Fisheries New Zealand
Tini a Tangaroa

Review of sustainability measures for rough skate (RSK 3) for 2025/26

Fisheries New Zealand Discussion Paper No: 2025/20
ISBN: 978-1-991380-30-2 (online)
ISSN: 2624-0165 (online)

June 2025

Contents

Guide to this discussion document and consultation

We are consulting on changes to the catch limits and allowances for RSK 3 under the Fisheries Act 1996 (**the Act**). We welcome your feedback on the proposed options for this stock and any alternatives. Your feedback will be incorporated into our final advice to the Minister for Oceans and Fisheries and will help to inform their decisions on any changes.

Further information

If you are interested in the evidence used to develop the proposals, you can refer to the Fisheries Assessment Plenary. For more information about fisheries management in New Zealand, see our fisheries management webpage, and our webpage about the Quota Management System (QMS).

Sending us your views

Submissions on these proposals will be received by Fisheries New Zealand through to **5pm on 23 July 2025**, by email to FMSubmissions@mpi.govt.nz. Submissions are public information and subject to the Official Information Act 1982.

More information about how to send us feedback is on page 8 of this document.

Rough skate (RSK 3) – FMA 3 South-East (Coast), **FMA 4** South-East (Chatham Rise), **FMA 5** Southland**, FMA 6** Sub-Antarctic

Part 1: Overview

Rough skate / uku
Zearaja nasuta

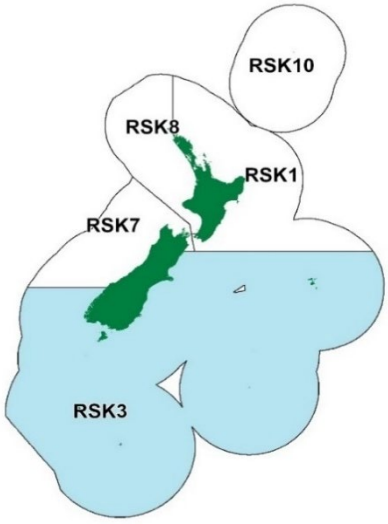

Figure 1: Quota Management Areas (QMAs) for rough skate with RSK 3 highlighted.

Rationale for review

1. Fisheries New Zealand (**FNZ**) is reviewing sustainability measures for rough skate in Quota Management Area (**QMA**) RSK 3 for the 1 October 2025 fishing year (Figure 1). The current Total Allowable Catch (**TAC**) of 1,672 tonnes has not been reviewed since it was introduced into the quota management system (**QMS**) in 2003.
2. The best available information on the stock status of RSK 3 is a partial quantitative assessment completed in 2025 (FNZ - Fisheries Assessment Plenary, May 2025), based on data from the East Coast South Island winter trawl survey (**ECSI trawl survey**) series (MacGibbon *et al.* 2024). The assessment indicates that the stock is unlikely (<40%) to be at or above the target biomass and about as likely as not (40-60%) to be below the soft limit (Figure 2). The soft limit is a reference point below which a stock is deemed to be overfished or depleted, resulting in potential sustainability concerns.

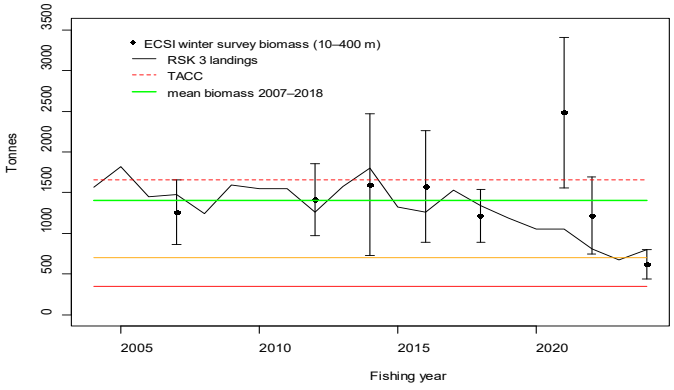

Figure 2: ECSI *Kaharoa* trawl survey relative biomass estimates in 10–400 m. Vertical lines are ± 2 standard errors. The green line represents the accepted B_{MSY} proxy of geometric mean abundance over years 2007 to 2018 (1,403 t), the orange line shows soft limit (50% B_{MSY} proxy), and the red line shows hard limit (25% B_{MSY} proxy).

3. It is important to note that results from the ECSI trawl survey series suggest uncertainty in rough skate biomass estimates: the biomass estimate in 2021 was double that of 2018 and the highest in the series since the survey was reinstated in 2007, before declining steeply in 2022 back to the 2018 level, and again in 2024, to pre-2007 levels. Even though the partial quantitative assessment indicates that the stock is about as likely as not to be below the soft limit, the Plenary noted that this evaluation is based on a single data point from the 2024 ECSI trawl survey (FNZ - Fisheries Assessment Plenary, May 2025). Data from the scheduled 2026 survey will provide greater certainty on the stock status of RSK 3.

4. In keeping with the Harvest Strategy Standard (**HSS**), the soft limit for RSK 3 is considered to have been breached when the probability that stock biomass is below the soft limit is greater than 50%. While acknowledging some uncertainty associated with rough skate biomass estimates, because RSK 3 is considered about as likely as not (40-60%) to be below the soft limit, the HSS directs FNZ towards development of a time-constrained rebuilding plan, whereby RSK 3 should be rebuilt back to at least the target level in a timeframe between T_{min} and $2*T_{min}$ with an acceptable probability.

5. Because the stock status for RSK 3 is assessed using a partial quantitative assessment, it is not possible to quantitatively determine rebuild timeframes such as T_{min} as specified by the HSS, the period appropriate to the stock, or the way and rate at which a particular TAC level will move the stock towards the target level. Under these circumstances, we propose an appropriate rebuild period of eighteen years[1], during which FNZ will continue to monitor stock levels primarily through its programme of regular trawl surveys.

6. FNZ is proposing two TAC options for RSK 3. Option 1 would maintain the *status quo*, and Option 2 would reduce the TAC by approximately 50% (Table 1). Adjustment to the TAC of RSK 3 would be pursuant to section 13(2)(b) of the Fisheries Act 1996 (**the Act**), and would apply from 1 October 2025 (the beginning of the next fishing year).

Proposed options

Table 1: Proposed management options (in tonnes) for RSK 3 from 1 October 2025.

Option	TAC	TACC	Allowances		
			Customary Māori	Recreational	All other mortality caused by fishing
Option 1 (*Status quo*)	1672	1653	1	1	17
Option 2	830 (↓ 842)	788 (↓ 865)	1	1	40 (↑ 23)

7. FNZ welcomes feedback on these proposed options or any alternatives.

8. While Option 1 (the *status quo*) is presented for consultation, FNZ's initial view is that Option 1 is unlikely to allow the stock to increase in the manner required under section 13(2)(b) of the Act, noting that it would not restrict catch of RSK 3 from recent levels (Figure 3).

9. Option 2 is more cautious in response to the soft limit being breached. By limiting catches to lower levels, it is more likely to enable the stock to rebuild to target within an approximate rebuild period of eighteen years. It would place greater weight on the single data point from the 2024 ECSI trawl survey indicating the stock is about as likely as not to be below the soft limit.

Deemed Value Rates

10. FNZ is satisfied that the current deemed value rates for RSK 3 provide sufficient incentives for fishers to balance their catch with annual catch entitlement (**ACE**) (consistent with section 75(2)(a) of the Act and the Deemed Value Guidelines). Therefore, no changes are proposed to the deemed value rates at this time. However, FNZ welcomes any feedback on these settings.

11. FNZ acknowledges that if the Total Allowable Commercial Catch (**TACC**) for this stock is reduced, subsequent changes in fishing behaviour and the ACE market may result in the need for deemed values to be re-evaluated in future.

[1] See paragraphs 77 and 78 (p.10) for discussion on appropriate rebuild period.

Analysis of options

12. The TAC proposals for RSK 3 are analysed below with an outline of the key risks and benefits for each option. Additional information and rationale to support current and proposed settings within the TACs can be found below in Table 3 under *Fishery characteristics and settings for RSK 3* and in Part 3 under *Mixed fishery considerations*.

Option 1 – Status quo

13. Option 1 retains existing settings for all allowances. The RSK 3 TACC has been under-caught for over a decade, significantly so in recent years – this option maintains the existing headroom in RSK 3.

Benefits

14. The calculated value of RSK 3 is $398,749.65 based on 2023/24 port prices for RSK 3 and the RSK 3 total catch (NB. the TACC has not been fully caught since 2013/14). Port price is what the commercial fisher receives, not what the fish is worth at market (which is higher). The port price does not reflect the income for Licensed Fish Receivers (including wholesalers and/or processors) and retailers.

15. Rough skates in RSK 3 are predominantly taken as a bycatch in the *FMA 3 inshore mixed trawl fishery* targeting flatfish, elephantfish, barracouta, red gurnard, tarakihi and red cod, and – to a lesser extent – fisheries targeting squid, scampi and ling further offshore. Maintaining existing headroom in RSK 3 will ensure rough skates do not act as a 'choke species', constraining access to these commercially important stocks.

Risks

16. This option poses a risk to the sustainability of rough skates in RSK 3. Retaining the current settings for RSK 3 does not address the declining trend in rough skate biomass observed in recent ECSI trawl survey estimates.

17. Further, this option does not acknowledge that RSK 3 is about as likely as not (40-60%) to be below the soft limit. In keeping with the HSS, the soft limit for RSK 3 is considered to have been breached when the probability that stock biomass is below the soft limit is greater than 50%.

18. Failing to acknowledge that the soft limit set for RSK 3 has been breached may be inconsistent with obligations under the 2013 National Plan of Action for the Conservation and Management of Sharks (**NPOA-Sharks**).[2] As part of *Goal 1: Maintain the biodiversity and long-term viability of New Zealand shark populations,* Objective 1.3 directs, for shark species managed under the QMS, an assessment be undertaken to determine the stock size in relation to B_{MSY} or other accepted management targets and on that basis review catch limits to maintain the stock at or above these targets.

19. Should the declining trend in rough skate biomass not be addressed in the 2025 October sustainability round, and the decline persists in 2026 ECSI trawl survey data, a future rebuild plan for RSK 3 may have a greater impact on fishing effort for more commercially valuable stocks targeted in mixed trawl and bottom longline fisheries.

Option 2 – 50% TAC decrease

20. Option 2 combines removal of the existing headroom in the RSK 3 TACC with a ten percent decrease to the resulting TACC. The calculation to remove headroom uses average landings of RSK 3 over the last five full fishing years (875 t) as the baseline above which capacity in the existing TACC is removed.

21. Overall, this option decreases the current TAC by 50% and the current TACC by 52%, while maintaining both the customary and recreational allowances at one tonne. The allowance for '*all other mortality caused by fishing*' is proposed to increase from 17 tonnes to 40 tonnes, which is likely to more accurately reflect other mortality occurring (refer to Table 3 '*Other sources of mortality caused by fishing'*).

[2] The NPOA-Sharks is currently being revised by FNZ. The draft National Plan of Action for the Conservation and Management of Sharks 2022 (NPOA-Sharks 2022) is available at this link.

22. Because the fishery has not been fully caught for several years, this option decreases the TACC by ten percent of actual catch based on the last five full fishing years.

Benefits

23. This option places more weight on sustainability concerns identified from the 2025 trawl survey biomass estimate for RSK 3, and rough skates' vulnerability to overfishing. The significant decrease to actual catch (based on the last five full fishing years) is more likely to enable RSK 3 to rebuild to its management target within an appropriate period (noting that this is currently unable to be quantitatively assessed, but FNZ is proposing an approximate period of eighteen years).

24. This option is consistent with obligations under the NPOA-Sharks. As part of *Goal 1: Maintain the biodiversity and long-term viability of New Zealand shark populations,* Objective 1.3 directs, for shark species managed under the QMS, an assessment be undertaken to determine the stock size in relation to B_{MSY} or other accepted management targets and on that basis, review catch limits to maintain the stock at or above these targets.

25. Option 2 places greater weight on the qualitative risk assessment of the impact of commercial fishing that was completed on all chondrichthyans (sharks, skates, rays, and chimaeras) at the New Zealand scale in 2017 (Ford *et al.* 2018). Of the eleven QMS chondrichthyan species reviewed, rough skates were ranked number one (highest) in terms of risk.

26. Increasing the allowance for 'all other mortality caused by fishing' to 40 tonnes reflects FNZ's improved understanding of post-release mortality rates for rough skates caught by bottom trawl and bottom longline and returned to the water under the exception provisions.

Risks

27. The decrease in TACC proposed under this option is very likely to have economic consequences for fishers and quota owners – particularly in the FMA 3 inshore mixed trawl fishery where rough skates are predominantly taken as a bycatch by vessels targeting more commercially valuable flatfish, elephantfish, barracouta, red gurnard, tarakihi and red cod (see Part 3, *Mixed fishery considerations* for more detail) and – to a lesser extent – squid, scampi and ling further offshore.

28. Because rough skates are widely distributed throughout most demersal fisheries in RSK 3 and difficult for fishers to avoid, the decrease in the TACC associated with this option may affect availability of RSK 3 ACE. This, in turn, could result in rough skates becoming a 'choke species' within RSK 3, potentially constraining the catch of commercially valuable target species and/or result in ACE fishers paying a greater amount in deemed value penalties. It is important to note, however, that under the existing exception provisions, fishers are able to return unwanted, live rough skates to the water[3].

29. Under this option, to avoid deemed value penalties, a greater volume of RSK 3 may be returned to the water under the existing landing exception, including rough skates that are unlikely to survive after being returned. Should this occur at scale, the post-release mortality of skates returned under the landing exception may not be adequately accounted for in the TAC allowance for 'all other mortality caused by fishing'.

30. For similar reasons, this option could result in misreporting of rough skates (RSK) as smooth skates (SSK), with the SSK 3 TACC retaining significant headroom in recent years. In addition to physical similarities between the two species, there is overlap in their distribution, depth, and fisheries profile.

Who will be affected by the proposed changes?

31. Rough skates are primarily caught in commercial fisheries, with recreational fishing surveys indicating that rough skates are very rarely caught – and not particularly prized – by recreational fishers. Quantitative information on the level of customary non-commercial take is not available.

[3] FNZ is currently reviewing proposals to reform the commercial landing and discard rules, including for rough skates.

32. Commercial interests in RSK 3 include quota owners, vessel owner-operators and contract fishers in the catching sector, Licensed Fish Receivers (**LFRs**) (Table 2) and retailers and exporters. The interests of these groups are represented through organisations such as Seafood New Zealand, the NZ Federation of Commercial Fishermen and local fisher's associations.

Table 2: Summary of quota owners, percentage settlement quota, permit holders, vessels landing the stock, and Licensed Fish Receivers (LFRs) involved with RSK 3. (Figures show the average over the last three October fishing years.)

Stock	No. quota owners	% Settlement quota	No. permit holders landing the stock	No. vessels landing the stock	No. LFRs landed into
RSK 3	60	20%	60	95	19

33. While RSK 3 is generally a non-targeted catch by commercial fishers, a decrease in the RSK 3 TACC may constrain their access to other stocks targeted in mixed fisheries. This could, in turn, affect quota owners' ability to utilise their quota. As noted above, however, fishers may return unwanted, live rough skates to the water under the existing landing exception – this returned catch is not required to be covered by ACE.

34. Tāngata whenua have commercial interest in RSK 3. While there is no information available on customary non-commercial take, in the South Island, skates have special significance to Māori, with uku/waewae/whai (rough skates) listed as a taonga species in the Te Waipounamu Iwi Forum Fisheries Plan. Similarly, in certain areas, whai repo (skates and rays) are considered kaitiaki and are not fished.

Input and participation of tāngata whenua

35. At the Te Waka a Māui me Ōna Toka (**TWAM**) Iwi Forum hui on 8 April 2025, FNZ noted that we would likely be reviewing RSK 3 as part of the October 2025 sustainability round. The Forum was supportive of the review, with FNZ confirming we would be seeking their input again at the next TWAM hui during public consultation.

36. FNZ also welcomes any input from tāngata whenua outside of this planned engagement.

Fishery characteristics and settings

Table 3: Fishery characteristics and settings for RSK 3.

Commercial (TACC)
37. The endemic rough skate is widely distributed throughout New Zealand waters, but most abundant around the South Island in depths down to 500 m. Like all skate species, rough skates are demersal (occurring near or on the seafloor).
38. Rough skates' distribution throughout New Zealand waters largely overlays that of the smooth skate *Dipturus innominatus* (SSK), both geographically and by depth (although smooth skates tend to occur slightly deeper than rough skates), with the two species commercially caught in close association with each other. Separating rough skates from smooth skates (particularly smaller individuals) by species can be challenging due to similarities in body shape, colouring, and patterning. Misidentification of the two species is a historical issue, with a considerable, but unknown, volume of each species misidentified in fisher reporting following introduction to the QMS in 2003 (Beentjes 2005).
39. The TACC for RSK 3 has remained at 1,653 tonnes since the stock's introduction into the QMS in 2003. RSK 3 has been under-caught for over a decade – significantly so in recent years (Figure 3).
40. Over the last five full fishing years, the port price for RSK 3 has ranged from $0.47 to $0.95 per kilogramme, with the current port price (2023/24) $0.50/kg. It is important to note that port price is an average of what commercial fishers receive across a QMA, not what the fish is worth at market

(which is higher). Nor does it reflect the income for Licensed Fish Receivers (including, wholesalers and/or processors) and retailers.

41. Rough skates are a common non-targeted catch (bycatch) across most demersal fisheries. Over the last five full fishing years, 87% of the RSK 3 catch has been taken by bottom trawl (including precision bottom trawl (**PRB**)) (Figure 4). Approximately 75% of bottom trawl-caught RSK 3 was caught in the *FMA 3 inshore mixed trawl fishery*, extending from Pegasus Bay (Canterbury) in the north, to the southwestern edge of the Catlins in the south[4] (Figure 5). Within this fishery, rough skates are primarily a bycatch taken by vessels targeting flatfish, elephantfish, barracouta, red gurnard, tarakihi and red cod (Figure 6).

42. A further 5% of bottom trawl-caught RSK 3 came from each of the southwest coast of Fiordland and the Sub-Antarctic Auckland Islands, respectively.

43. Over the same period, six percent of the RSK 3 catch was caught by bottom longline – the bulk (75%) coming from the Bounty Plateau situated in FMA 6, approximately 700 km east-south-east of the NZ mainland, by vessels targeting ling (Figure 7).

44. Four percent of RSK 3 was caught by Danish seine – almost all of which is taken in Pegasus Bay and the northern Canterbury Bight, primarily by vessels targeting red cod, rig, flatfish and elephantfish. The two percent of RSK 3 caught by set net is from Kaikoura, east Otago, south Otago/the Catlins and southern Rakiura waters; primary target species in these fisheries are rig, school shark and hapuku & bass.

45. Total RSK 3 catch shows a decreasing trend over the last decade – a trend mirrored by rough skate catch in the FMA 3 inshore mixed trawl fishery – the latter of which may be explained by the 50% decline in fishing effort in this fishery since 1990 (Fisheries New Zealand 2023).

Customary Māori

46. In certain areas, whai repo (skates and rays) are considered kaitiaki and are not fished; for example, fishing for whai repo is prohibited in the Lyttelton Harbour/Whakaraupō and Rapaki Mātaitai Reserves on Banks Peninsula. Tāngata Tiaki/Kaitiaki in this area consider whai repo a tipuna (ancestor) with guardianship of the bay. The presence and protection of whai repo is considered necessary to ensure the overall health of the bay.

47. A customary allowance of one tonne was set for RSK 3 on 1 October 2003 and has remained unchanged. There is no quantitative estimate available on the level of Māori customary catch of rough skates in RSK 3.

Recreational

48. Rough skates are not particularly prized by recreational fishers, with no species-specific information included in the 2022/23 National Panel Survey of Marine Recreational Fishers (Heinemann & Gray 2024).

49. A recreational allowance of one tonne was set for RSK 3 on 1 October 2003 and has remained unchanged. Rough skates caught recreationally in the RSK 3 area are subject to an individual species daily limit of five 'skates/rays' within a combined recreational daily limit of 30 finfish; in the Chatham Rise recreational fishing area, the individual species daily limit is one 'skate/ray'. There is no minimum legal size.

Other sources of mortality caused by fishing

50. The allowance for all other sources of mortality to the stock caused by fishing is intended to provide for unrecorded mortality of fish associated with fishing activity, including misreporting, predation, and incidental mortality of returned fish.

51. A 17-tonne allowance for other mortality was set for RSK 3 on 1 October 2003 and has remained unchanged since.

[4] Statistical areas 020, 022, 024 and 026.

52. Section 72 of the Act requires commercial fishers to not return or abandon QMS species to the sea or waters from which they are taken unless there is an exception. Under the Fisheries (Landing and Discard Exceptions) Notice, commercial fishers may return a rough skate (caught by any method) to the waters from which it was taken if it is likely to survive on return, and the return takes place as soon as practicable after it is taken. Rough skates returned alive to the water under the exception provisions are reported by fishers using disposal code X.

53. Between 2019/20 and 2023/24, the volume of rough skates returned to the water under the exception ranged from three to five percent of total catch. This suggests almost all rough skates caught in RSK 3 were retained and subsequently landed.

54. All skates possess a series of relatively robust physical features, including the absence of an air-filled swim bladder (reducing the effects of barotrauma[5]) and tough, well-protected skin. Rough skates can breathe while stationary and have two additional respiratory openings behind the eyes (spiracles), in addition to the gills, that further enhance this ability.

55. To understand species survivability following capture and return to the water within a New Zealand context, FNZ commissioned research (McKenzie *et al*. 2024) to estimate post-release survival rates for rough skates caught by bottom trawl and bottom longline.

56. The research concluded that post-release survival of rough skates caught by bottom trawl (including PRB) is uncertain due to the high uncertainty surrounding the impact of increases in fishing depth and trawl cod-end volumes caught. However, there is greater certainty surrounding the impact of tow duration, with post-release survival estimated as moderate to high following a tow duration of three hours or less, and low to moderate following a tow duration of three to five hours. Table 11 characterises the predominant bottom trawl fishery in which RSK 3 is caught (FMA 3 inshore mixed trawl fishery), suggesting the post-release survival estimate would be at the lower end of the scale. While the research did not provide estimates for post-release survival following capture by Danish seine or set net, FNZ considers rough skates are unlikely to survive when caught and released by these methods.

57. During capture by bottom longline, rough skates are not subject to the crushing trauma and sustained swimming associated with capture by trawl. While increased fishing depth (>300 m) and soak time (fishing duration) (>24 hours) was estimated to have a negative impact on survival, overall likelihood of post-release survival is generally estimated to be moderate to high. Table 11 characterises the predominant bottom longline fishery in which RSK 3 is caught (Bounty Plateau ling fishery), suggesting the post-release survival estimate would be at the higher end of the scale.

58. Option 2 in this paper proposes to more accurately reflect our improved understanding of post-release mortality rates for rough skates caught by bottom trawl, Danish seine and set net, which comprise an average of 72% of the reported returns over the last five full fishing years.

59. There is high interannual variability in the volumes of returns of RSK 3 to the sea, ranging between 21 tonnes and 57 tonnes over the last five full fishing years. To account for annual fluctuations in reported returns and enable conservative accounting of other potential sources of mortality from fishing, Option 2 uses the highest reported return volume of RSK 3 over the last five fishing years and a conservative estimate of the likelihood of survival based on the methods from which these returns occurred. Following capture by bottom trawl, Danish seine and set net – methods estimated to have a low to moderate likelihood of post-release survival – potential post-release mortality is estimated to be 36 tonnes.

60. Acknowledging the greater (but not certain) likelihood of post-release survival associated with bottom longline capture, an additional four tonnes is added to 'Other sources of mortality caused by fishing', bringing the allowance to a total of 40 tonnes, equating to five percent of the proposed TACC in Option 2.

[5] Barotrauma is the physical damage to body tissues caused by a difference in pressure. Fish in deep water are under increased pressure and as the fish is drawn to the surface the pressure decreases. As the pressure decreases, any air within the fish such as that in air-filled swim bladders expands, causing damage to tissue and organs.

Supporting information and legal context

61. In Parts 2 and 3 below there is additional information to support the above analysis and proposed options. Part 2 outlines our initial assessment of the proposed changes against provisions of the Fisheries Act 1996. The proposals have been assessed against sections 9, 10, 11, and 13 of the Act. There is also information on mātaitai reserves and other customary management tools which are relevant to the Minister's decision making under section 21(4).

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

63. Part 3 provides additional figures, and some additional science and management information which informed our analysis in Parts 1 and 2.

How to have your say

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

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

65. FNZ invites you to make a submission on the proposals set out in this discussion document. Consultation closes at **5pm on 23 July 2025.**

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

Part 2: Initial assessment against relevant legal provisions

Overview

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

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

Initial assessment of the proposals against section 13 of the Act

69. Table 4 below outlines FNZ's initial assessment of the proposed options for RSK 3 against section 13(2)(b) of the Act. This assessment has been informed by the best available information on the status of the stock (discussed in the '*Rationale for Review'* in Part 1).

Table 4: Initial assessment under section 13(2)(b) of the Act for the proposed RSK 3 changes.

Section 13(2)(b)	70. The stock status for RSK 3 can be reliably estimated in relation to the level which can produce maximum sustainable yield (***MSY***). A partial quantitative assessment in 2025 (Fisheries New Zealand 2025) indicated the stock is unlikely (<40%) to be at or above the B_{MSY} target biomass and about as likely as not (40-60%) to be below the soft limit. The soft limit is a reference point below which a stock is deemed to be overfished or depleted, resulting in potential sustainability concerns. 71. FNZ's preliminary view is that Option 2 proposed for this stock would be consistent with the requirement in 13(2)(b) that a TAC be set that enables the level of any stock whose current level is below that which can produce the maximum sustainable yield to be altered— *(i)* in a way and at a rate that will result in the stock being restored to or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; and *(ii)* within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock. 72. While FNZ does not have a fully quantitative stock assessment or projections to determine the way and rate at which the stock may be restored to the target under different TAC settings, FNZ considers the *status quo* (Option 1) is unlikely to meet the requirements under 13(2)(b), noting that it would allow catches to increase beyond recent levels which were followed by an estimated decline in biomass.
Section 13(2)(b)(i) Interdependence of stocks	73. The rough skate is an important demersal predator throughout its range. The limited information available on rough skate diet suggests, on the southeast coast of the South Island at least, these skates are specialised feeders targeting the red swimming crab *Nectocarcinus antarcticus* (a non-QMS species), as well as small teleosts and octopuses (Bennett and Randhawa 2019). 74. Throughout their distribution, rough skates are likely predated on by a range of active predators, including New Zealand sea lions, killer whales (orca) and certain

	shark species, at different life history stages. However, there is no evidence indicating a dependence on rough skates as a key prey species, other than their importance as a prey species for New Zealand sea lions in New Zealand sub-Antarctic waters (Lalas and Webster 2014). 75. The potential impacts of RSK 3 harvest levels on associated predator and prey species, and the wider ecosystem, are unknown. However, while the extent of potential impacts on interdependent stocks cannot be quantified based on available information, FNZ notes that Option 2 of this review proposes to reduce catch of RSK 3 to help prevent a further decline in biomass and help it to rebuild back to a level that supports *MSY*. Rebuilding biomass may help to mitigate negative impacts that could otherwise occur for stocks strongly associated with rough skates in RSK 3.
Section 13(2)(b)(ii) Biological characteristics	76. Like all skate species, rough skates are demersal, occurring near or on the seafloor. Around the South Island, rough skates are most abundant in depths down to 500 m. Little is known about their reproductive biology. Rough skates reproduce by laying yolky eggs, enclosed in leathery cases, on the seabed. Rough skates lay their eggs in spring-summer (Francis 1997). Two eggs are laid at a time, but the number of eggs laid annually by a female is unknown. 77. Rough skates grow to at least 90 cm total length (Roberts *et al*. 2015) and reach a maximum age of nine years; natural mortality (M) is thought to range between 0.25–0.35 (Francis *et al*. 2001a, b). 78. Females and males reach sexual maturity at four and six years of age, respectively (Francis *et al*. 2001a, b). This relatively slow growth combined with other life history characteristics is indicative of medium productivity. Species with high productivity can sustain higher rates of fishing mortality than species with lower productivity. 79. A 2017 qualitative risk assessment of New Zealand elasmobranchs suggested rough skates are among the most vulnerable species to overexploitation, due to their high range overlap with commercial fishing grounds, being caught for more than 300 days a year and a lack of information on ecological interactions (Ford *et al.* 2018). 80. These characteristics (medium productivity and potential vulnerability to overexploitation) suggest caution is warranted in setting the TAC.
Section 13(2)(b)(ii) Environmental conditions	81. Fisheries New Zealand is not aware of any specific environmental conditions affecting RSK 3 which might impact the stock's resilience to fishing pressure. 82. Environmental conditions – in particular increases in sea temperature and marine heatwaves – may produce physiological stress during key life history stages for rough skates (e.g. egg-laying, incubation period) and influence changes in prey distribution and abundance. However, the broad depth distribution shown by rough skates – found from shallow coastal waters to deeper waters of the upper continental slope – suggests the species' temperature preference is broader than that of other deep-sea skates. 83. Given the paucity of information on rough skate biology, life history and ecological interactions, isolating and quantifying these impacts is difficult. As we are not proposing to increase the TACC allowance, the risk that fishing may exacerbate these effects is reduced.
Section 13(2)(b)(ii)	84. The stock's position in relation to the B_{MSY} proxy is assessed using a partial quantitative assessment, which does not allow biomass projections based on potential management actions.

Period appropriate to the stock	85.	Taking this into account, FNZ considers an appropriate period for rebuilding RSK 3 to the B_{MSY} proxy – based on rough skates' average generation time, relevant environmental conditions, and international best practice – is approximately eighteen years.
Section 13(2)(b)(i) Way and rate that will result in stock moving to a level that can produce MSY	86.	For any stock whose current level is below that which can produce the *MSY*, section 13(2)(b) of the Act requires a TAC be set that enables the stock to return to, or above, this level in a way and at a rate that will result in the stock being restored to or above a level that can produce the *MSY*, having regard to the interdependence of stocks.
	87.	The way and rate at which the stock will be restored to a level that supports *MSY* will depend on the TAC set for RSK 3. A larger reduction to the TAC now would provide greater certainty of returning the stock to or above the target within the proposed period of eighteen years, and the larger the reduction is, the faster it would be rebuilt to the target level.
	88.	However, as noted above, information is not available to determine precisely how TAC changes will move the stock relative to *MSY*, or how quickly the stock would rebuild depending on any particular TAC setting. There is further uncertainty in this, given the disparity in recent trawl survey estimates for RSK 3, and the fact that the determination of the stock being at or below the soft limit is based on a singular data point.
	89.	Option 2 for RSK 3 proposes to reduce catch below recent levels. FNZ considers there is an acceptable probability that this will restore biomass to or above a level than can produce *MSY* within an approximate period of eighteen years. However, FNZ acknowledges there is a high level of uncertainty around this, given the lack of information to support forward projections. Importantly, there will be regular opportunities to evaluate the effectiveness of this option in rebuilding the stock in this timeframe, given the biennial ECSI trawl survey estimates and associated assessments.
	90.	While it is possible that biomass could be restored to a level that supports *MSY* under Option 1 (the *status quo*), FNZ considers it highly unlikely based on available information. The *status quo* would allow catch levels to increase substantially from recent levels (which were followed by a decline in estimated biomass). If catch levels were to increase further, there is a high risk that biomass could decline even further from a level that supports *MSY*.
	91.	FNZ's view is that the *status quo* is unlikely to help restore RSK 3 to a level that supports *MSY* in a period of eighteen years and therefore is not consistent with the Minister's requirements under section 13(2)(b) of the Act.
Section 13(3) Factors to have regard to in considering the way and rate the stock is moved towards or above B_{MSY}	92.	Section 13(3) is considered relevant to the proposed TAC change for RSK 3 because the options aim to move the stock toward a level that can produce *MSY*.
	93.	As noted above, forward projections are not available to help FNZ determine what way and rate these options would move the stock in relation to B_{MSY}. However, logically, a larger reduction in the TAC will move the stock toward a level that supports *MSY* faster than a small reduction or no change. In considering the way and rate at which the stock is moved, the Minister must have regard to relevant social, cultural, and economic factors. Information on these factors can be found in Part 1 under '*Analysis of options*' and '*Who will be affected by the proposed changes?*'
	94.	The proposed TAC reduction under Option 2 would constrain catches of RSK 3 below recent levels, and this is likely to have short to medium term negative economic impacts on those involved in the commercial fisheries where RSK 3 is bycaught. The reduction could lead to high financial penalties for fishers who are

	unable to avoid catching skates and/or may constrain targeting of other fishstocks, which would likely have negative impacts for commercial revenue from those species. However, FNZ notes that economic value is likely to benefit in the longer term if RSK 3 rebuilds to a higher biomass level as a result of the TAC reduction.

Harvest Strategy Standard (HSS)

95. The Harvest Strategy Standard (**HSS**) is a policy statement of best practice in relation to the setting of stock targets and limits for fish stocks in New Zealand's QMS. It is intended to provide guidance on how fisheries law will be applied in practice, by establishing a consistent and transparent framework for decision-making to achieve the objective of providing for utilisation of New Zealand's QMS species while ensuring sustainability. The minimum requirement of the HSS is that stocks are maintained at or above B_{MSY}-compatible reference points.

96. Consistent with the HSS, a B_{MSY} proxy management target was developed for RSK 3 based on geometric mean abundance over years 2007 to 2018 (1,403 t). This period was chosen because both biomass and catch were relatively stable over this period. It was also evident that biomass had increased substantially since the 1990s, and this was correlated with a reduction in fishing effort in the mixed species inshore trawl fishery for FMA 3 (Starr et al. 2024). A soft limit (50% B_{MSY} proxy) and hard limit (25% B_{MSY} proxy) were also established.

97. Based on the 2025 partial quantitative assessment, RSK 3 is considered unlikely (<40%) to be at or above the target, and about as likely as not (40-60%) to be below the soft limit. Under the HSS, the soft limit will be considered to have been breached when the probability that stock biomass is below the soft limit is greater than 50%. In this instance, the HSS directs FNZ to develop a time-constrained rebuilding plan whereby the stock should be rebuilt back to at least the target level in a timeframe between T_{min} and $2*T_{min}$ with an acceptable probability (where T_{min} is the theoretical number of years required to rebuild a stock to the target in the absence of fishing).

98. Because the stock status for RSK 3 is assessed using a partial quantitative assessment, we are unable to determine how quickly a particular TAC will move the stock towards the target level.

99. Little is known about the reproductive biology of rough skates. However, a rebuild period (T_{min}) should reflect known biological characteristics of rough skates: longevity estimated at up to nine years, late maturity of four and six years for males and females, respectively and low fecundity – combined, these characteristics are indicative of medium productivity. Species with higher productivity can sustain higher rates of fishing mortality than species with lower productivity. Generally, species with high productivity are more resilient and take less time to rebuild from a depleted state.

100. Noting that formal analyses of rough skate reproductive biology are not available, an estimated average generation time of nine years[6] is used as T_{min}. In selecting a timeframe between T_{min} and $2*T_{min}$, the latter is used, reflecting international best practice (Food and Agriculture Organization (FAO) 2001). This defines an appropriate rebuild period of eighteen years for RSK 3.

101. Option 2 acknowledges that the best available information indicates RSK 3 biomass has breached the soft limit, and places emphasis on the sustainability concerns for this fishery and rough skates' vulnerability to overfishing. In contrast to Option 1, the TAC under Option 2 is more likely to restore RSK 3 to or above a level than can produce *MSY* within an appropriate period (noting 'an appropriate period' is currently unable to be quantitatively assessed).

[6] *Generation time* is the average time taken for an individual to replace itself within a stock or population. In keeping with Operational Guidelines for New Zealand's Harvest Strategy Standard (Fisheries New Zealand 2011), average generation time is calculated as: a_{50} + (1/M), where a_{50} is the age at which 50% of female rough skates are mature (six years) and *M* is rough skates' natural mortality rate (estimated at 0.25-0.35) (Francis *et al*. 2001a, b).

Kaitiakitanga

102. Tāngata whenua can provide information on how they exercise kaitiakitanga, and on their values, goals, and objectives for fisheries, through Iwi Fisheries Forums and through Iwi Fisheries Plans, which set out iwi views on the management of fisheries resources and fish stocks.

103. The Te Waka a Māui me Ōna Toka Iwi Fisheries Forum has produced Te Waipounamu Iwi Forum Fisheries Plan, which outlines a vision, values and objectives to support and provide for the interests of South Island iwi.

104. In the South Island, with uku/waewae/whai (rough skates) listed as a taonga species in the Te Waipounamu Iwi Forum Fisheries Plan, skates have special significance to Māori, and the following objectives are relevant to options proposed in this paper:

- To create thriving customary fisheries that support the cultural well-being of South Island iwi and whanau.
- South Island iwi are able to exercise kaitiakitanga.
- To develop environmentally responsible, productive, sustainable and culturally appropriate commercial fisheries that create long-term commercial benefits and economic development opportunities for Iwi.
- To restore, maintain, and enhance the mauri and wairua of fisheries throughout the South Island.

105. FNZ considers the proposed options for RSK 3 to be consistent with these objectives but welcomes feedback from tāngata whenua on this view.

Mātaitai reserves and other customary management tools

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

Table 5: Mātaitai reserves and other customary management tools that apply to RSK 3.

Customary area	Management type
FMA 5 Waitutu, Oreti, Ōmāui, Motupōhue (Bluff Hill), Horomamae, Kaihuka, Te Whaka ā Te Wera, Pikomamaku, Kaihuka, Ōtara **FMA 3** Waikawa Harbour/Tumu Toka, Tautuku, Puna-wai-Tōriki, Ōtākou, Waikouaiti, Moeraki, Tuhawaiki, Te Ahi Tarakihi, Te Kaio, Koukourarata, Lyttelton Harbour/Whakaraupō, Rāpaki, Oaro, Mangamaunu, Te Waha o te Marangai	**Mātaitai reserve** Commercial fishing is not permitted within mātaitai reserves unless regulations state otherwise.
East Otago, Akaroa Harbour, Oaro-Haumuri, Te Taumanu o Te Waka a Māui,	**Taiāpure** All types of fishing are permitted within a taiāpure. The management committee can recommend regulations to manage commercial, recreational, and customary fishing.

n/a	**Temporary closures** Section 186B temporary closures are used to restrict or prohibit fishing of any species of fish, aquatic life or seaweed or the use of any fishing method.

Initial assessment of the proposals against section 9 of the Act

107. Table 6 below outlines FNZ's assessment of the proposed options for RSK 3 against the environmental principles in section 9 of the Act, which the Minister must take into account when considering the RSK 3 TAC. This assessment has been informed by FNZ's knowledge of the current environmental impact of this fishery, which is discussed throughout Parts 1 and 2.

Table 6: Initial assessment of the proposed changes for RSK 3 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	108. The *Analysis of options* and *Fishery characteristics and settings for RSK 3* sections in Part 1 and, in this table (Table 6), *Biological diversity of the aquatic environment should be maintained,* outline methods used to catch RSK 3 and broader effects of this fishing. 109. The FMA 3 and FMA 5 inshore mixed bottom trawl fisheries, in which the majority of RSK 3 is taken as a bycatch, interact with associated and dependent species including seabirds, marine mammals, sharks and benthic invertebrates. Table 7 summarises interactions with protected species considered high-risk (classified as threatened under the New Zealand Threat Classification System) within these fisheries between 2019/20 and 2023/24. 110. It should be noted that there has previously been a low level of observer coverage in fisheries associated with RSK 3 to verify reporting accuracy; since 2021, of the fishing events with RSK 3 catch, 10% were monitored by an observer. Verification by cameras has been greater – 28% of fishing events with RSK 3 catch since 2021 were monitored by cameras, and FNZ notes that camera verification in these fisheries has increased substantially in recent years.[7] **Table 7: Reported or observed captures of high-risk protected species in the FMA 3 and FMA 5 inshore mixed trawl fisheries (statistical areas 020, 022, 024, 025, 026, 030): 2019/20–2023/24.** **Species** / **Total reported or observed captures** Basking shark: 1 Bottlenose dolphin: 1 Hector's dolphin: 15 Southern royal albatross: 1 111. Table 7 indicates fifteen Hector's dolphins were reported caught in these fisheries over this five-year period. The overall risk to Hector's dolphin, or any other high risk protected species in the in the FMA 3 and FMA 5 inshore mixed trawl fisheries is unlikely to change as a result of either option proposed in this review. This is because overall effort is not expected to change. 112. All commercial fishers must electronically report their estimated catch and geospatial position (known as ER/GPR reporting). Since October 2023 all trawl vessels less than or equal to 32 metres in overall length fishing off the north, east, and south coasts of the South Island (except those targeting scampi) have been required to have onboard cameras installed and uploading footage to FNZ.

[7] Information on the schedule of the rollout of on-board cameras can be found on our website at: https://www.mpi.govt.nz/fishing-aquaculture/commercial-fishing/fisheries-change-programme/on-board-cameras-for-commercial-fishing-vessels/.

113. Camera footage review rates by FNZ vary by fishery and are based on random selection within a risk-based approach, with higher review rates in fisheries with higher risk of at-risk protected species interaction. Together, ER/GPR and onboard cameras enable more comprehensive monitoring and verification of fisher-reporting of protected species interactions and encourage compliance with relevant management measures.

114. In addition, the risk of fishing-related mortality for Hector's dolphin populations in FMA 3 and FMA 5 is managed through the 2020 Hector's and Māui Dolphin Threat Management Plan (**TMP**) and the 2022 South Island Hector's dolphin Bycatch Reduction Plan (**BRP**). The TMP identifies strategies to mitigate human-induced threats and outlines fisheries management goals and objectives. The BRP draws together FNZ, the Department of Conservation and industry in the implementation of regulatory and voluntary measures to reduce Hector's dolphin bycatch. Regulatory measures include the setting of six Fishing-Related Mortality Limits (**FRMLs**), enabling the Minister for Oceans and Fisheries to act more quickly and prohibit all or any fishing or fishing methods in an area for the purpose of ensuring that any FRML is not exceeded. To date, no Hector's dolphin FRMLs have been reached or exceeded, indicating that, based on the best available science, the performance of the BRP is aligning with fisheries management objectives outlined in the TMP.

115. A smaller volume of RSK 3 is taken as a bycatch in deepwater sub-Antarctic bottom trawl fisheries targeting scampi and squid in the Auckland Islands (statistical area 602) and squid south of the Snares (028). Interactions between these fisheries and associated and dependent species are discussed in greater detail in the chapters for those species in the 2025 Fisheries Assessment Plenary (see reference list for links to each chapter).

116. Over the last five full fishing years, six percent of RSK 3 was taken as a bycatch in bottom longline fisheries – primarily in the Bounty Plateau ling fishery situated in FMA 6, approximately 700 km east-south-east of the New Zealand mainland (Figure 7). Reported interaction rates with associated and dependent species are comparatively lower in this fishery – with a long-finned pilot whale the only high risk protected species interaction reported (in 2020/21). Given RSK 3 forms a very small bycatch component of this fishery, it is unlikely that TAC changes proposed for RSK 3 will influence fishing effort or associated and dependent species in bottom longline fisheries.

117. Since February 2025, bottom longline vessels have been required to implement specific seabird mitigation measures to minimize bycatch, as outlined in the Fisheries (Seabird Mitigation Measures—Bottom Longlines) Circular 2025. Since 3 March 2025, all bottom longline vessels must have onboard cameras installed and uploading footage to FNZ.

118. Other fish species that are taken as non-target catch (bycatch) are, like rough skates, primarily species managed under the QMS and there are no concerns for the sustainability of any of these other non-target species.

119. Because bycatch of rough skates is a small component of the mixed trawl fisheries in which it is caught, the TAC setting for RSK 3 is unlikely to have much influence on fishing effort or the level of associated and dependent species interactions in those fisheries.

120. FNZ acknowledges, however, that a TAC reduction could cause a shift in effort away from areas where rough skates are more abundant. While uncertain, this could influence interactions of the mixed trawl fisheries with associated and protected species in some areas. However, FNZ considers it unlikely that either of

	the proposed TAC options for RSK 3 would threaten the long-term viability of any associated or dependent species (based on the information summarised above). FNZ will continue to monitor interactions in these fisheries and consider appropriate management actions where risks are identified.
Biological diversity of the aquatic environment should be maintained - Section 9(b) of the Act	121. Bottom trawling impacts benthic habitats, with effects varying by habitat type. Biogenic habitat such as sponge gardens and coral reefs, are likely to incur physical destruction of structures and reduction or loss of associated biodiversity and are slow to recover. Disturbance of soft sediment habitats by bottom trawling can result in disturbance and compaction of sediment, loss of habitat structure (e.g. burrows), changes in species composition (favouring opportunistic species), and altered biogeochemistry. Fisheries New Zealand provides information on the impacts of bottom trawling on the Bottom trawling webpage. This includes information on benthic impacts and trawl footprint and the mitigations in place. 122. Rough skates are primarily a bycatch species taken by trawl fisheries targeting flatfish, elephantfish, barracouta, red gurnard, terakihi, and red cod. The combined number of annual tows and the trawl footprint for these fisheries in RSK3 has reduced by 15% and 4% respectively between 2019/20 and 2023/24. 123. In the FMA 3 and FMA 5 inshore mixed trawl fisheries, between the 2019/20 – 2023/24 fishing years, bycatch of corals, sponges or bryozoans were reported in 3% of events where observers were onboard and in 0.12 % of all events. During the 2023/24 fishing year observers reported 32 kg of sponges and 2.7 kg of coral. 124. The options proposed for RSK 3 in this review are not expected to change fishing effort. As such, no significant changes in benthic impacts would be expected as fishing effort will almost certainly remain within the existing trawl footprint. 125. While rough skates are likely prey species for a small number of predators, FNZ considers that the proposals in this review to maintain or decrease TACC settings are unlikely to reduce ongoing availability of rough skates to predators within RSK 3.
Habitat of particular significance for fisheries management should be protected - Section 9(c) of the Act	126. Over the last five full fishing years, 87% of the RSK 3 catch has been taken by bottom trawl (including PRB) (Figure 4). Bottom trawling can directly impact benthic habitats and biodiversity, particularly where it occurs outside of the existing trawl footprint and in high biodiversity value areas. Research has characterised New Zealand's benthic environment and levels of fishing impacts, in the Aquatic Environment and Biodiversity Annual Review (Fisheries New Zealand 2022). 127. FNZ is currently undertaking a process to review habitat data in science working groups and compile a registry of habitats of particular significance (**HoPS**), as well as assess the risk posed by fishing activity to those habitats. Using the best available information, FNZ has identified fifteen potential HoPS for fisheries management in RSK 3. 128. Potential HoPS that may be at risk of adverse effects due to trawling within the FMA 3 and FMA 5 inshore mixed trawl fisheries include the Hay Paddock. This is a potential nursery habitat for juvenile tarakihi and appears to be diminishing in areal extent as a consequence of disturbance from bottom trawling (Fisheries New Zealand 2024). A similar habitat in Pegasus Bay may also be trawled but we do not have evidence to understand whether it has changed in extent or not. The bryozoan-dominated parts of Otago shelf form a potential HoPS for juvenile blue cod, but this area is generally avoided by trawlers. Further details are provided in

	Part 3, *Supporting Information* below. Work is ongoing to identify potential adverse effects of fishing activity to potential HoPS. 129. The options proposed in this paper (maintaining or decreasing the TACC for RSK 3) are not expected to change the risk of adverse effects on those potential HoPS which overlap with RSK fishing effort. This is because the stock is taken as non-target catch and the proposals are not expected to lead to an increase in fishing effort.

Initial assessment of the proposals against section 11 of the Act

130. Section 11 of the Act sets out various matters that the Minister must take into account (sections 11(1) and 11(2A)) or have regard to (section 11(2)) when setting or varying sustainability measures such as the proposed TAC changes. The matters relevant to this review under section 11 are set out below.

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

The Minister must take into account:	
Effects of fishing on any stock and the aquatic environment – section 11(1)(a)	131. "Effect" is defined widely in the Act. The direct effects of fishing for RSK 3 need to be considered, as well as the direct and indirect effects of fishing on any relevant stocks and species, and the surrounding ecosystem. 132. Information relevant to the direct effects of fishing on this stock is described throughout this paper, particularly in Part 1 in *Analysis of options* and *Fishery characteristics and settings for RSK 3*. The effects of the RSK 3 bottom trawl and bottom longline fisheries on associated stocks and species, and the wider ecosystem, are summarised above in Tables 4, 6 and 7. 133. The effects of fishing on RSK 3, on associated species, and on the environment, could be influenced by changes in the TAC of RSK 3, and the Minister should take this into account in any decision on its TAC. 134. The magnitude of fishing effects on RSK 3 is likely to vary depending on the TAC setting, with greater effects more likely to occur under a higher TAC setting. However, as noted above, because RSK 3 is a bycatch stock which comprises a small catch component in the mixed trawl fisheries that catch it, TAC changes for this stock are less likely to influence the effects of fishing on associated species and the environment.
Existing controls that apply to the stock or area – section 11(1)(b)	135. Throughout RSK 3, fisheries regulations are in place with regards to headline height and mesh size, as well as various other gear restrictions that relate to trawling and set netting. These can be found in commercial fisheries regulations. 136. In particular, a 4 nm set net prohibition is in place throughout FMA 3 and FMA 5, as is a low headline requirement for trawlers operating inside two nautical miles of the coast. 137. As part of the South Island Hector's dolphin Bycatch Reduction Plan, Fishing-Related Mortality Limits (**FRMLs**) are in place in inshore waters of FMA 3 and FMA 5. 138. Skates caught recreationally in the RSK 3 area are subject to an individual species daily limit of five 'skates/rays' within a combined recreational daily limit of 30 finfish; in the Chatham Rise recreational fishing area, the individual species daily limit is one 'skate/ray'. There is no minimum legal size.

	139. Bylaws for the Lyttelton Harbour/Whakaraupō Mātaitai prohibit the taking of whai repo (skates and rays) from within the mātaitai.
The natural variability of the stock – section 11(1)(c)	140. Little is known about the reproductive biology of rough skates. Rough skates reproduce by laying yolky eggs, enclosed in leathery cases, on the seabed. Rough skates lay their eggs in spring-summer (Francis 1997). Two eggs are laid at a time, but the number of eggs laid annually by a female is unknown. 141. Rough skates grow to at least 90 cm total length (Roberts et al., 2015) and reach a maximum age of nine years; natural mortality (M) is estimated to be 0.25–0.35 (Francis *et al.* 2001a, b). 142. Females and males are estimated to reach sexual maturity at four and six years of age, respectively; combined with other life history characteristics, this is indicative of medium productivity. 143. This relative paucity of information means the natural variability of rough skates in RSK 3 is therefore unknown.
Fisheries plans, and conservation and fisheries services – section 11(2A)	144. RSK 3 is listed as a Group 2 stock in the National Inshore Finfish Plan. Group 2 recognises the need to manage for moderate levels of benefit, which vary between sectors and regions with moderate levels of information to monitor their status. Group 2 stocks are monitored with partial quantitative stock assessments, which are mostly based on trends in relative abundance. Future population (biomass) projections are not provided for. **Fisheries and conservation services** 145. Fisheries and conservation services of significance have been described throughout this paper where relevant. 146. Services of relevance to the review of RSK 3 include the research surveys used to monitor status (summarised under '*rationale for review*'), aquatic environment and biodiversity research, observer and camera coverage (see Table 6), and the tools used to enforce compliance with management settings.
The Minister must have regard to:	
Relevant statements, plans, strategies, provisions, and documents - section 11(2)	**Regional plans:** 147. Four regional councils and/or territorial authorities have coastlines within the boundaries of RSK 3: Canterbury, Otago, Southland and the Chatham Islands. 148. Each regional has policy statements and plans to manage the coastal and freshwater environments, including terrestrial and coastal linkages, ecosystems, and habitats. The provisions of these various documents are, for the most part, of a general nature and focus mostly on land-based stressors on the marine environment. There are no provisions specific to RSK 3. FNZ has reviewed the documents and the provisions that might be considered relevant. A summary of these can be found on our website here. FNZ considers the options in this paper are all consistent with the objectives of these relevant plans.
Non-mandatory relevant considerations	
Other plans and strategies	149. FNZ considers that the sustainability measures proposed for RSK 3 are generally consistent with relevant objectives of Te Mana o te Taiao – the Aotearoa New Zealand Biodiversity Strategy. This includes Objective 10, which is to ensure that ecosystems are protected, restored, resilient and connected

	from mountain tops to ocean depths; and Objective 12, which is to manage natural resources sustainably. 150. FNZ considers that Option 2 proposed in this review is consistent with the in maintaining biodiversity and long-term viability of rough skate populations – in particular Objective 1.3, which directs, for shark species managed under the QMS, an assessment be undertaken to determine the stock size in relation to B_{MSY} or other accepted management targets and on that basis review catch limits to maintain the stock at or above these targets.

Information principles: section 10 of the Act

151. The best available information relevant to this review of RSK 3 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 information. As per section 10(c) of the Act, caution is required in decision-making where information is uncertain, unreliable, or inadequate. However, as per section 10(d) of the Act, the absence of, or any uncertainty in, any information must also not be used as a reason for postponing or failing to make a decision.

Table 9: Best available information and key areas of uncertainty for RSK 3.

Best available information	Key areas of uncertainty, unreliability, or inadequacy
MacGibbon, DJ; Beentjes, MP; Escobar-Flores, P (2024) Inshore trawl survey of Canterbury Bight and Pegasus Bay, April–June 2024 (KAH2402). *New Zealand. Fisheries Assessment Report 2024/87*. 150p. Fisheries New Zealand (2025). Fisheries Assessment Plenary, May 2025: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. RSK 3 chapter accessible at: https://www.mpi.govt.nz/dmsdocument/69948-Fisheries-Assessment-Plenary-May-2025-Volume-3-ROUGH-SKATE-RSK.	▪ As a major source of uncertainty, the 2025 Plenary for RSK 3 (FNZ – Plenary, 2025) notes recent ECSI trawl survey indices are variable and the current stock status designation relies upon a single data point, which has declined over three surveys from a record high. ▪ Beentjes (2005) noted that, following introduction into the QMS in 2003, rough and smooth skates were not always correctly identified and a considerable, but unknown, catch of either species is misidentified with over-reporting of rough skate and, correspondingly, under-reporting of smooth skate. It is not known if reporting has improved since this time. ▪ Fisheries New Zealand's estimation of finfish release survival from New Zealand inshore commercial fisheries (McKenzie *et al*. 2024) concluded that post-release survival of rough skates caught by bottom trawl (including PRB) is uncertain due to the high uncertainty surrounding the impact of increases in fishing depth and bag size. However, there is greater certainty surrounding the impact of tow duration, with post-release survival estimated as moderate to high following a tow duration of three hours or less, and low to moderate following a tow duration of three to five hours. Although shorter tows are likely to result in greater post-release survival, that likelihood is negatively impacted with increasing total catch volume and fishing depth.

Mixed fishery considerations

152. RSK 3 is a low-value stock primarily taken as a bycatch in mixed bottom trawl and bottom longline fisheries, with smaller volumes taken by Danish seine and set net. Over the last five full fishing years (2019/20 to 2023/24), 87% of the RSK 3 catch has been taken by bottom trawl, 6% by bottom longline, 4% by Danish seine and 2% by set net (see Figure 4).

153. Approximately 75% of bottom trawl-caught RSK 3 was bycatch in the *FMA 3 inshore mixed trawl fishery* (statistical areas 020, 022, 024, 026), extending from Pegasus Bay (Canterbury) in the north, to the southwestern edge of the Catlins in the south (Figures 5 and 6). A further five percent each came from the southwest coast of Fiordland and the Auckland Islands.

154. The Fisheries Amendment Act 2022 outlines landing exception provisions (the **exception provisions**) for rough skates, whereby commercial fishers may return a rough skate (caught by any method) to the waters from which it was taken if it is likely to survive on return, and the return takes place as soon as practicable after it is taken. This returned catch is not required to be covered by ACE[8].

155. Under the National Inshore Finfish Fisheries Plan, FNZ has committed to progress an ecosystem-based fisheries management approach – including integrated management of stocks caught together in mixed fisheries. RSK 3 falls under the *FMA 3 inshore mixed trawl stock complex* defined in this plan. No new information is available to justify a review of TAC settings for other stocks in the complex, however details are provided in Table 10 to consider interdependencies in relation to the TAC options presented.

Table 10: Status of FMA 3 inshore mixed trawl fishery target stocks* associated with RSK 3 catch: 2019/20–2023/24 (ordered by total catch volume).

Stock	Stock status	TACC	Comments for current fishing year
FLA 3 (flatfish)	Fishing mortality likely (>60%) to be at or below the target (2020)	1,430 t	Landings have declined from around 1,002 tonnes (t) in 2019/20 to 411 t in 2023/24. Catch to-date** in 2024/25 is 256 t – equating to 18% of the TACC.
ELE 3 (Elephantfish)	Biomass about as likely as not (40–60%) to be at or above the target (2016)	1,150 t	Landings have declined from around 1,135 t in 2019/20 to 846 t in 2023/24. Catch to-date**in 2024/25 is 6,039 t – equating to 52% of the TACC.
BAR 1 (Barracouta)	Biomass likely (>60%) to be at or above the target (2018)	11,000 t	Landings have declined slightly from around 5,603 t in 2019/20 to 5,489 t in 2023/24. Catch to-date**in 2024/25 is 595 t – equating to 55% of the TACC.
GUR 3 (Red gurnard)	Biomass very likely (>90%) to be at or above the target (2022)	1,654 t	Landings have increased slightly from around 1,537 t in 2019/20 to 1,572 t in 2023/24. Catch to-date**in 2024/25 is 1,135 t – equating to 69% of the TACC.
TAR 3 (Tarakihi)	Biomass exceptionally unlikely (<1%) to be at or above the target (2022)	694 t	Landings have declined from around 882 t in 2019/20 to 660 t in 2023/24. Catch to-date**in 2024/25 is 403 t – equating to 58% of the TACC.
RCO 3 (Red cod)	Fishing mortality likely (>60%) to be at or below the target (2018)	4600 t	Landings have declined from around 1,557 t in 2019/20 to 569 t in 2023/24. Catch to-date**in 2024/25 is 250 t – equating to 5% of the TACC.

* Only those stocks accounting for >5% of total catch between 2019/20–2023/24 are shown.
** As of April 2025 (MHR greenweight kg).

[8] FNZ is currently reviewing proposals to reform the commercial landing and discard rules, including for rough skates.

Additional figures

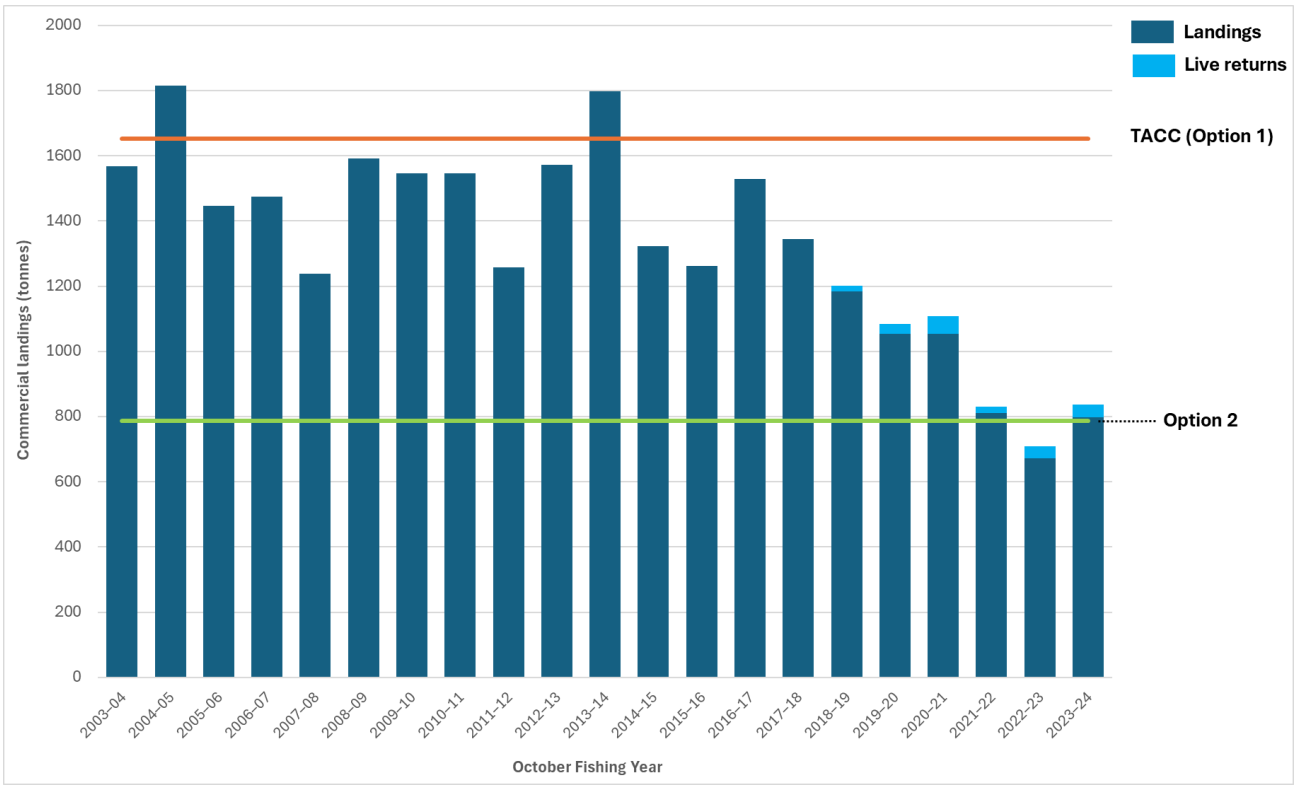

Figure 3: Commercial landing and live return history (in tonnes) since the 2003/04 fishing year for RSK 3, with proposed management options for the stock overlaid (proposed TACC levels).

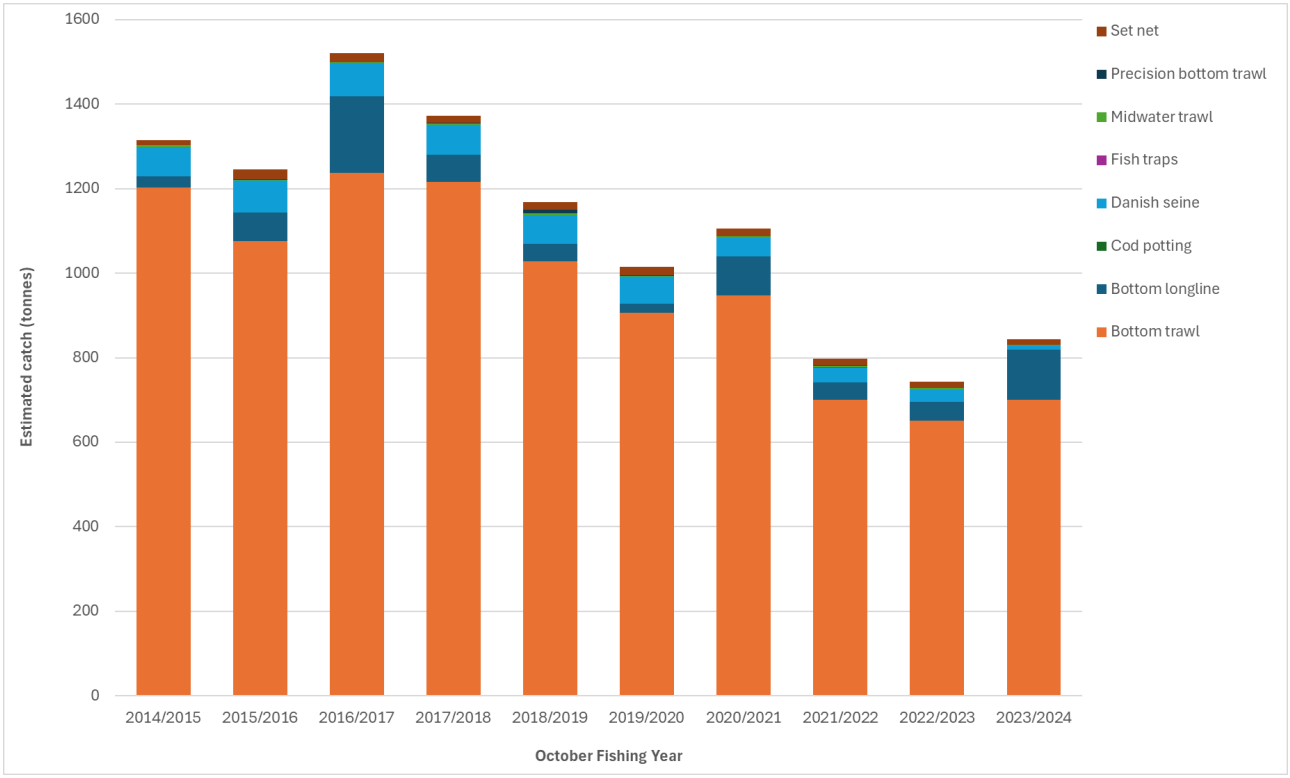

Figure 4: RSK 3 characterisation of fishing method by year: 2014/15 to 2023/24.

Table 11: Key characteristics of FMA 3 inshore mixed trawl fishery and Bounty Plateau bottom longline fishery.

Fishery	Tow duration/soak time	Fishing depth
FMA 3 inshore mixed trawl fishery (statistical areas 020, 022, 024, 026)	▪ 76% of RSK 3 catch* came from trawls where tow duration was greater than 3 hours.	▪ 95% of RSK 3 catch* came from trawls where bottom depth was less than 100 m.
Bounty Plateau bottom longline ling fishery (statistical areas 607, 608)	▪ 44% of RSK 3 catch* came from fishing events where soak time was <12 hours. ▪ 79% of RSK 3 catch came from events where soak time was <18 hours. ▪ 96% of RSK 3 catch came from events where soak time was <24 hours.	▪ 58% of RSK 3 catch* came from fishing events where bottom depth was <300 m. ▪ 85% of RSK 3 catch came from events where bottom depth was <400 m.

* Average percentage between 2019/20 and 2023/24.

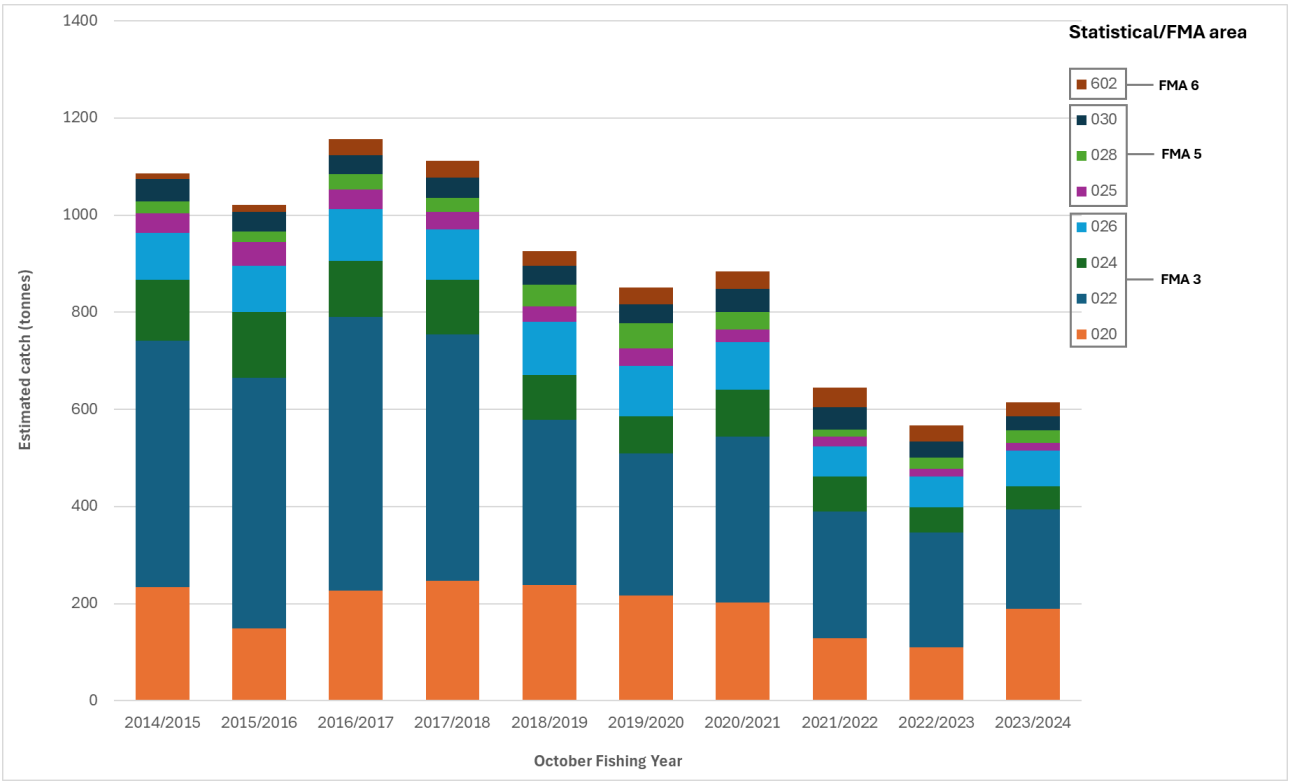

Figure 5: Bottom trawl (including PRB) catch of RSK 3 by Statistical Area/Fisheries Management Area (top 8 Statistical Areas only): 2014/15 to 2023/24.

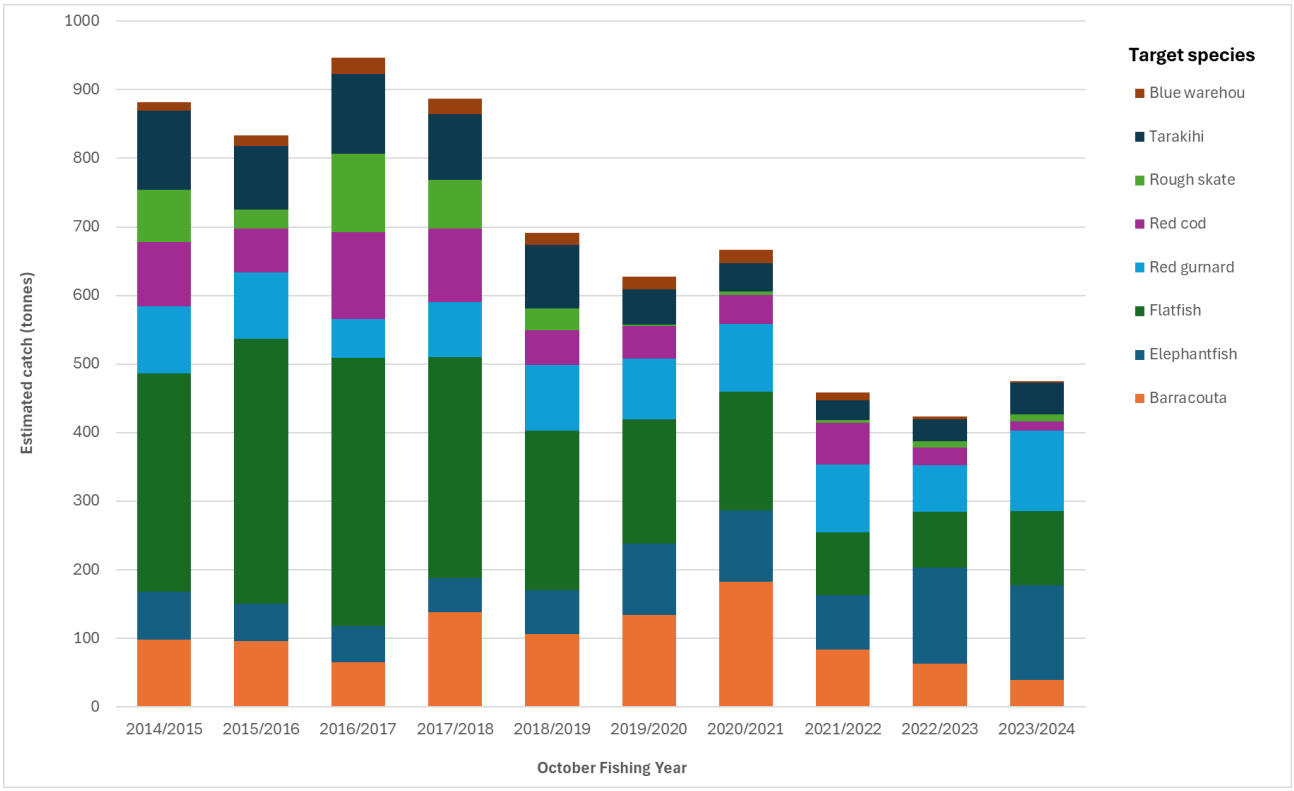

Figure 6: Bottom trawl (including PRB) catch of RSK 3 by (top 8) target species and fishing year in the FMA 3 inshore mixed trawl fishery (statistical areas 020, 022, 024, 026): 2014/15 to 2023/24.

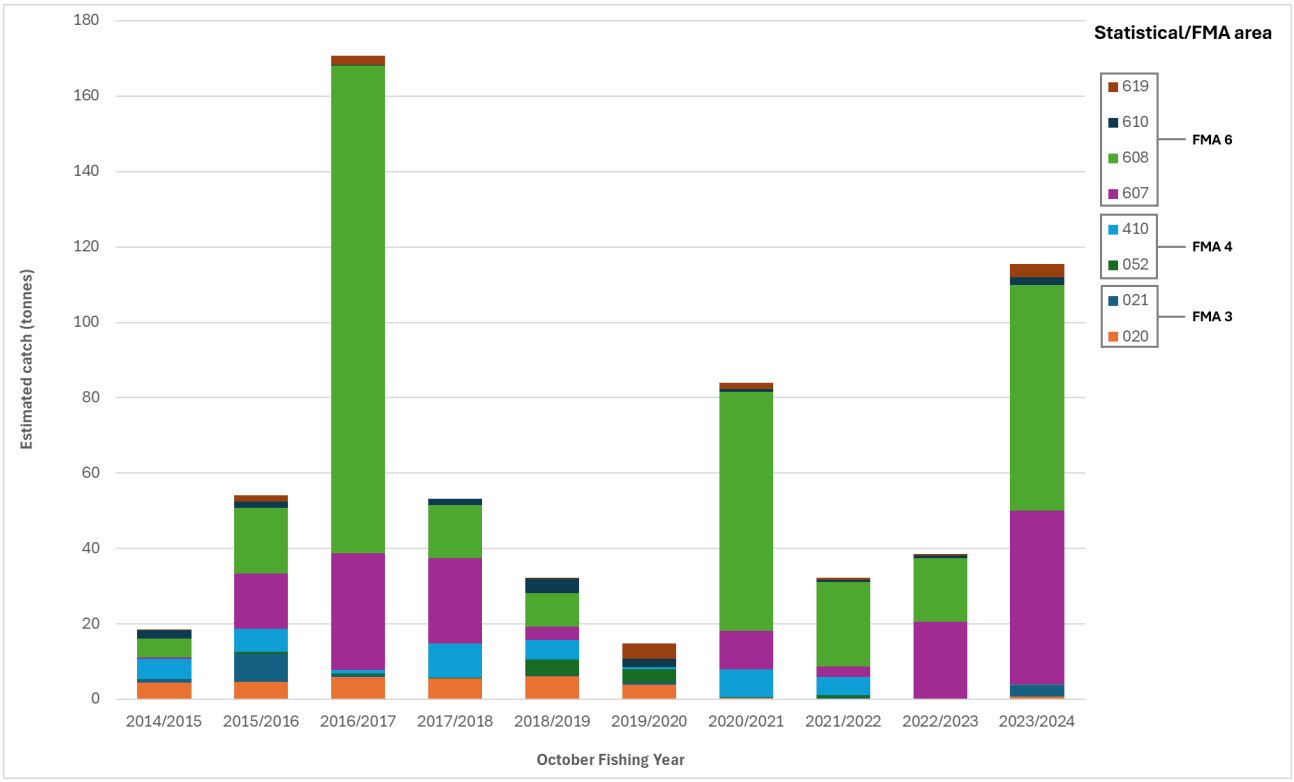

Figure 7: Bottom longline catch of RSK 3 by Statistical Area/Fisheries Management Area (top 8 Statistical Areas only): 2014/15 to 2023/24.

Supporting information on protected species interactions

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

157. Fisheries New Zealand provides information on the impact of the FMA 3 and FMA 5 inshore mixed trawl fisheries on associated or dependent species on the Seabirds and protected marine species caught by commercial fishers: quarterly report webpage. In addition to captures listed in Table 7, non-fish protected species (NFPS) captures (*dead*, *alive,injured*) reported by fishers between 2019/20 and 2023/24 included albatrosses (244 in total), shags (218), petrel, prion or shearwater (150), and gulls (19). Seventy-seven New Zealand fur seals were reported caught during the period, as were three 'seals or sea lions (unidentified)', one 'baleen whale (unidentified)' and one 'dolphin and toothed whale (unidentified)'.

Potential habitat of particular significance for fisheries management

158. As part of an ongoing work programme FNZ have identified potential habitats of particular significance for fisheries management (**HoPS**) in RSK 3 which overlap with RSK 3 fishing effort. A description of those areas and their sensitivities, why they are considered particularly significant, and the current measures in place that restrict fishing in those areas can be found in Table 12.

Table 12: Potential habitat of particular significance for fisheries management (HoPS) relevant to RSK 3.

Potential habitat of particular significance	**Blueskin Bay (possibly historical - 1956), Pegasus Bay, Canterbury Bight – sandy sediment (elephantfish)**
Attributes of habitat	The habitat is characterised by a combination of location, sediment type, and water depth; elephantfish repeatedly choose particular locations characterised by sand or mud bottoms in very shallow waters (Fisheries New Zealand 2024).
Reasons for particular significance	Areas with a high level of egg laying with predictable use by elephantfish during summer (October – February) and egg presence for a further 5 – 8 months (Hurst *et al*. 2000; Fisheries New Zealand 2024). Ensuring the areal extent and ecological function of this site is likely to support productivity of elephantfish.
Risks-Threats	Disturbance and resuspended sediment from disturbance of the seafloor, sedimentation, anchoring, and introduction of invasive species that change the nature of the substrate.
Existing protection measures	Trawling by vessels over 46 m long is prohibited - Fisheries (South-East Area Commercial Fishing) Regulations 1986: 4A. Voluntary closures are agreed in the Canterbury Bight, but fishing data shows not all fishers adhere to the agreement.
Evidence	Fisheries New Zealand (2024); Hurst *et al*. (2000);Morrison *et al*. (2014).
Potential habitat of particular significance	**Hay Paddock, Canterbury Bight, Pegasus Bay – mixed biogenic habitat (tarakihi)**
Attributes of habitat	The 'Hay Paddock', an area off Oamaru named for the tube worms and sponges which characterise the area, and areas in Canterbury Bight and Pegasus Bay (Vooren 1975). Sponge and shell hash, abundant ascidians, hydroids, and bryozoans (Jones *et al*. 2016, 2018).

Reasons for particular significance	Nursery for juvenile fish, including tarakihi (Vooren 1975; Anderson 2019; Beentjes *et al.* 2023). Increased availability of habitat and food to many fisheries resources. Tarakihi is a species undergoing stock rebuilding. Ensuring the areal extent and ecological function of this site is likely to support productivity of national tarakihi fisheries. Tarakihi move from southern to central New Zealand as they mature (McKenzie *et al*. 2021).
Risks-Threats	The Hay Paddock appears to be diminishing in areal extent as a consequence of disturbance from bottom trawling (FNZ - Plenary 2025). Damaging or removing structures created by worm tubes and sponges has potential to adversely affect the productivity of fish stocks, including tarakihi. Work is ongoing to identify potential adverse effects of fishing activity to potential HoPS.
Existing protection measures	Trawling by vessels over 46 m long is prohibited - Fisheries (South-East Area Commercial Fishing) Regulations 1986: 4A.
Evidence	Anderson (2019); Beentjes *et al*. (2023); FNZ - Plenary (2025); Jones *et al*. (2016); Jones *et al*. (2018); McKenzie *et al*. (2021); Vooren (1975).
Potential habitat of particular significance	**Biogenic reef in parts of Foveaux Strait (blue cod)**
Attributes of habitat	Mixed emergent invertebrates (e.g., sponges, ascidians, molluscs, bryozoans) through parts of Foveaux Strait (Jiang and Carbines 2002; Carbines and Cole 2009).
Reasons for particular significance	Juvenile blue cod can grow faster and in higher relative abundance on areas of biogenic reef in Foveaux Strait than on other habitats nearby (Carbines *et al*. 2004) and eat a more varied diet (Jiang and Carbines 2002). Potentially significant habitat is patchy and distributed across the central and eastern strait, and in bays around the coast of Stewart Island-Rakiura.
Risks-Threats	Disturbance of habitat structure and resuspended sediment from disturbance of the seafloor. The effects of changing climate on these habitats are not fully understood, but increased rainfall on land leading to increased sedimentation at sea, as well as warming oceans, has potential to be detrimental to suspension-feeding invertebrates e.g., some bryozoans; however, it may also stimulate productivity.
Existing protection measures	Trawl restrictions: Trawling by vessels over 46 m long is prohibited - Fisheries (South-East Area Commercial Fishing) Regulations 1986: 4A.
Evidence	Jiang and Carbines (2002); Carbines and Cole (2009); Carbines *et al*. (2004)
Potential habitat of particular significance	**Biogenic reef on Otago shelf in 60–120 m water depth (blue cod)**
Attributes of habitat	Bryozoan thickets with associated emergent epifauna (e.g., sponges, hydroids) on Otago shelf (Probert *et al.* 1979; Batson and Probert 2000; Jones *et al.* 2018)
Reasons for particular significance	Small blue cod use Otago shelf habitat for food and shelter; however, it is uncertain whether these sites meet a nursery definition. A study from a similar system in Foveaux Strait showed that juvenile blue cod grow faster and in higher abundance on areas of biogenic reef than on other habitats nearby (Carbines *et al.* 2004) and have a more diverse diet than those on less complex habitat (Jiang and Carbines 2002).
Risks-Threats	Disturbance of habitat structure and resuspended sediment from disturbance of the seafloor. The effects of changing climate on these habitats is not fully understood, but increased rainfall on land leading to increased sedimentation at sea, as well as warming oceans, has potential to be detrimental to some bryozoans.

Existing protection measures	Trawling by vessels over 46 m long is prohibited - Fisheries (South-East Area Commercial Fishing) Regulations 1986: 4A.
Evidence	Batson and Probert (2000); Jones *et al.* (2018); Carbines *et al.* (2004); Jiang and Carbines (2002); Probert *et al.* (1979).
Potential habitat of particular significance	**Chatham Rise – broad bathymetric feature supporting high primary productivity (hoki nursery)**
Attributes of habitat	The Chatham Rise is a region of high primary productivity (Murphy *et al*. 2001).
Reasons for particular significance	The major nursery ground for juvenile hoki aged 2–4 years is along the Chatham Rise, in depths of 200 to 600 m (Horn 2011). Juveniles are more abundant in shallower water (RL O'Driscoll, personal communication, December 2022).
Risks-Threats	While bottom contact fishing may modify the seabed, there is limited information on juvenile hoki habitat requirements, and it is not known whether the effect of bottom contact fishing will have a positive or negative impact on the function of this habitat for juvenile hoki.
Existing protection measures	Within the *Mid Chatham Rise* benthic protection area (under the Fisheries (Benthic Protection Areas) Regulations 2007) no trawling is permitted within 100m of seabed. All trawlers must notify intent to trawl in area, carry at least 2 observers and use ENMS (electronic net monitoring system) on trawl nets.
Evidence	Murphy *et al.* (2001); Heath (1985); Uddstrom and Oien (1999); Sutton (2001); Horn (2011); O'Driscoll (2022).

References

Anderson, TJ; Morrison, M; MacDiarmid, A; Clark, M; D'Archino, R; Nelson, W; Tracey, D; Gordon, D; Read, G; Kettles, H; Morrisey, D; Wood, A; Anderson, O; Smith, A.M; Page, M., Paul-Burke, K; Schnabel K; and Wadhwa, S (2019) Review of New Zealand's key biogenic habitats. NIWA report prepared for the Ministry for the Environment. 190 p.

Batson, PB; Probert, PK (2000) Bryozoan thickets off the Otago Peninsula. *New Zealand Fisheries Assessment Report 2000/46*. 31 p.

Beentjes, MP; MacGibbon, DJ; Escobar-Flores, P (2023) Inshore trawl survey of Canterbury Bight and Pegasus Bay, May–June 2022 (KAH2204). New Zealand Fisheries Assessment Report 2023/35. 147 p.

Beentjes, MP (2005) Identification and reporting of commercial skate landings. *New Zealand Fisheries Assessment Report 2005-16*. 18 p.

Bennett, J and Randhawa, HS (2019) Diet composition of New Zealand's endemic rough skate, *Zearaja nasuta*, *New Zealand Journal of Marine and Freshwater Research,* 53:1. 162-168.

Carbines, G; and Cole, RG (2009) Using a remote drift underwater video (DUV) to examine dredge impacts on demersal fishes and benthic habitat complexity in Foveaux Strait, Southern New Zealand. *Fisheries Research 96:* 230–237.

Carbines, G; Jiang, W; and Beentjes, MP (2004) The impact of oyster dredging on the growth of blue cod, *Parapercis colias*, in Foveaux Strait, New Zealand. *Aquatic Conservation: Marine and Freshwater Ecosystems, 14 (5).* 491-504.

Fisheries New Zealand (2025). Fisheries Assessment Plenary, May 2025: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. Accessible at: https://www.mpi.govt.nz/fishing-aquaculture/fisheries-management/fish-stock-status/plenary-reports-for-individual-species. RSK 3 chapter available at: https://www.mpi.govt.nz/dmsdocument/69948-Fisheries-Assessment-Plenary-May-2025-Volume-3-ROUGH-SKATE-RSK. Scampi chapter available at: https://www.mpi.govt.nz/dmsdocument/69954-Fisheries-Assessment-Plenary-May-2025-Volume-3-SCAMPI-SCI. Squid chapter available at: https://www.mpi.govt.nz/dmsdocument/69681-Fisheries-Assessment-Plenary-May-2025-Volume-1-ARROW-SQUID-SQU.

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

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

Food and Agriculture Organization (FAO) (2001) BAYES-SA, Bayesian stock assessment methods in Fisheries management – User manual. www.FAO.ORG Corporate Document Repository Y1958E

Ford, RB; Francis, MP; Holland, L; Clark, MR; Duffy, CAJ; Dunn, MR; Jones, E; and Wells, R (2018) Qualitative (Level 1) Risk Assessment of the impact of commercial fishing on New Zealand chondrichthyans: an update for 2017. Wellington: Ministry for Primary Industries. *New Zealand Aquatic Environment and Biodiversity Report No 201.* 103 p.

Francis, MP (1997) A summary of biology and commercial landings, and a stock assessment of rough and smooth skates (*Raja nasuta* and *R. innominata). New Zealand Fisheries Assessment Research Document 1997-5.* 27p. (Unpublished document held by NIWA library.)

Francis, MP; Ó Maolagáin, C; Stevens, D (2001a) Age, growth, and sexual maturity of two New Zealand endemic skates, *Dipturus nasutus* and *D. innominatus*. *New Zealand Journal of Marine and Freshwater Research 35*: 831–842.

Francis, MP; Ó Maolagáin, C; and Stevens, D (2001b) Age, growth, maturity, and mortality of rough and smooth skates (*Dipturus nasutus* and *D. innominatus). New Zealand Fisheries Assessment Report 2001-17*. 21 p.

Heath, RA (1985) A review of the physical oceanography of the seas around New Zealand—1982. *N.Z. J. Mar. FreshwaterRes. 19*: 79–124.

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

Horn, PL (2011). Natal fidelity: a literature review in relation to the management of the New Zealand hoki (*Macruronus novaezelandiae*) stocks. *New Zealand Fisheries Assessment Report 2011/34*. 18 p.

Hurst, RJ; Stevenson, ML; Bagley, NW; Griggs, LH; Morrison, MA; Francis, MP; and Duffy, CA (2000) Areas of importance for spawning, pupping or egg-laying, and juveniles of New Zealand coastal fish. *Final Research Report for Ministry of Fisheries Research Project ENV1999/03 Objective 1.* National Institute of Water and Atmospheric Research. 271 pp.

Jiang, W and Carbines, G (2002) Diet of blue cod, *Parapercis colias*, living on undisturbed biogenic reefs and on seabed modified by oyster dredging in Foveaux Strait, New Zealand. *Aquatic Conservation: Marine and Freshwater Ecosystems. 12.* 257-272.

Jones EG; Morrison MA; Davey N; Mills S; Pallentin A; George S; Kelly M; Tuck I (2018) Biogenic habitats on New Zealand's continental shelf. Part II: National field survey and analysis. New Zealand Aquatic Environment and Biodiversity Report No. 202. 261 p.

Jones, EG; Morrison, MA; Davey, N; Hartill, BW; and Sutton, C (2016) Biogenic habitats on New Zealand's continental shelf. Part I: Local ecological knowledge. New Zealand Aquatic Environment and Biodiversity Report No. 174. Ministry for Primary Industries, Wellington. 99 pp.

Lalas, C and Webster, T (2014) Contrast in the importance of arrow squid as prey of male New Zealand sea lions and New Zealand fur seals at The Snares, subantarctic New Zealand. *Marine Biology* 161: 631–643.

Lyon, WS; Francis, RICC and Francis, MP (2011) Calculating incubation times and hatching dates for embryonic elephantfish (*Callorhinchus milii*). *New Zealand Journal of Marine and Freshwater Research*, 45(1): 59-72.

MacGibbon, DJ; Beentjes, MP; and Escobar-Flores, P (2024) Inshore trawl survey of Canterbury Bight and Pegasus Bay, April–June 2024 (KAH2402). *New Zealand Fisheries Assessment Report 2024-87.* 150 p.

McKenzie, JR; Underwood, MJ; Jones, EG; Jordan, L; and Bian, R (2024) Estimation of finfish release survival from New Zealand inshore commercial fisheries. *New Zealand Fisheries Assessment Report* 2024-09. 180 p. https:--www.mpi.govt.nz-dmsdocument-61042-FAR-202409-Estimation-of-finfish-release-survival-from-New-Zealand-inshore-commercial-fisheries.

McKenzie, JR; Beentjes, M; Armiger, H; Bradley, A; Spong, K; Walsh, C; Buckthought, D; Stevenson, M; Taylor, R; Evans, O; Bian, R; Parsons, D; Sutton, C; Hart, A; Ó Maolagáin, C; Patke, S; Langley, A; Kater, D; Sykes, J; O'Driscoll, M; Qureshi, Y; Miller, A; Bodie, C; Smith, M; Hartill, B; Toman, D; Maggs, J; Bagley, N (2021.) Fishery characterisation and age composition of tarakihi in TAR 1, 2, 3, 5, 7, and 8, for 2018–19 and 2019–20. New Zealand Fisheries Assessment Report 2021/79. 118 p.

Morrison, MA; Jones, EG; Parsons, DP; and Grant, CM; (2014). Habitats and areas of particular significance for coastal finfish fisheries management in New Zealand: A review of concepts and life history knowledge, and suggestions for future research. New Zealand Aquatic Environment and Biodiversity Report No. 125. Ministry for Primary Industries, Wellington. 205 pp.

Murphy, RJ; Pinkerton, MH; Richardson, KM; Bradford-Grieve, JM; and Boyd, PW (2001) Phytoplankton distributions around New Zealand derived from SeaWiFS remotely-sensed ocean color data. *N.Z. J. Mar. FreshwaterRes*. *35*: 343–362.

Probert, PK; Batham, EJ; and Wilson, JB (1979) Epibenthic macrofauna off southeastern New Zealand and mid-shelf bryozoan dominance. *New Zealand Journal of Marine and Freshwater Research 13*: 379-392.

Roberts, CD; Stewart, AL; and Struthers, CD (2015) The Fishes of New Zealand. Te Papa Press, Wellington.

Starr, PJ; Tornquist, MG; Large, K; Middleton, DAJ; and Neubauer, P (2024) Characterisation and CPUE analyses for the SPO 1, SPO 2, SPO 3, SPO 7, and SPO 8 fisheries to 2020–21. *New Zealand Fisheries Assessment Report 2024-40.* 492 p.

Sutton, P (2001) Detailed structure of the Subtropical Front over Chatham Rise, east of New Zealand. *J. Geophys. Res. 106*: 31045–31056.

Uddstrom, MJ and Oien, NA (1999) On the use of high-resolution satellite data to describe the spatial and temporal variability of sea surface temperatures in the New Zealand region. *J. Geophys. Res. 104*: 20729–20751.

Vooren, CM (1975). Nursery grounds of tarakihi (Teleostei: Cheilodactylidae) around New Zealand. *New Zealand Journal of Marine and Freshwater Research 9*: 121–158.