are commonly found in marine environments.
[15] Choat & Schiel (1982); Shears & Babcock (2004).
[16] Shears et al. (2004)
[17] 2024 Aquatic Environment Biodiversity Report, Chapter 13: Trophic and Ecosystem Level Effects (and references within).
[18] Babcock et al. (1999); Shears & Babcock (2003); and Leleu et al. (2012).
[19] Edgar et al. (2017).
[20] Udy et al. (2019).
[21] Bernhardt & Leslie (2013); Duffy et al. (2016).
[22] Filbee-Dexter & Scheibling (2014); Ling et al. (2015); Shears & Babcock (2003).

142. FNZ expects the final report of the urchin barren mapping project to be published later in 2025. Results of the urchin barren mapping project will be used to provide a baseline to evaluate the effectiveness of management measures such as those proposed in this consultation to urchin barren extent over time. They may also be used to develop priority areas for long term monitoring and spatial management.

143. A literature review, conducted as part of this mapping project, has identified and collated records of urchin barren coverage across north-eastern New Zealand (including CRA 2). This includes studies conducted in the northern part of CRA 2 that are published in either peer reviewed scientific journals or in university graduate student theses (Table 14 and Figure 6). FNZ notes that the studies of urchin barren coverage included in this compilation, have been conducted at different spatial scales, with each representing a snapshot at specific points in time. This review also does not include any information about the distribution of urchin barrens on reefs south of Te Whanganui-o-Hei/Cathedral Cove Marine Reserve (Hahei) in southern Hauraki Gulf. Consequently, caution should be exercised when inferring current urchin coverage across the whole of CRA 2.

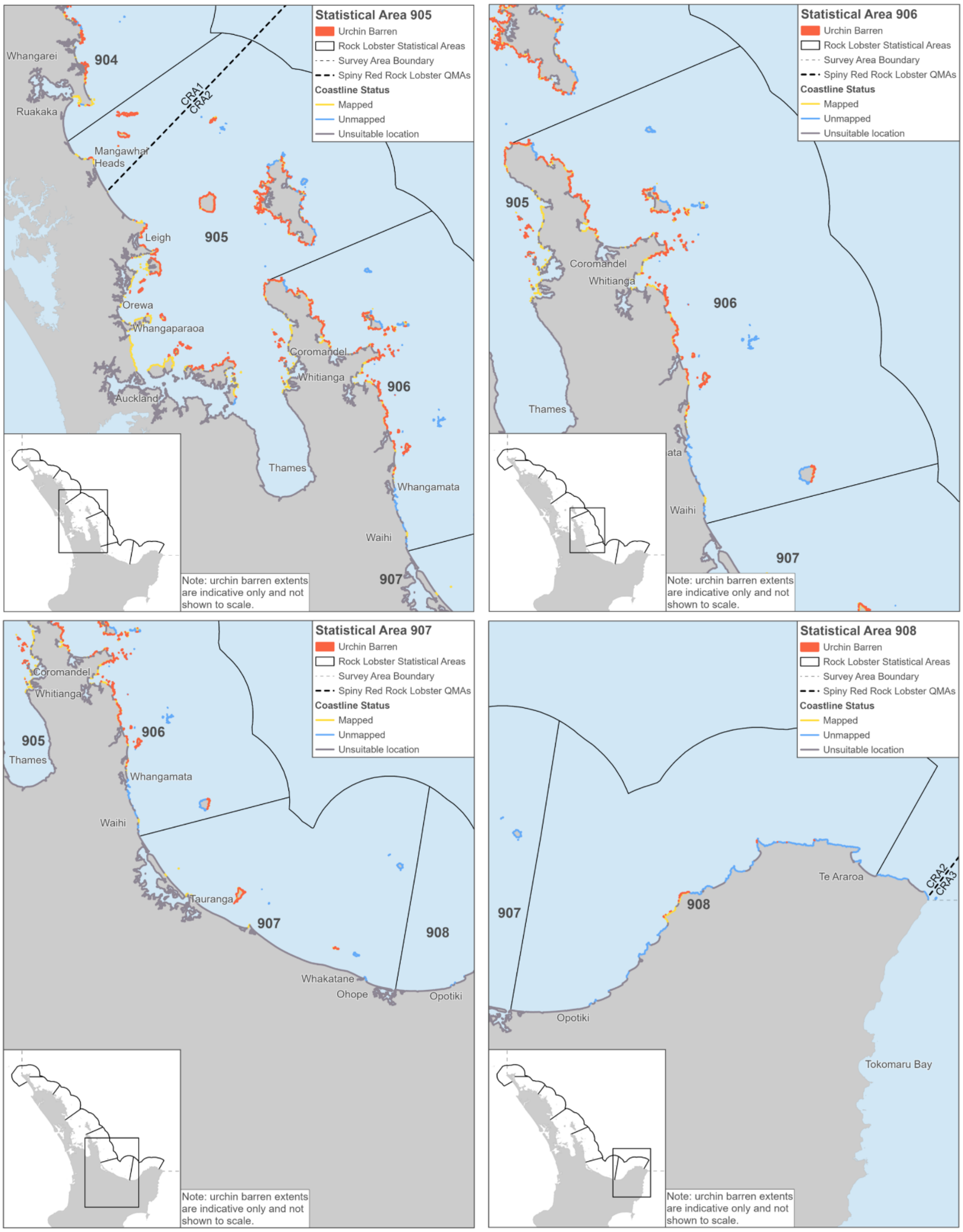

Figure 5. Urchin barrens (shown in orange) mapped in shallow coastal waters in the CRA 2 Quota Management Area as detected through aerial and satellite imagery. CRA 2 is split into each rock lobster statistical area 905 (top left), 906 (top right), 907 (bottom left) and 908 (bottom right). Dotted line in rock lobster statistical area 908 (bottom right) shows the southern extent of the survey area (i.e. southeast North Island has not been surveyed under this project). Mapped areas of reef that did not have urchin barrens are shown in yellow. Unmapped areas, indicating areas that could be suitable for urchin barrens but that could not be mapped due to poor imagery are shown in blue. Areas unsuitable for urchin barrens e.g., estuaries, sandy beaches etc. are shown in grey. Note that all area boundaries have been exaggerated to be visible at the statistical area extent and are not shown to scale.

Table 14. Recent studies of urchin barren coverage within the northern portion of CRA 2.

Location	Year studied	Estimated proportion of reef covered by urchin barrens	Publication
Mokohinau Islands	2019	Barren coverage 4% of shallow reef in 1978 and 26% of shallow reef in 2019.	Lawrence, K. (2019). Mapping long-term changes in reef ecosystems using satellite imagery. University of Auckland Thesis.
Te Hauturu-o-Toi/Little Barrier	2019	Urchin barrens covered 32.72% of reef.	Dartnall, L. (2022). The extent of kina barrens over time at Hauturu-o-Toi and the Noises Islands. University of Auckland Thesis.
Cape Rodney to Okakari Point Marine Reserve	2019	Urchin barrens covered 2% of shallow reef.	Lawrence, K. (2019). Mapping long-term changes in reef ecosystems using satellite imagery. University of Auckland Thesis
	2006	Urchin barrens covered 44.7 hectares in 1977, 4.5 hectares in 2006.	Leleu, K., Remy-Zephir, B., Grace, R., & Costello, M. J. (2012). Mapping habitats in a marine reserve showed how a 30-year trophic cascade altered ecosystem structure. Biological Conservation, 155, 193-201.
Tawharanui	2006	Tāwharanui (38% barren coverage on shallow reefs at fished sites and 2% barren coverage on shallow reefs at marine reserve sites) and Leigh (39% barren coverage on shallow reefs at fished sites and 1% barren coverage on shallow reefs at marine reserve sites)	Kerr, V. C., Grace, R. V., & Shears, N. T. (2024). Estimating the extent of urchin barrens and kelp forest loss in northeastern Aotearoa, New Zealand. New Zealand Journal of Marine and Freshwater Research, 1–22.
Noises Islands	2019	Urchin barrens covered 49.5% of reef.	Dartnall, L. (2022). The extent of kina barrens over time at Hauturu-o-Toi and the Noises Islands. University of Auckland Thesis.
Long Bay	2020	No urchin barrens observed at fished or reserve sites.	Kulins, S. (2021). Investigating the ecological effects of Long Bay-Okura Marine Reserve. University of Auckland Thesis.
Te Whanganui-o-Hei/Cathedral Cove Marine Reserve (Hahei)	2014	20% coverage of reef outside of the reserve. 5% coverage of reef inside the reserve.[23]	Kibele, J., & Shears, N. (2017). Mapping rocky reef habitats on the eastern Coromandel Peninsula with multispectral satellite imagery (No. 12557259). Hamilton, New Zealand: Waikato Regional Council.
	2015	Urchin barren coverage not quantified, observed at some sites. Appears *Carpophyllum flexuosum* replacing barrens.	Haggitt, T. (2017). Te Whanganui a Hei Marine Reserve Habitat Mapping, Report prepared by eCoast for Department of Conservation.
Waiheke	2016	Urchin barren coverage not quantified, observed at some sites.	Haggitt, T. (2016) Ecological survey of Waiheke Island north-west coastline, report prepared by eCoast for Auckland Council and Hauraki Gulf Conservation Trust.

[23] Urchin barren coverage was combined with turfing algae coverage for analysis.

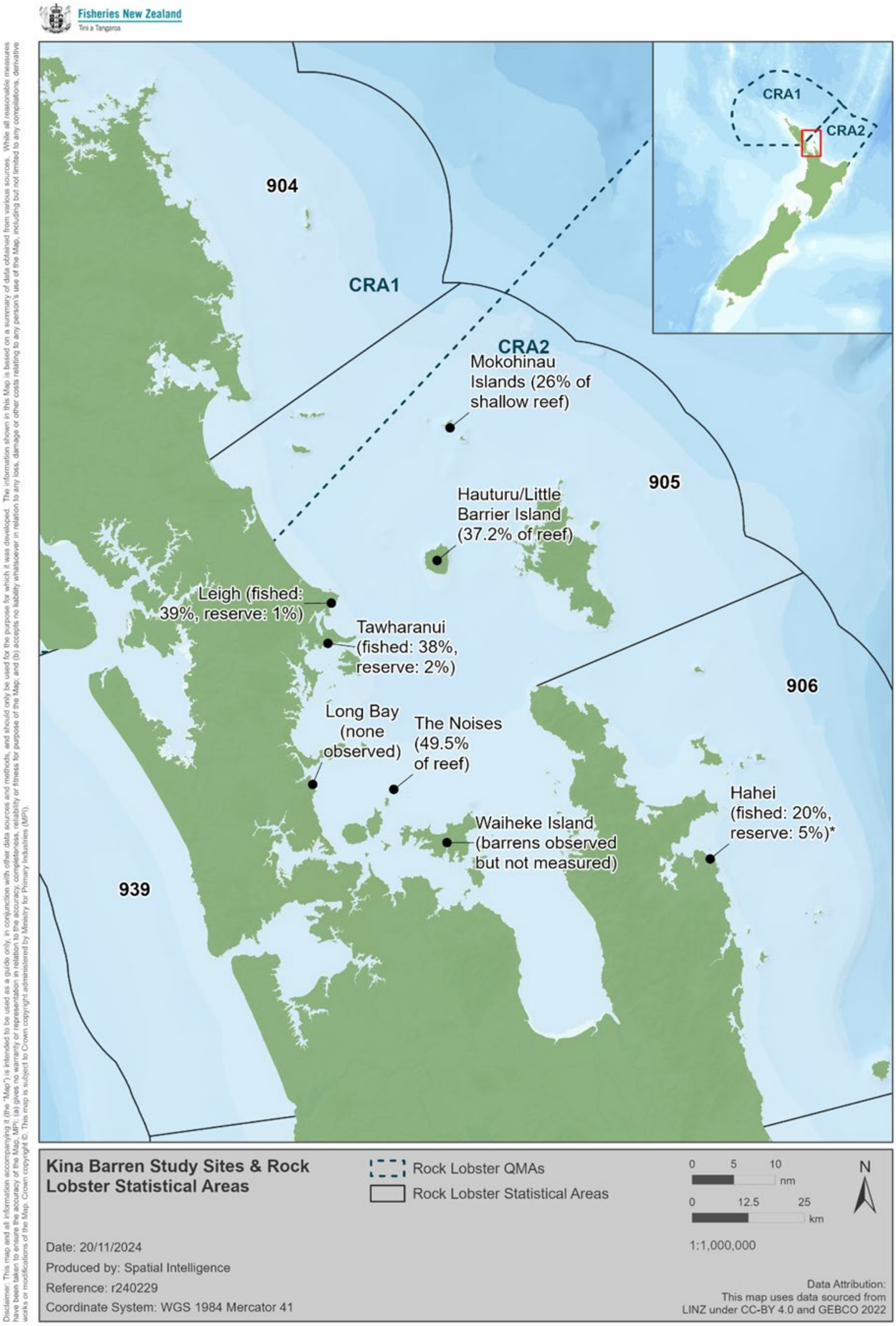

Figure 6. Map of coastal reef locations within the northern portion of CRA 2 where known urchin barrens occur, that have been compiled by an FNZ literature review (see Table 14).

Distribution of urchin barrens in CRA 4

144. The majority of literature on the causes of urchin barrens focuses on reefs in north-eastern New Zealand where fishing effects on top predators of urchins are considered a primary factor.[24] Much of the available information describing the relationship between fishing and kina barrens comes from Hauraki Gulf/Northland (CRA 1 and CRA 2).

145. FNZ is not aware of any published literature on the role of fishing in the development of urchin barrens or the distribution of urchin barrens in CRA 4. This does not imply that the relationship does not exist.

146. There have also been anecdotal reports of urchin barrens from divers in parts of Wellington Harbour, with a citizen science project underway to monitor and restore kelp forests in the area (Miller and Peat, 2023). The findings of these projects are yet to be published.

147. The extent of urchin barrens and relative importance of contributing factors appears to vary regionally across New Zealand, although research is limited outside of north-eastern New Zealand.

Management targets and urchin barrens

148. The best available information indicates that predators, including rock lobsters, when present at sufficient abundance and size structure can have a significant role in mitigating sea urchin barrens. In CRA 2, a higher management target may therefore contribute, alongside other measures for rock lobster and measures for other urchin predators, to addressing urchin barrens prevalent in parts of CRA 2. While the remaining discussion in this section relates to how the management target options may influence urchin barren formation in CRA 2, maintaining a higher abundance of rock lobster may help to prevent the formation of urchin barrens within the CRA 4 area.

149. The biomass of spiny rock lobster, as one of a few known urchin predators, required to avoid, remedy, or mitigate urchin barren formation is unknown. In addition, a higher management target is not expected on its own to avoid, remedy, or mitigate urchin barren formation. Management targets inform QMA wide management of the rock lobster population, and do not inform management decisions about local scale (i.e. reef scale) abundance of rock lobster, which is the scale at which urchin barren management is required.

150. FNZ has been undertaking a range of work to contribute to addressing urchin barrens in the Hauraki Gulf area. A summary of work up until April 2025 is provided in Part 4 of this document: Review of sustainability measures for rock lobster in CRA 7 (Otago) and CRA 2 (Hauraki Gulf, Coromandel, and Bay of Plenty). From 1 April 2025 parts of the inner Hauraki Gulf were closed to recreational and commercial spiny rock lobster fishing. FNZ is preparing consultation on further measures for parts of the CRA 2 QMA to mitigate the risk of spatial displacement of fishing effort.

151. Managing to a biomass higher than B_{MSY} is expected to contribute towards ecosystem based management and to complement the existing and proposed measures to contribute to addressing urchin barrens.

152. FNZ has contracted modelling to understand the implications of managing at alternative targets on the population structure of CRA 2 (see Figure 7). This figure shows how the abundance of different rock lobster size classes are expected to vary between management targets, illustrating how, at higher management targets (with a larger CRA 2 biomass), large rock lobster may become more abundant.

[24] Doheny et al. (2023)

153. Laboratory-based feeding experiments have shown that only lobster with a carapace (body) length greater than 130 mm are capable of feeding on larger kina.[25] Therefore, increasing the abundance of large rock lobsters may support a reduction in the abundance of urchins, and therefore the prevalence urchin barrens within CRA 2.

154. There will be additional biological consequences of managing the stock at different biomass targets for the species that interact with rock lobster, as well as social, cultural, and economic consequences for the stakeholders of the CRA 2 fishery.

155. FNZ notes that urchin abundance above a certain density will result in urchin barrens, and that this density threshold will vary between locations depending on environmental conditions.[26] There is no definitive knowledge of the threshold of predator abundance, along with other factors, required to reverse urchin barrens. This uncertainty around the biomass threshold required to prevent or reverse barrens must be considered, amongst other matters such as the maintenance of biological diversity and any adverse effects of fishing and socio-economic impacts, when developing management targets and future catch settings.

156. Urchin barrens were first documented in the Hauraki Gulf in the 1960s[27] and became a dominant feature of coastal rocky reefs across north-eastern New Zealand over the following two decades. Data is not available to allow us to reliably estimate the biomass of all urchin predator species at the time when urchin barrens were first becoming established at large scales.

157. The main fished predators of sea urchins in New Zealand are considered to be rock lobsters, snapper, and blue cod (Doheny et al., 2023). It is commonly accepted that snapper is the predominant fish predator of kina within northern waters (Marinovich et al. 2023), and blue cod is the predominant fish predator within southern waters. The currently modelled time series of snapper biomass in the Hauraki Gulf begins in 1970, when biomass declined steeply to a low point in the late 1990s, after which it has increased steadily and in 2023 was estimated to be well above the level in 1970 (Fisheries New Zealand, May 2024).[28] Snapper biomass has increased due to management intervention and an increase in productivity probably associated with warming waters.

158. Further cited urchin predators include large starfishes, red moki, banded wrasse, and hāpuku (once common inshore but now relatively absent from northern inshore waters).[29] Commercial landings of hāpuku in Northland and the Hauraki Gulf/Bay of Plenty peaked in the late 1970s/early 1980s (at around 1000 tonnes annually) and decreased following introduction to the QMS in 1986. No estimates of current or historical biomass are available for hāpuku, red moki, or banded wrasse in the region.

159. A monitoring project conducted by tangata whenua in Northland in 2024 indicated that low diversity and abundance of reef fish may also be a contributing factor to the formation and persistence of urchin barrens. The Whangai Mokopuna Rohe Moana management group observed that many reef fish may be important predators of juvenile kina and may contribute to controlling kina numbers by eating the eggs when kina spawn.[30]

160. Additionally environmental factors can cause kelp decline, including sedimentation, eutrophication, disease, and marine heatwaves.[31]

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[25] MacDiarmid et al. (2013)
[26] Shears & Babcock (2004); Doheny et al. (2023)
[27] Dromgoole (1964)
[28] Accessible at: May 2024 Volume 3: Red Gurnard to Yellow-eyed Mullet
[29] Doheny et al. (2023)
[30] Hansford et al. (2025)
[31] Doheny et al. (2023)

161. The currently modelled time series of rock lobster biomass in CRA 2 only extends to 1980 (Figure 2), when the lobster biomass is estimated to have been more than 3.5 times greater than the default B_{MSY} (greater than Option 3), and more than twice the current biomass. It is likely the rock lobster biomass was even greater historically. Managing CRA 2 biomass to Option 3 may bring CRA 2 nearer to the abundance of large rock lobster and overall population required to meaningfully play an increased role as a predator of urchins and prevent the formation, or reduce the extent, of urchins barrens within CRA 2. However, this abundance threshold is unknown.

162. Bringing the rock lobster population back to levels nearer to the biomass found in the ecosystem prior to the spread of urchin barrens may contribute to controlling urchin populations. However, there is no way of reliably predicting the abundance required to achieve urchin barren control. The relative contribution of rock lobsters, other urchin predator species, and other environmental factors that have contributed to loss of kelp habitats remains to be resolved. Noting, the environment has also changed substantially since the 1960s (due to factors including climate change and coastal development). Consequently, while we believe that increasing lobster abundance will help, it is possible that managing rock lobster to a higher biomass may not, by itself, be sufficient to prevent the formation or reduce the extent of existing urchin barrens in CRA 2.

163. This uncertainty must be considered when evaluating the potential ecological, social, cultural, and economic consequences of any management decision.

164. FNZ considers that managing at higher targets increases the likelihood that rock lobster contribute as effective predators in the ecosystem. Without detailed information on the relationship between rock lobster abundance and urchin barren formation, FNZ considers it logical that the highest target options for each stock (Option 3) will provide the highest likelihood of bringing rock lobster abundance to a level that would enable them to contribute to addressing urchin barrens.

165. FNZ notes 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).

Management target modelling

Management target modelling for CRA 2

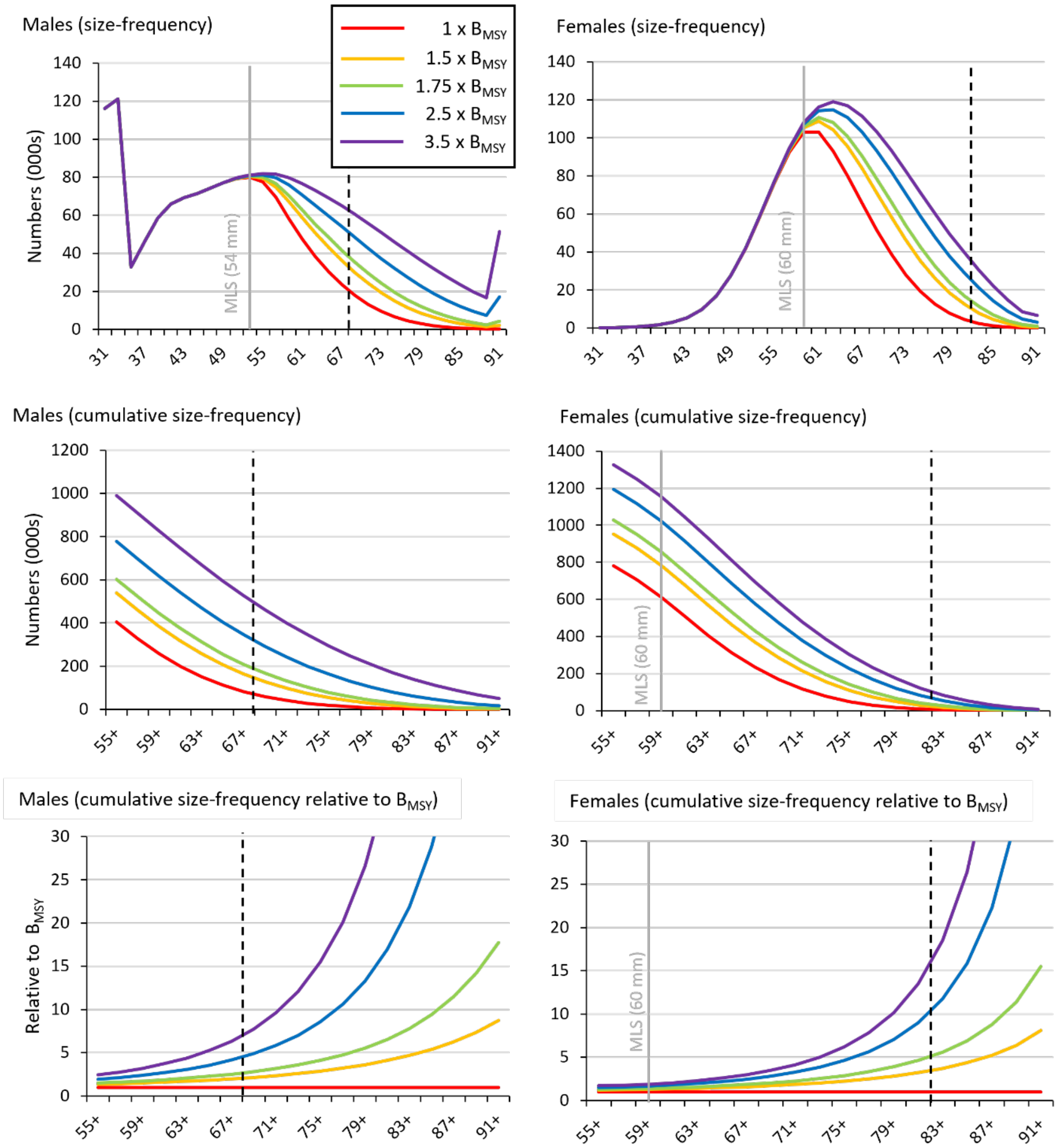

Figure 7. Predicted long-term numbers of male (left) and female (right) rock lobster in CRA 2 under different biomass management targets. The management target values (*expressed* as multiples of B_{MSY}) are close to, but not exactly the same as the relative to B_{MSY} levels that were obtained by iterative model simulation when estimating these predicted values. The 2024 rapid assessment update for CRA 2 indicated the stock was at approximately 1.54 x B_{MSY} (similar to the 1.5x B_{MSY} line). The minimum legal-size (MLS) for males (54 mm tail width) and for females (60 mm) are indicated by grey vertical lines. Tail widths that equate to 130 mm carapace length (CL) for each sex are indicated by dashed vertical lines, which is the size at which rock lobster are considered capable of eating any size kina. The upper panels show predicted length frequencies for lobster larger than 30 mm, for each sex. The middle panels show the cumulative number of lobster that are of a given size or larger, for each 2mm length class greater than 55 mm. The lower panels indicate the relative extent to which the abundance of larger lobster of a given size class or above is expected to increase, when expressed relative to B_{MSY}, which is the current interim biomass management target.

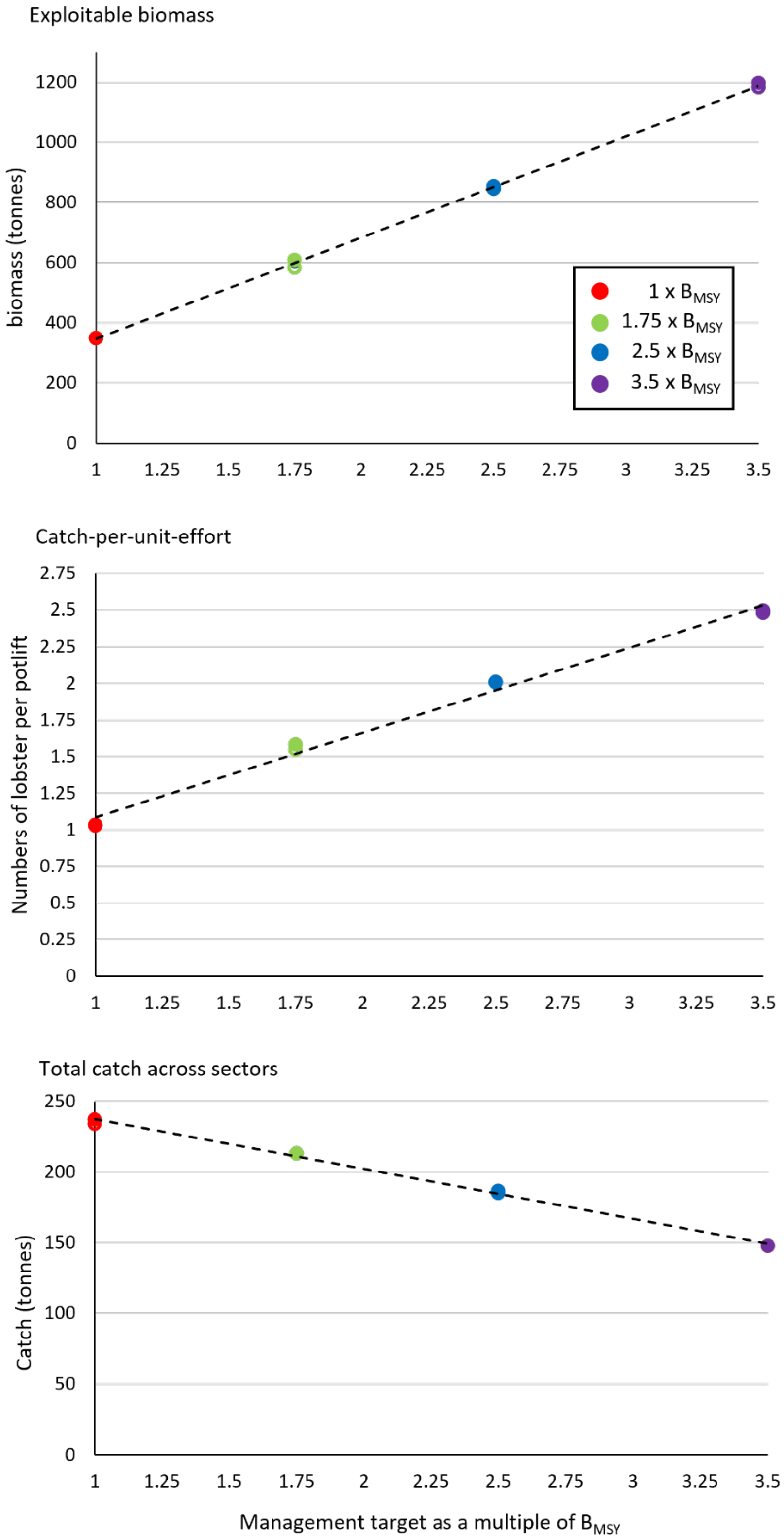

Figure 8. Predicted long-term exploitable biomass (in tonnes; top), catch-per-unit-effort (in number of lobster per potlift; middle), and total catch across sectors (in tonnes; bottom figure) for CRA 2 under different biomass management targets. These figures indicate once the population has reached equilibrium at the target biomass. The trendline is the average between the fixed catch (solid dots) and fixed exploitation rate (unfilled dots) scenarios. The values plotted in this figure are given in Table 14 below.

Table 15. Predicted values for CRA 2 under different biomass management targets for fixed catch and fixed exploitation rate (U) scenarios once the population has reached equilibrium at the target biomass. The 95% credibility intervals are provided in brackets. The management target values (expressed as multiples of B_{MSY}) are close to, but not exactly the same as the relative to B_{MSY} levels that were obtained by iterative model simulation when estimating these predicted values.

Target	~1 x B_{MSY} (Default B_{MSY})		~1.75 x B_{MSY} (Option 1)		~2.5 x B_{MSY} (Option 2)		~3.5 x B_{MSY} (Option 3)	
	Fixed catch	Fixed U	Fixed catch	Fixed U	Fixed catch	Fixed U	Fixed catch	Fixed U
Percentage of exploitation rate associated with B_{MSY}	96.3 (48.9-284.8)	95.7 (90.6-100.6)	52.1 (32.9-99.2)	54.4 (52.2-56.5)	33.4 (23.1-51.2)	33.5 (32.4-34.7)	19.2 (14.3-26.4)	19.5 (18.8-20.3)
Total catch (tonnes)	237 (214-237)	234 (182-309)	213	213 (173-269)	187	185 (154-228)	148	148 (125-177)
Exploitation rate (weighted by season)	0.285 (0.145-0.843)	0.283 (0.268-0.298)	0.154 (0.098-0.294)	0.161 (0.154-0.167)	0.099 (0.068-0.152)	0.099 (0.096-0.103)	0.057 (0.042-0.078)	0.058 (0.056-0.060)
CPUE (numbers per potlift)	1.029 (0.286-1.930)	1.036 (0.792-1.367)	1.581 (0.891-2.417)	1.546 (1.211-2.008)	2.008 (1.378-2.827)	2.004 (1.590-2.565)	2.496 (1.868-3.321)	2.482 (1.986-3.145)
Exploitable biomass (tonnes)	351 (87-731)	349 (263-477)	608 (304-991)	583 (458-758)	853 (543-1,253)	844 (679-1,070)	1,197 (862-1,621)	1,182 (961-1,470)
Percentage of unfished exploitable biomass	12.7 (3.1-26.8)	12.6 (9.2-18.0)	21.9 (10.9-36.2)	21.0 (16.0-28.5)	30.7 (19.5-45.6)	30.5 (23.8-40.1)	43.1 (31.1-59.0)	42.6 (33.9-54.7)
Percentage of unfished spawning stock biomass	36.4 (16.2-61.7)	36.2 (27.4-49.3)	50.7 (31.2-73.0)	49.8 (38.5-65.6)	60.6 (43.2-80.9)	60.5 (47.7-77.7)	69.1 (53.6-88.2)	69.0 (55.3-86.8)
Percentage of unfished total biomass	26.7 (14.2-43.6)	26.6 (20.0-36.4)	36.3 (23.2-52.5)	35.4 (27.5-46.7)	44.3 (31.7-60.5)	44.1 (35.0-56.9)	54.3 (41.5-70.8)	53.9 (43.4-68.2)
Numbers (in 1000s) of male lobsters larger than the MLS (54 mm TW)	8,418 (3,511-13,963)	8,493 (7,247-9,943)	12,626 (8,211-17,562)	12,346 (10,616-16,433)	16,120 (12,013-20,855)	16,039 (13,844-18,500)	20,472 (16,361-25,302)	20,345 (17,555-23,505)
Numbers (in 1000s) of female lobsters larger than the MLS (60 mm)	10,371 (4,126-17,603)	10,534 (8,670-12,871)	15,361 (9,849-21,212)	15,242 (12,641-18,463)	18,519 (13,973-23,621)	18,633 (15,612-22,361)	21,225 (17,326-25,809)	21,232 (17,954-25,225)

Management target modelling for CRA 4

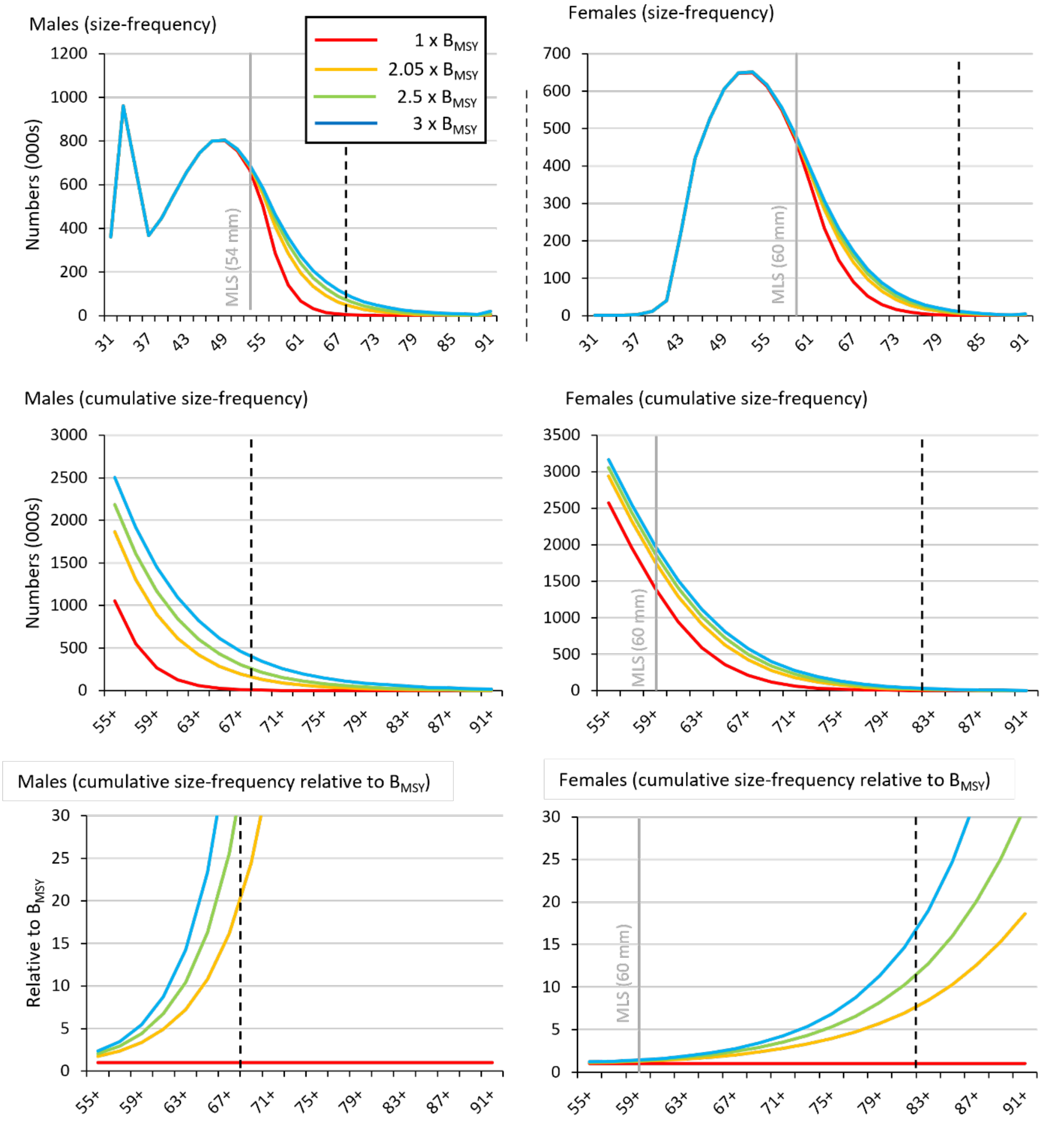

Figure 9. Predicted long-term numbers of male (left) and female (right) rock lobster in CRA 4 under different biomass management targets. The management target values (*expressed* as multiples of B_{MSY}) are close to, but not exactly the same as the relative to B_{MSY} levels that were obtained by iterative model simulation when estimating these predicted values. The 2024 stock assessment for CRA 4 indicated the stock was at approximately 2.05x B_{MSY} (similar to the 2.05x B_{MSY} line). The minimum legal-size (MLS) for males (54 mm tail width) and for females (60 mm) are indicated by grey vertical lines. Tail widths that equate to 130 mm carapace length (CL) for each sex are indicated by dashed vertical lines, which is the size at which rock lobster are considered capable of eating any size kina. The upper panels show predicted length frequencies for lobster larger than 30 mm, for each sex. The middle panels show the cumulative number of lobster that are of a given size or larger, for each 2mm length class greater than 55 mm. The lower panels indicate the relative extent to which the abundance of larger lobster of a given size class or above is expected to increase, when expressed relative to B_{MSY}, which is the current interim biomass management target.

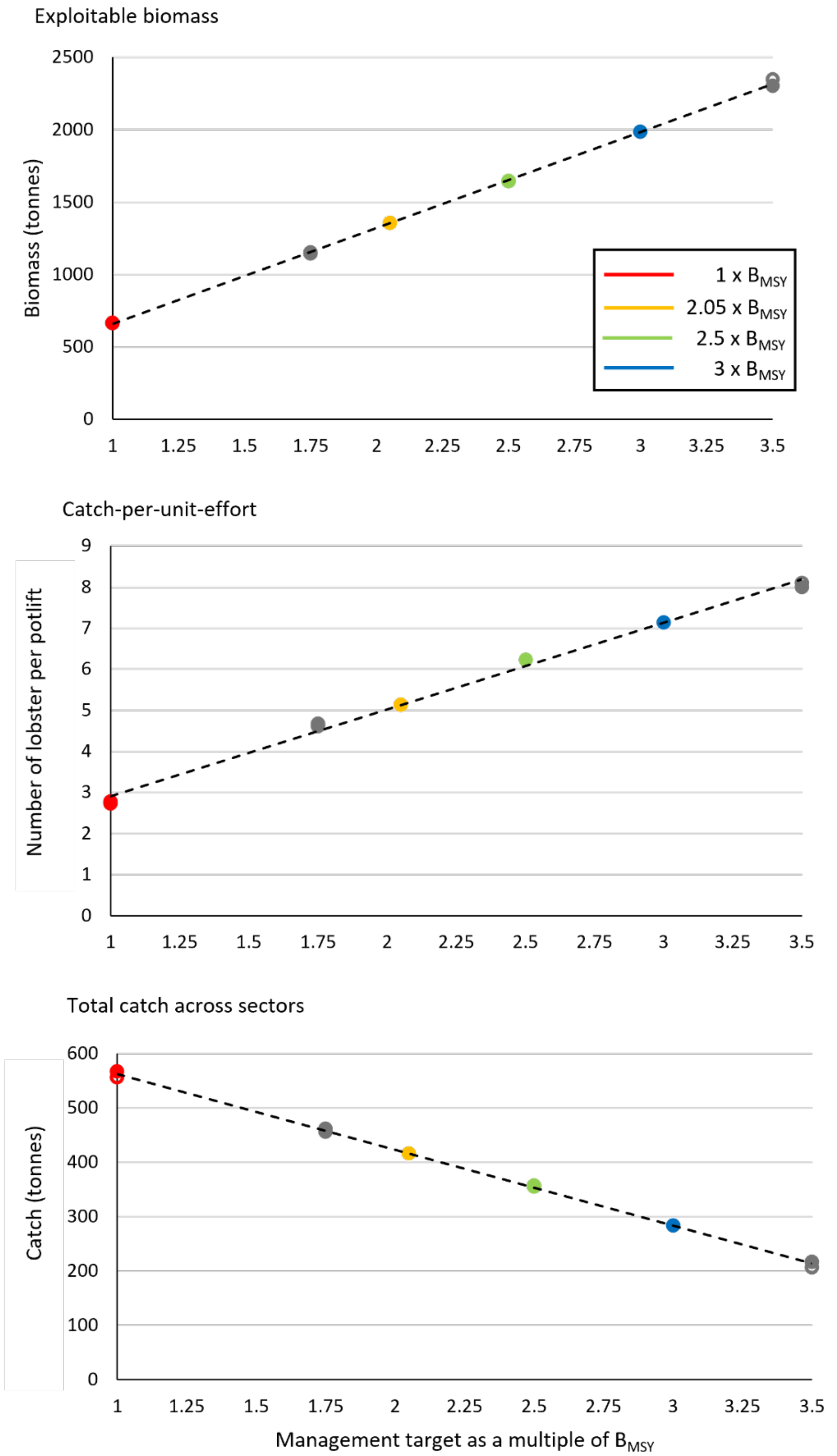

Figure 10. Predicted long-term exploitable biomass (in tonnes; top), catch-per-unit-effort (in number of lobster per potlift; middle), and total catch across sectors (in tonnes; bottom figure) in CRA 4 under different biomass management targets. These figures indicate once the population has reached equilibrium at the target biomass. Gray dots indicate modelled values that are not presented as options in this paper. The trendline is the average between the fixed catch (solid dots) and fixed exploitation rate (unfilled dots) scenarios. The 2.05 x and 3 x B_{MSY} options were not modelled, the values plotted here are extrapolated by a linear regression using the trendline. The values plotted in this figure are given in Table 16 below (except for 2.05 and 3 x B_{MSY}).

Table 16. Predicted values for CRA 4 under different biomass management targets for fixed catch and fixed exploitation rate (U) scenarios once the population has reached equilibrium at the target biomass. The 95% *credibility* intervals are provided in brackets. The management target values (*expressed* as multiples of B_{MSY}) are close to, but not exactly the same as the relative to B_{MSY} levels that were obtained by iterative model simulation when estimating these predicted values.

Target	~1 x B_{MSY} (Default B_{MSY})		~1.75 x B_{MSY}		~2.5 x B_{MSY} (Option 2)		~3.5 x B_{MSY}	
	Fixed catch	Fixed U	Fixed catch	Fixed U	Fixed catch	Fixed U	Fixed catch	Fixed U
Percentage of exploitation rate associated with B_{MSY}	102.9 (52.1-202.8)	99.8 (91.2-109.6)	49.5 (31.0-96.5)	48.5 (46.4-51.0)	27.1 (18.9-41.3)	26.9 (26.0-27.9)	11.9 (8.9-16.1)	11.1 (10.6-11.6)
Total catch (tonnes)	567 (481-567)	556 (423-745)	462	456 (357-593)	357	355 (283-449)	217	207 (171-253)
Exploitation rate (weighted by season)	0.371 (0.188-0.732)	0.360 (0.329-0.396)	0.179 (0.112-0.345)	0.175 (0.168-0.184)	0.098 (0.068-0.149)	0.097 (0.094-0.101)	0.043 (0.032-0.058)	0.040 (0.038-0.042)
CPUE (numbers per potlift)	2.728 (1.063-5.520)	2.777 (2.037-3.823)	4.612 (2.367-7.356)	4.666 (3.480-6.264)	6.220 (4.097-9.011)	6.233 (4.690-8.293)	7.993 (5.781-10.900)	8.107 (6.146-10.700)
Exploitable biomass (tonnes)	663 (291-1,324)	667 (494-912)	1,145 (583-1,849)	1,150 (875-1,529)	1,645 (1,059-2,391)	1,645 (1,269-2,139)	2,300 (1,680-3,097)	2,345 (1,834-3,010)
Percentage of unfished exploitable biomass	16.6 (7.1-34.1)	16.6 (12.0-23.7)	28.6 (14.6-47.0)	28.7 (21.4-39.3)	41.2 (26.6-59.9)	41.1 (31.4-54.5)	57.7 (42.6-76.8)	58.7 (45.9-75.4)
Percentage of unfished spawning stock biomass	61.9 (44.2-84.4)	62.0 (47.8-81.2)	67.5 (50.4-89.0)	67.6 (52.8-87.3)	71.8 (55.3-92.9)	71.7 (56.4-91.9)	76.2 (60.0-97.3)	76.5 (60.6-97.0)
Percentage of unfished total biomass	51.8 (36.8-72.1)	51.5 (38.9-69.4)	57.8 (42.1-78.1)	57.8 (44.4-76.3)	63.8 (48.2-83.9)	63.6 (49.6-82.7)	71.3 (55.6-91.4)	71.7 (56.7-91.3)
Numbers (in 1000s) of male lobsters larger than the MLS (54 mm TW)	22,082 (13,271-34,977)	21,787 (18,489-25,771)	34,157 (22,171-46,947)	33,986 (28,815-40,286)	44,793 (33,441-57,190)	44,692 (37,768-52,672)	57,142 (45,929-69,730)	57,958 (48,684-68,355)
Numbers (in 1000s) of female lobsters larger than the MLS (60 mm)	18,962 (11,886-27,354)	19,147 (15,145-23,773)	24,543 (17,655-31,731)	24,554 (19,952-30,003)	28,472 (22,378-35,340)	28,377 (23,507-34,134)	32,454 (26,501-39,197)	32,583 (27,380-38,891)

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