Fisheries New Zealand
Tini a Tangaroa

Review of sustainability measures for silver warehou (SWA 3 and SWA 4) for 2025/26

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Contents

Guide to this discussion document and consultation

We are consulting on changes to the catch limits and allowances for silver warehou in SWA 3 and SWA 4 under the Fisheries Act 1996 (**the Act**). We welcome your feedback on the proposed options for these stocks 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 6 of this document.

Silver warehou (SWA 3) – East Coast of the South Island, and **(SWA 4) –** Southland, Sub-Antarctic and Chatham Islands

Part 1: Overview

Silver warehou / warehou
Seriolella punctata

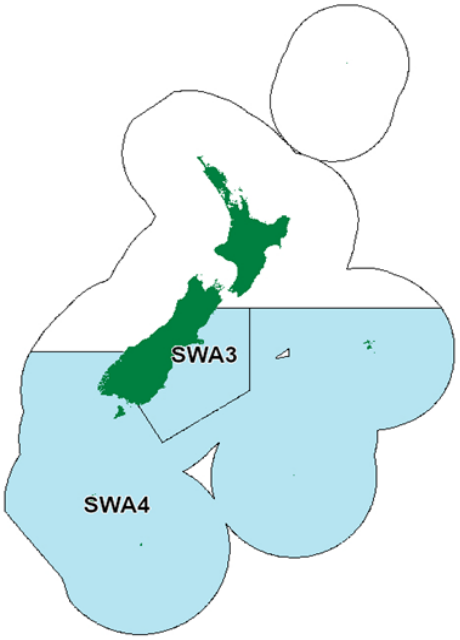

Figure 1: Quota Management Area (QMAs) for silver warehou with SWA 3 and SWA 4 highlighted.

Rationale for review

1. The Total Allowable Catches (**TACs**) for SWA 3 and SWA 4 were last reviewed for the October 2023 and April 2024 sustainability rounds, respectively. Aside from updated information on catches and fishery trends, little additional information has become available since those reviews.
2. Further research on the SWA 3 and SWA 4 stocks is planned for the 2025/26 financial year.[1] In the interim, however, Fisheries New Zealand (**FNZ**) considers that the information that supported the 2023 and 2024 reviews is still pertinent, and that there may be an additional utilisation opportunity for both stocks.
3. The information that supported the 2023 and 2024 reviews, which is summarised in the silver warehou chapter of the May 2025 Plenary, is that:
    - Commercial CPUE indices indicate that the stock(s) have been in good shape since at least the year 2000, with healthy age distributions and indications of strong incoming year classes (recruitment) periodically.[2]
    - Although the 2023 stock assessment model was not accepted, the Plenary concluded there was no sustainability issue for the Chatham Rise and Southland areas.
4. The catch information that has become available since the previous reviews is summarised as follows:
    - For SWA 3, catch has continued to increase (refer Figure 2) despite a decrease in the amount of targeting. The 2023/24 catch was the highest since 2006/07.
    - For SWA 4, catch has remained relatively constant, with catch during 2023/24 slightly less than the 2022/23 catch.
5. Informed by the above information, FNZ is proposing two options for moderate increases (10 or 15%) to the TAC of SWA 3 and an option for a small increase (5%) to the TAC of SWA 4.
6. Decisions to vary the TACs of these stocks would be made by the Minister for Oceans and Fisheries under section 13(2A) of the Fisheries Act 1996 (**the Act**) and would apply from 1 October 2025 (the beginning of the next fishing year).

[1] The project description is available in the Proposed Fisheries Research Services for 2025/26.
[2] As indicated by Figure 4 in the SWA Plenary Chapter.

Table 1: Proposed management options (in tonnes) for SWA 3 and SWA 4 from 1 October 2025.

Option	TAC	TACC	Allowances		
			Customary Māori	Recreational	All other mortality caused by fishing
SWA 3					
Option 1 (*status quo*)	4,040	4,000	0	0	40
Option 2 (10% increase)	4,444 (↑ 404)	4,400 (↑ 400)	0	0	44 (↑ 4)
Option 3 (15% increase)	4,646 (↑ 606)	4,600 (↑ 600)	0	0	46 (↑ 6)
SWA 4					
Option 1 (*status quo)*	5,227	5,175	0	0	52
Option 2 (5% increase)	5,488 (↑ 261)	5,434 (↑ 259)	0	0	54 (↑ 2)

7. FNZ welcomes feedback and submissions on the options proposed, or any alternatives.

Deemed Value Rates

8. FNZ is satisfied that the current deemed value rates for SWA 3 and SWA 4 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).
9. While no changes are proposed, FNZ welcomes any feedback on these settings. FNZ acknowledges that if the TACCs of these stocks are varied, subsequent changes in fishing behaviour and the ACE market may result in the need for deemed values to be re-evaluated in future.

Analysis of options

Option 1 (status quo)

10. Under the *status quo* the TAC/TACCs would remain unchanged. Fishers, particularly those operating in the east coast South Island hoki fishery (HOK 1, which is within the SWA 3 QMA), would likely continue to take significant amounts of silver warehou as non-target catch with no ability to cover all catch with ACE.
11. The dynamics of trying to minimize catch of silver warehou in this area could affect the efficiency of the hoki target fishery.

Option 2 – 10% TAC increase for SWA 3 – 5% TAC increase for SWA 4

12. The options for both stocks will be presented to the Minister for Oceans and Fisheries as discrete recommendations. This means the Minister may decide, for example, to adjust the TAC for one stock but retain the *status quo* for the other.
13. Under this option the TACs for SWA 3 and SWA 4 would increase by 10% and 5% respectively. For both stocks, the customary Māori and recreational allowances would remain unchanged.
14. The allowance for all other mortality caused by fishing would also increase. Under this option, it would be set at 44 tonnes for SWA 3 and 54 tonnes for SWA 4. In both cases, this is equivalent to 1% of the respective TACCs. For SWA 3 the TACC would increase by 10% to 4,400 tonnes, while for SWA 4 it would increase by 5% to 5,434 tonnes.

Benefits

15. The benefits of the additional ACE would result in some fishers, particularly those operating in the east coast South Island hoki fishery, being able to balance more of their incidental catch of silver warehou (SWA 3) with ACE. This could result in more efficient hoki fishing if there was less focus on avoiding silver warehou.

16. There would also be scope for fishers in SWA 4 to be able to take more silver warehou in this area, either as non-target catch, for example in the squid fishery if squid abundance increased, or as targeted catch.

Risks

17. For SWA 3, a catch of 4,638 tonnes was recorded during 2023/24. This means that the 10% increase to the TACC may not result in sufficient ACE being available for fishers to be able to balance all silver warehou catch with ACE, if future catch were at the same level as 2023/24.

18. Routine monitoring of both stocks can be undertaken using fisher-reported catch data. Additionally, observer coverage in the key fisheries that take most silver warehou as non-target catch is high.

19. Trawl surveys, particularly the Tangaroa Chatham Rise, provide an additional source of information on potential changes in abundance. FNZ's ability to monitor and respond to signals from any of these information sources is a key mitigation to any risk that might come with increasing the TAC.

Option 3 – 15% TAC increase for SWA 3

20. Under this option the TAC for SWA 3 would increase by 15%, while the customary Māori and recreational allowances would remain unchanged.

21. The allowance for all other mortality caused by fishing would also increase. Under this option, it would be set at 46 tonnes, equivalent to 1% of the TACC. The SWA 3 TACC would increase by 15% to 4,600 tonnes.

22. An additional option for SWA 4 is not included. FNZ considers there is little justification for an increase greater than the 5% proposed under Option 2 at this time. Additionally, the TAC/TACC for SWA 4 was increased at the start of the current (2024/25) fishing year.

Benefits

23. Based on recent catch, the additional ACE from this option would result in fishers, particularly those operating in the east coast South Island hoki fishery, being able to balance the majority of their incidental catch of SWA 3 with ACE. As with Option 2, hoki fishing in this area may be able to be undertaken more efficiently if the focus on minimising silver warehou catch was reduced.

24. As the TACC under this option is at the level of catch during 2023/24, there may be no change in export revenue. A reduction in deemed values would be expected, however.

Risks

25. While there is no new information regarding abundance, FNZ considers the risk to the sustainability of both stocks from either option is low. For SWA 3 in particular, the proposed options do not provide for a TACC that is higher than catch taken during the 2023/24 fishing year. There is no information to suggest that the ongoing period of high abundance on both stocks has changed.

26. This option is unlikely to result in an increase in fishing effort as most silver warehou in SWA 3 (and SWA 4) will probably continue to be taken as a non-target catch in fisheries such as squid, hoki, and barracouta.

27. As with Option 2, FNZ's ability to monitor and respond to any signals indicating abundance changes is a key mitigation to any risk that might come with increasing the TAC under this option.

Who will be affected by the proposed changes?

28. The proposed changes will primarily affect the small number of permit holders who have landed the bulk of the silver warehou taken in SWA 3 and SWA 4 in recent years. Based on combined landings of both stocks for the five fishing years between 2019/20 and 2023/24, eight permit holders recorded 96% of the catch. Fifty permit holders recorded the remaining 4% of catch.
29. In terms of licensed fish receivers (**LFRs**), there is a similar pattern, with seven LFRs receiving 95% of the combined SWA 3 and SWA 4 catch over that same time period. Twenty-three LFRs received 2% of the remainder, with 3% of catch not landed to an LFR.
30. The proposal will also affect quota holders, who would be allocated additional ACE if TACCs for either stock were to increase. For both stocks, most quota is held by a small number of entities. For SWA 3, four entities hold 83% of the quota while for SWA 4, five entities hold 86% of quota shares. The remaining shares are divided between 64 and 59 entities for SWA 3 and SWA 4 respectively.
31. The distribution and depth range of silver warehou means it is not taken by recreational anglers. Similarly, there are no recorded customary Māori catch of silver warehou.

Input and participation of tāngata whenua

32. SWA 3 and SWA 4 falls within the rohe of Te Waka a Māui me Ōna Toka (South Island) Iwi Fisheries Forum, which includes all nine iwi of Te Waipounamu (South Island), and the Chatham Islands Fisheries Forum. While the latter is not currently meeting, the Chatham Islands Community Fisheries Forum is a vehicle through which input and participation can be undertaken.
33. FNZ circulated a summary of the stocks proposed for review in this round, including SWA 3 and SWA 4, to the chairs of the relevant Iwi Fisheries Forums. FNZ invited feedback from the forums and offered to provide more detailed information for any stocks upon request.
34. 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 SWA 3 / 4 as part of the October 2025 sustainability round. The Forum was supportive of the review, with FNZ confirming it would be seeking their input again at the next TWAM hui during the public consultation phase.
35. FNZ also welcomes any input and submissions from tangata whenua outside of this engagement.
36. Regarding the Customary Māori allowance for SWA 3 / 4, which is currently set at zero tonnes, TWAM's position is that an allowance other than zero should be included to allow for pātaka arrangements.

Fishery characteristics and settings

Table 2: Fishery characteristics and settings for SWA3 and SWA 4.

Commercial (TACC)
37. The SWA 3 and SWA 4 stocks were introduced into the QMS in 1986. TACCs were initially set at 2,600 and 3,600 tonnes for SWA 3 and SWA 4 respectively. Between 1988 and 1994, these were gradually increased to 3,280.3 tonnes (SWA 3) and 4,089.9 tonnes (SWA 4) as a result of administrative processes related to QMS introduction.
38. The TACCs for both stocks were reviewed for the first time since QMS introduction in 2021. The SWA 3 TACC was increased to 3,610 tonnes, while the SWA 4 TACC was increased to 4,500 tonnes. Further reviews in 2023 (SWA 3) and 2024 (SWA 4) resulted in the current TACCs of 4,000 tonnes for SWA 3 and 5,175 tonnes for SWA 4.
39. Despite the recent TACC increases, catch of SWA 3 has exceeded available ACE for the last four completed fishing years (2020/21 – 2023/24).
40. For that same time period, catch of SWA 4 has consistently been between 4,000 and 5,000 tonnes but only exceeded available ACE during the 2023/24 fishing year.

41. In both stocks, the majority of silver warehou is taken as non-target catch, predominantly in the squid, hoki and barracouta fisheries. Some silver warehou is targeted. In SWA 3, the proportion that is targeted has declined year-on-year for the last four completed fishing years (2020/21 – 2023/24) from 33% in 2020/21 to 16% in 2023/24.

42. In SWA 4 over the same time period the percentage of catch that was targeted has fluctuated between 15% in 2021/22 and 30% in 2022/23.

43. Most silver warehou in these stocks is taken by the deepwater trawl fleet. Over the 2022/23 and 2023/24 fishing years, 97% of the combined SWA 3/4 catch was taken by vessels greater than 28 m in length. Most vessels in this fleet process and freeze fish on board. Silver warehou is typically processed to a 'dressed' state, which involves removal of the head and pectoral fins.

44. Almost all of the 3% of silver warehou taken by smaller vessels over this time period was taken by trawl vessels, predominantly in barracouta and squid target tows. There is some targeting of silver warehou by trawl vessels under 28 m in length (around 0.5% of catch over the two year time period).

Customary Māori

45. Silver warehou does not appear in customary take information. This is likely because the depth range and offshore distribution of the species makes it generally inaccessible for this purpose. There are also no records of silver warehou being taken for customary purposes through the pātaka system. The current customary Māori allowance is zero tonnes.

46. While acknowledging TWAM's position on customary Māori allowances, FNZ notes that a zero allowance does not preclude silver warehou taken from SWA 3 / SWA 4 from being taken and distributed through pātaka systems.

47. FNZ welcomes any input from tāngata whenua to inform advice on whether this allowance should be reviewed to reflect pātaka systems.

Recreational

48. Due to its depth range and offshore distribution, silver warehou is not thought to be taken by recreational fishers. While 'warehou' is mentioned in the National Panel Survey of Marine Recreational Fishers 2022-23, this is likely to have been blue (or common) warehou (Heinemann and Gray, 2024).

49. Accordingly, the recreational fishing allowance is currently zero tonnes, although FNZ welcomes information from stakeholders on alternatives to this.

Other sources of mortality caused by fishing

50. As part of the TAC reviews undertaken since 2021, an allowance that equated to 1% of the TACC for both stocks was set on the basis of consistency with other species taken by the same vessels.

51. There is no more recent information indicating that the basis of this allowance should be reviewed.

Supporting information and legal context

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

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

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

How to have your say

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

    - Which options do you support for revising the TACs 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?

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

57. 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.

Part 2: Initial assessment against relevant legal provisions

Overview

58. 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).

59. 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

60. Table 3 below outlines FNZ's initial assessment of the proposed options for SWA 3 and SWA 4 against section 13(2A) of the Act. This assessment has been informed by the best available information on the status of the stock (summarised in Part 1, with more information in Part 3 under '*stock status*').

Table 3: Initial assessment under section 13(2A) of the Act for the proposed changes to SWA 3 & SWA 4.

Section 13(2A)	61. The biomass of silver warehou in SWA 3 / SWA 4 cannot be reliably estimated in relation to B_{MSY} using the best available information, so section 13(2A) applies when setting or varying the TAC. Under this section, the Minister must set a TAC using the best available information that is not inconsistent with the objective of maintaining the stock at or above a level that supports *MSY*, or moving the stocks towards or above a level that can produce *MSY*, while having regard to the interdependence of stocks, the biological characteristics of the stocks, and any environmental conditions affecting the stocks. 62. FNZ's view is that all options presented for SWA 3 and SWA 4 are not inconsistent with the objective of maintaining the stocks at or above B_{MSY}. The best available information indicates that the stocks have been in good shape since at least 2000. There is also evidence of recent recruitment into the fishery. Taken together, FNZ's view is that the stocks are unlikely to decrease below a level that can produce *MSY* as a result of any of the options.
Section 13(2A)(b) Interdependence of stocks	63. The stock structure for silver warehou is not well known, but there are potential interdependencies between SWA 3 and SWA 4 noting that silver warehou in all of the Chatham Rise and Southland may comprise a single stock. 64. Silver warehou specialise in feeding on salps. There is little information about predators of silver warehou, but they are likely to have a range of different predators, including species of fish as well as marine mammals. They are unlikely to be a prey species for seabirds because of their depth distribution. 65. There is little information regarding interdependencies between silver warehou and other stocks they interact with. The proposed increases to the TACs for SWA 3 and SWA 4 could have some effect on associated predator and prey species if effort targeting silver warehou were to increase (or if effort in their associated fisheries were to increase), but specific impacts are uncertain. 66. While uncertain, FNZ considers that effects of the options to increase the TACs of SWA 3 and SWA 4 would have limited effects for associated stocks. The proposed changes are of a low magnitude and there appears to have been increased

	recruitment into the fishery, so the stocks are likely to remain at a high level of abundance following the proposed TAC changes. 67. As noted earlier, most silver warehou in SWA 3 and SWA 4 is currently taken as non-target catch, and this is not expected to change. Little change to the amount of targeting is expected if the TACs for either stock were to increase.
Section 13(2A)(b) Biological characteristics of the stock	68. Silver warehou grows rapidly and reaches sexual maturity at around 45 cm fork length in four years. The maximum age is estimated to be 23 for females and 19 for males. The species aggregates to feed and spawn. Mature fish appear to favour deeper water (>300m) than immature fish (<300m). The timing of spawning appears to vary considerably. The Plenary notes that the peak time for spawning appears to be winter on the west coast of the South Island, winter-spring on the western Chatham Rise, and spring-summer around the Chatham Islands. 69. These biological characteristics make silver warehou more resilient to fishing pressure than longer-lived species that reach sexual maturity later. Combined with the information indicating that the biomass of silver warehou has remained at a high level for an extended period of time, none of the options are likely to lead to sustainability concerns.
Section 13(2A)(b) Environmental conditions	70. There is little information regarding the environmental conditions that are likely to affect silver warehou. However, as the age structure has remained healthy and CPUE indices silver warehou in SWA 3 /4 have remained stable for an extended period of time, it is unlikely that environmental factors are adversely impacting the stock at present.
Section 13(3) Factors to have regard to in considering the way and rate the stock is moved towards or above B_{MSY}	71. Section 13(3) is not considered relevant to the TAC decisions for SWA 3 or SWA 4 because the proposed TAC options only aim to maintain the stocks at or above B_{MSY}. They are not intended to move the stocks to a certain level in a certain way or rate (noting that forward projections are also not available to help FNZ determine what way and rate these options would move the stock in relation to B_{MSY}).

Harvest Strategy Standard (HSS)

72. The Harvest Strategy Standard (**HSS**) 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 (**QMS**). The HSS outlines FNZ's approach to relevant sections of the Act and, as such, forms a core input to FNZ's proposals on the management of fisheries, particularly the setting of TACs under section 13.

73. The HSS assists us to decide when a review of sustainability and related settings for a stock may be warranted, by establishing reference points and guidance for the fisheries management responses when stocks are at those reference points.

74. The default Harvest Strategy Standard management target of 40% B_0 (unfished biomass) applies to SWA 3 / SWA 4. The soft limit is 20% B_0, and the hard limit is 10% B_0.

75. For both stocks, there are no available estimates of biomass relative to reference points such as B_{MSY} (the biomass that enables a fish stock to deliver *MSY*), and as such there is uncertainty as to where the current biomass sits in relation to the default targets (including the soft or hard limit) set out by the HSS.

Kaitiakitanga

76. Tangata 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.

77. Te Waipounamu (all of South Island) Iwi consider all fish species as taonga, as do iwi/imi from Rēkohu/Wharekauri.

78. Te Waipounamu Iwi Forum Fisheries Plan contains objectives to support and provide for the interests of South Island iwi, and contains two objectives which are relevant to the management options proposed for SWA 3 / 4:

- **Management Objective 3**: to develop environmentally responsible, productive, sustainable, and culturally appropriate commercial fisheries that create long-term commercial benefits and economic development opportunities for South Island iwi.
- **Management Objective 5**: to restore, maintain and enhance the mauri and wairua of fisheries throughout the South Island.

79. The CIFF@44º (Chatham Island Fisheries Forum plan, which includes Rangihaute/Rangiauria-Pitt Island) contains three management objectives that are relevant to the management options proposed for SWA 4:

- **Management Objective 2:** Kaitiakitanga is fundamental to the management of all fisheries resources.
- **Management Objective 5:** Thriving Fisheries. Thriving sustainable fisheries that are enduring for present and future generations.
- **Management Objective 6:** Traditional Fisheries. Fisheries and fisheries areas of cultural significance are protected, maintained, and enhanced.

80. For settlement quota holders, any TACC increase would result in additional ACE being available for sale.

81. FNZ considers that the options proposed for SWA 3 and SWA 4 are consistent with the objectives of these plans regarding the maintenance of sustainable fisheries and providing for commercial benefits. FNZ welcomes feedback from tangata whenua on this view.

Mātaitai reserves and other customary management tools

82. 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.

83. There are no customary fisheries management tools such as mātaitai, taiāpure, or section 186A/186B temporary closures directly relevant to SWA 3 and 4. The deepwater trawl fleet, which catches almost all silver warehou in SWA 3 and 4, is prohibited from operating within at least 12 nautical miles of the South Island and Chatham Island coast.

Initial assessment of the proposals against section 9 of the Act

84. Table 4 below outlines FNZ's assessment of the proposed options for SWA 3 / 4 against the environmental principles in section 9 of the Act, which the Minister must take into account when considering the TAC for these stocks. This assessment has been informed by FNZ's knowledge of the current environmental impact of this fishery, which is discussed under *'Information on environmental impacts'* within *'Part 3: Supporting information'*.

Table 4: Initial assessment of the proposed changes for SWA 3 and SWA 4 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	85. The deepwater trawl fleet that takes the majority of silver warehou interacts with associated and dependent species such as seabirds, marine mammals, and benthic invertebrates. The interactions with these species are discussed in Part 3 under '*protected species interactions*'. 86. One seabird species caught by the fleet, Southern Buller's albatross, is classified as 'at risk' under the New Zealand Threat Classification System (**NZTCS**) and considered high risk based on the most recent seabird risk assessment (Edwards at al., 2023). Fifty percent of the risk to this species is attributed to trawl vessels greater than 28 m in length via the 'large freezer' and 'squid' fishing groups used in the current assessment.[3] 87. However, the overall risk to Southern Buller's albatross, or any other protected species, is unlikely to change if the TAC for SWA 3 or SWA 4 were to increase. This is because overall effort by the 'large freezer' or 'squid' fishing groups is unlikely to change as a result of these proposed changes. 88. The fish species that are taken as non-target catch in silver warehou target tows are primarily species managed under the QMS and there are no concerns for the sustainability of any of the non-target species. 89. Based on this information, FNZ considers it highly unlikely that any of the proposed options would threaten the long-term viability of any associated or dependent species.
Biological diversity of the aquatic environment should be maintained - Section 9(b) of the Act	90. 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. 91. In the 2023/24 fishing year 93% of all tows targeting hoki, squid, barracouta or silver warehou in SWA3 were bottom contacting (on the seabed or within 1m of the seabed). Over the five most recent complete fishing years, the number of bottom contacting tows and the combined annual trawl footprint from these fisheries have been stable. Tows fall within the historical trawl footprint and indicate that effort is not expanding into new unfished areas. 92. In the 2023/24 fishing year 98% of all tows targeting hoki, squid, barracouta or silver warehou in SWA4 were bottom contacting (on the seabed or within 1m of the seabed). Over the five most recent complete fishing years, the number of bottom contacting tows have fluctuated and the combined annual trawl footprint from these fisheries has increased by 30%. Tows fall within the historical trawl footprint and indicate that effort is not expanding into new unfished areas. 93. It is unlikely that there would be any change in overall fishing effort if the TAC of SWA 3 or SWA 4 were to increase. If more targeting of silver warehou were to occur as a result of an increase to the TAC of SWA 3 or SWA 4, this would be balanced by a corresponding reduction in targeting of other species such as hoki. 94. Additionally, the deepwater trawl fleet fish within previously trawled areas and there is no reason to expect this pattern would change. Therefore, no significant changes in benthic impacts would be expected as a result of an increase to the TAC of SWA 3 or SWA 4.

[3] Any targeting of silver warehou in SWA 3 or SWA 4 was included within the 'large freezer' fishing group. The key target species in this group is hoki.

	95. While silver warehou may be a prey species, there is likely to be little risk that predators would be affected if the TAC for either stock were to increase due to the ongoing abundance of silver warehou within both QMAs.
Habitat of particular significance for fisheries management should be protected - Section 9(c) of the Act	96. Information on potential habitats of significance for fisheries management (**HoPS**) is provided in Part 3. FNZ is currently undertaking a process to review habitat data in science working groups to compile a registry of HoPS, and to assess the risk of adverse effects from fishing. 97. Within FMAs 3 and 4, several areas where silver warehou may be caught by trawling have been identified as potential HoPS. These include areas in relatively shallow waters on the shelf area where a small fraction of silver warehou is caught, as well as areas in deeper water (the Chatham Rise) where the majority of silver warehou catch takes place. 98. A range of management measures is in place that is relevant to these areas. For the areas in shallow water, regulations prohibit trawling by vessels greater than 46m in length. Trawling is prohibited in part of Pegasus Bay at all times, while seasonal trawl restrictions apply around several river mouths in Pegasus Bay and the Canterbury Bight. There is also a voluntary agreement that fishers will not trawl within one nautical mile of the coast in the Canterbury Bight between Banks Peninsula and the Canterbury Bight. 99. In deeper water trawling is prohibited in the mid-Chatham Rise benthic protection area. Regulations that prohibit trawling by vessels greater than 46m in length apply to the Territorial Sea, and an area outside the Territorial Sea on the western Chatham Rise. An industry initiative that prohibits the targeting of hoki by vessels greater than 28 m in length around the Mernoo Bank and the Canterbury Banks. 100. The options proposed are unlikely to affect interactions between these habitats and SWA 3 and SWA 4 fisheries. Work is ongoing to identify potential adverse effects of fishing on potential HoPS.

Initial assessment of the proposals against section 11 of the Act

101. 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 5: Initial assessment of the proposed changes for SWA 3 and SWA 4 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)	102. "*Effect"* is defined in the Act. [4] The direct effects of fishing on SWA 3 / SWA 4 need to be considered, as well as the indirect effects of fishing on other species and the surrounding ecosystem. 103. Information about the direct effects of fishing on SWA 3 / SWA 4 is provided throughout this paper, particularly within Part 1 under 'A*nalysis of options*', and *'Fishery characteristics and settings'*. 104. The effects of fishing on SWA 3 / SWA 4, on associated species, and on the environment, could be influenced by changes in the TAC of SWA 3 / SWA 4, and the Minister should take this into account in any decision on its TAC.

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

	105. Potential indirect effects of fishing for other species, for example, potential impacts of removing silver warehou in SWA 3 / SWA 4 on the food chain, are addressed above in Table 4. 106. The magnitude of the effects of fishing on the SWA 3 / SWA 4 stocks, their associated species, and the wider environment, will vary depending on their TAC settings. Greater effects may occur under higher TAC settings, and this is something the Minister must consider in decision on these measures.
Existing controls that apply to the stock or area – section 11(1)(b)	**Commercial fishing controls** 107. Includes spatial trawl restrictions for vessels over 46 m under Fisheries (South-East Area Commercial Fishing) Regulations 1986 and Fisheries (Commercial Fishing) Regulations 2001. **Recreational finfish controls** 108. Although silver warehou is not a recreational species, it would come under the general recreational daily limit requirements for finfish. In all of FMAs 3-6, the combined daily limit for finfish is 30.
The natural variability of the stock – section 11(1)(c)	109. The abundance of silver warehou in SWA 3 and SWA 4 appears to have been driven by several strong year classes entering the fishery over the years. FNZ will continue to monitor the fishery, including via the biennial Chatham Rise trawl survey, and the east coast South Island inshore trawl survey, which primarily monitor adult and juvenile silver warehou respectively. 110. Although silver warehou is also taken in the biennial sub-Antarctic trawl survey, this survey is not currently considered a reliable index for this species (FNZ – Fisheries Assessment Plenary, 2025).
Fisheries plans, and conservation and fisheries services – section 11(2A)	111. All silver warehou stocks are managed as Tier 2 stocks within the National Fisheries Plan for Deepwater and Middle-depth fisheries 2019 - part 1A (FNZ - National Deepwater Plan 2019). 112. The National Deepwater Plan sets out a series of Management Objectives for deepwater fisheries, the most relevant to the SWA 3 / SWA 4 stocks being: • **Management Objective 1:** Ensure the deepwater and middle-depth fisheries resources are managed so as to provide for the needs of future generations. • **Management Objective 4:** Ensure deepwater and middle-depth fish stocks and key bycatch fish stocks are managed to an agreed harvest strategy or reference points. 113. The National Deepwater Plan is a formally approved section 11A plan, which the Minister must take into account when making sustainability decisions. The proposed options for SWA 3 / SWA 4 are consistent with the Management Objectives in the plan, including those outlined above. 114. Additionally, a hoki chapter was finalised in 2013, which incorporated silver warehou stocks. While it is not a formally approved section 11A plan, the chapter contains a number of operational objectives designed to contribute to the Management Objectives in the National Deepwater Plan. **Fisheries and conservation services** 115. Fisheries services of relevance to the review of the SWA 3 / SWA 4 TACs include research used to monitor stock abundance, and observer coverage. 116. The stock assessments previously attempted have been cost recovered from SWA 3 / SWA 4 quota owners. Observer coverage on the deepwater trawl fleet is relatively high. In the five years between 2018/19 and 2022/23, coverage of hoki target tows undertaken in the SWA 3 / SWA 4 QMAs ranged between 27

	and 49%. Biological sampling of silver warehou in SWA 3 / SWA 4 is undertaken as part of this coverage.
The Minister must have regard to:	
Relevant statements, plans, strategies, provisions, and documents - section 11(2)	**Regional plans:** 117. There are three regional councils (as well as the Chatham Island Council) that have coastlines within the boundaries of SWA 3 / SWA 4: Canterbury, Otago, and Southland. 118. Each of these regions have 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 SWA 3 / SWA 4. 119. 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	Te Mana o te Taiao (Aotearoa New Zealand Biodiversity Strategy) 120. The sustainability measures proposed for SWA 3 / SWA 4 are generally consistent with relevant objectives of Te Mana o te Taiao – the Aotearoa New Zealand Biodiversity Strategy. This includes Objective 10, which is to ensure that ecosystems are protected, restored, resilient and connected from mountain tops to ocean depths; and Objective 12, which is to manage natural resources sustainably.

Information principles: section 10 of the Act

121. The best available information relevant to this review of SWA 3 / SWA 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 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 6. Best available information and key areas of uncertainty for SWA 3 / SWA 4.

Best available information	Key areas of uncertainty, unreliability, or inadequacy
The best available information includes various catch per unit effort (**CPUE**) indices, information from the *Tangaroa* Chatham Rise and *Kaharoa* trawl surveys, and observer sampling data. Collectively, the information is consistent in indicating the ongoing abundance of silver warehou in both stocks.	The CPUE indices referred to have not been updated to incorporate data after the 2020/21 fishing year. Further research is planned for the 2025/26 financial year. There is no accepted way of tracking the abundance of SWA 3 / 4 due to the characteristics and behaviour of the fish and fishing fleet. Observer data from recent years has not been formally analysed.

Additional figures

122. Figures 2 and 3 show catch, available ACE, and the TACC for SWA 3 and SWA 4 respectively since 2001/02.

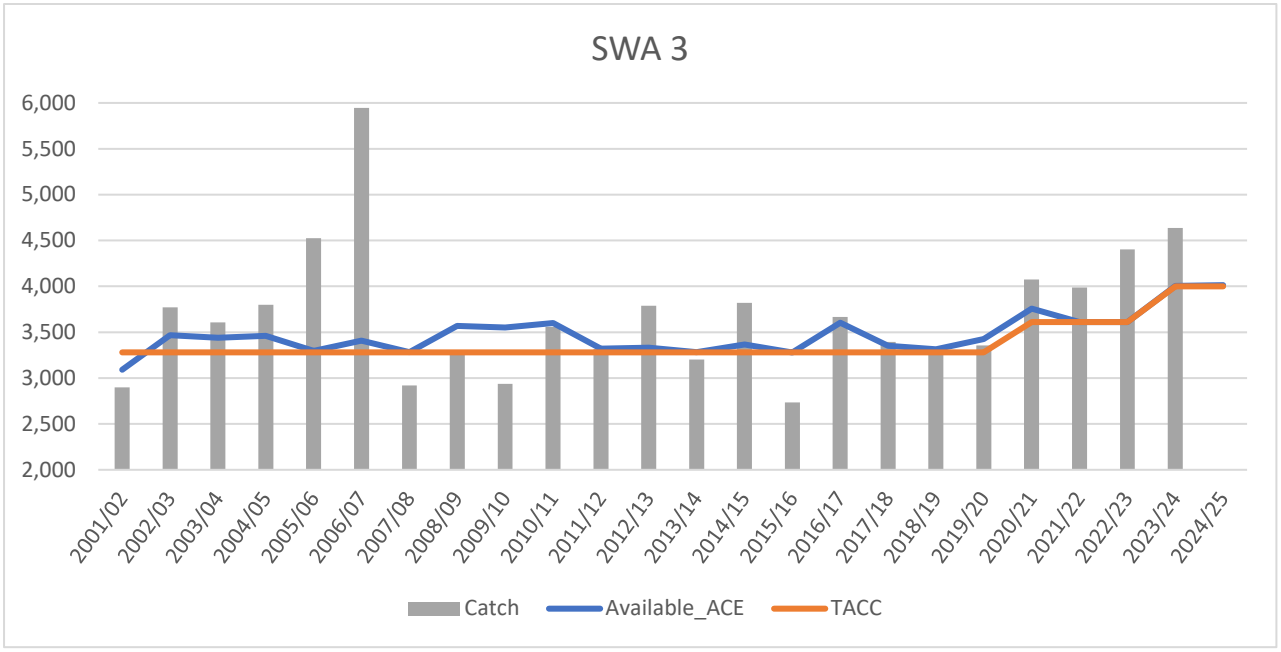

Figure 2: Catch, available ACE, and TACC for SWA 3 since 2001//02 (all figures in tonnes)

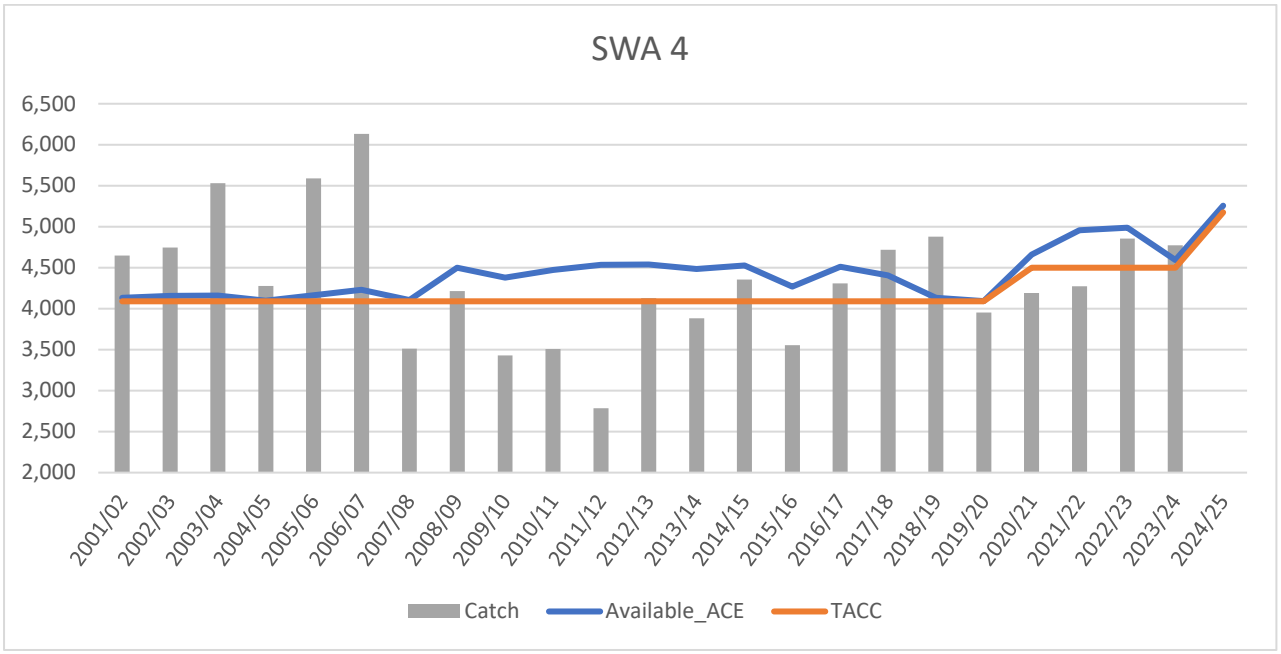

Figure 3: Catch, available ACE, and TACC for SWA 4 since 2001//02 (all figures in tonnes)

Stock status

123. While there is no new information on stock status, there is additional length frequency information available from recent years.

124. Figure 4 summarises data from the January 2024 Chatham Rise trawl survey, while Figure 5 summarises raw length frequency information recorded by observers from the SWA 3 and SWA 4 QMAs (combined) for the four fishing years between 2020/21 and 2023/24. The consistent presence of fish smaller than 35 cm in the data indicates ongoing recruitment into the fishery.

125. For comparative purposes, information from the 2014 and 2016 trawl surveys is also included (Figure 6). These also show modes of smaller fish consistent with the more recent data.

126.

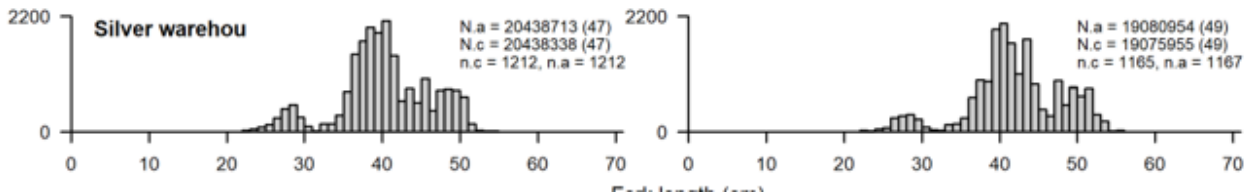

Figure 4: Length frequency distribution for silver warehou from the 2024 Tangaroa Chatham Rise trawl survey, scaled to population size by frequency. The left and right panels show male and female fish respectively.

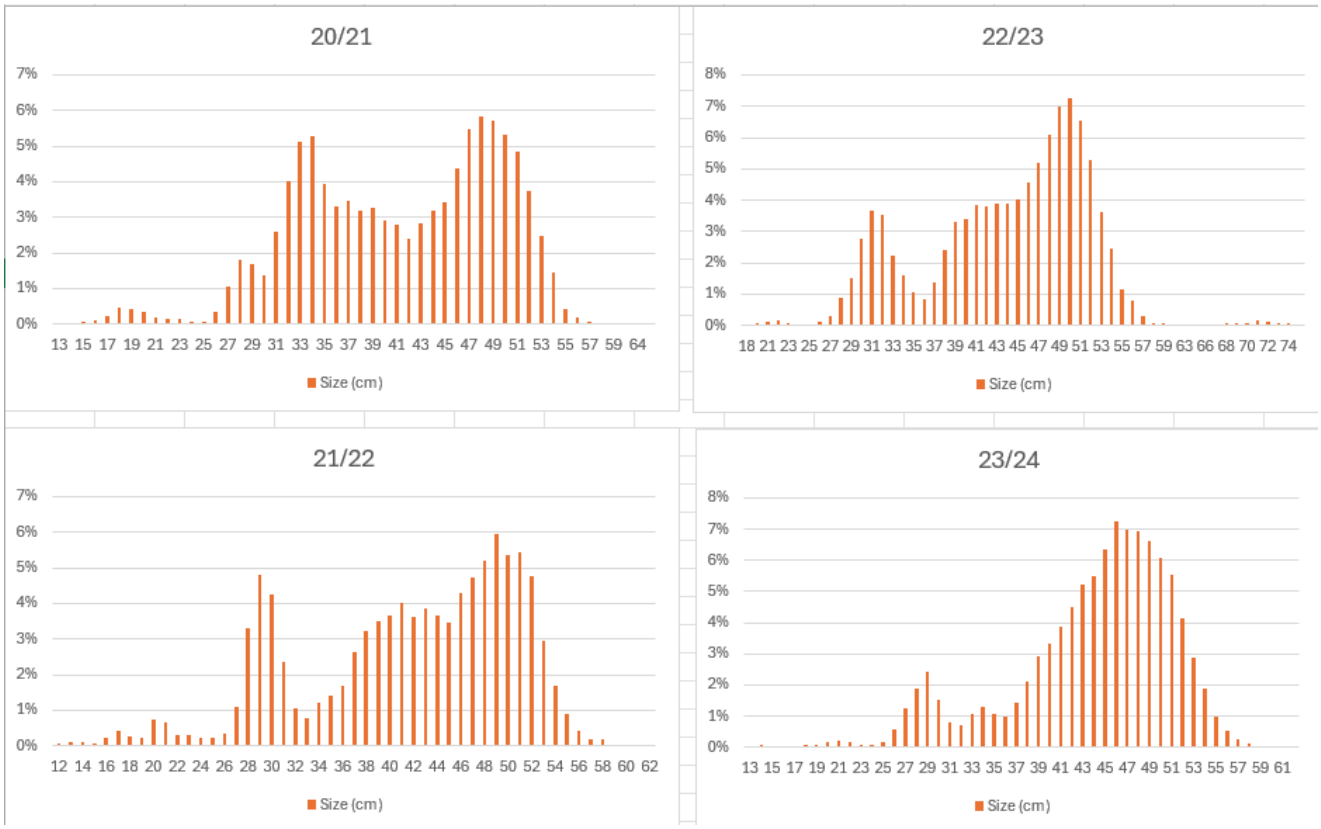

Figure 5: Raw length frequency information for silver warehou (both sexes combined) measured by observers in SWA 3 / 4 combined between the 2020/21 and 2023/24 fishing years

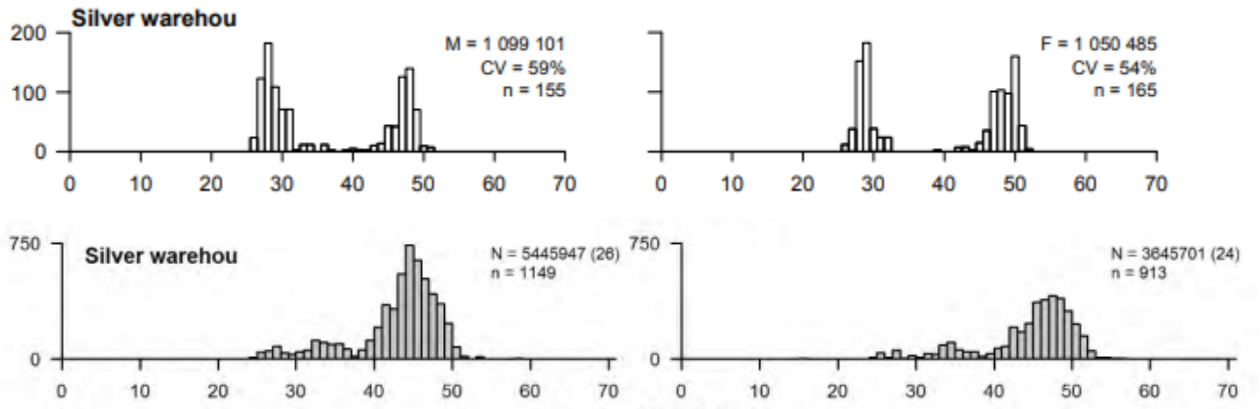

Figure 6: Length frequency information for silver warehou from the 2014 (upper) and 2016 (lower) Tangaroa Chatham Rise trawl surveys.

Information on environmental impacts

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

Protected species interactions

128. Further information on interactions with associated or dependent species/groups is set out below. It relates to fishing events where silver warehou was recorded as the target species.

Seabirds

129. The deepwater trawl fleet that operates in FMAs 3-6 interacts with seabirds from time to time. Based on fisher-reported data, 22 seabird interactions were reported when the target species was recorded as SWA in the SWA 3 and SWA 4 QMAs for the five fishing years between 2019/20 and 2023/24.

130. Based on observer data, the species most encountered in SWA target tows over this time period were white-capped albatross and southern Buller's albatross (both categorised as *at risk* – NZTCS).

131. Regulations requiring the use of seabird scaring devices by vessels greater than 28 metres in length have been in place for close to 20 years.[5] Additionally, a range of non-regulatory measures have been in place for a similar time period. They are set out in vessel-specific protected species risk management plans (PSRMPs) and include measures such as fish waste management practices and the deployment of additional seabird scaring devices at times of heightened risk.

Mammals

132. The deepwater trawl fleet operating in FMAs 3-6 occasionally interacts with marine mammals, primarily New Zealand fur seals as well as a small number of New Zealand sea lions. Based on fisher-reported data, three marine mammals (all fur seals) were reported when the target species was recorded as SWA in the SWA 3 and SWA 4 QMAs for the five fishing years between 2019/20 and 2023/24.

133. To minimise the risk of marine mammal captures, Seafood New Zealand Deepwater Council[6] developed Marine Mammal Operational Procedures (**MMOP**) for all trawlers greater than 28 m in length. The MMOP describes a range of procedures that a crew should follow to reduce the risk of marine mammal captures, such as minimising the length of time fishing gear is on the sea surface, removing all pieces of dead fish ('stickers') from the net before shooting the gear, steaming away from any congregations of

[5] The mandatory requirements for these vessels are set out set out in the Seabird Scaring Devices Circular 2010 No. F517, which is issued pursuant to regulation 58A of the Fisheries (Commercial Fishing) Regulations 2001.

[6] Seafood New Zealand Deepwater Council is the industry body that represents the majority of SWA 4 quota holders.

marine mammals before shooting the gear again, and appointing a crew member to watch for marine mammal interactions every time the gear is shot or hauled.

Sea turtles

134. The fisheries that take silver warehou in SWA 3 / SWA 4 do not interact with sea turtles.

Fish and invertebrate bycatch

135. Interactions with protected fish species are infrequent. Three basking sharks and one white pointer shark (both categorised as *threatened* – NZTCS) have been reported by fishers targeting silver warehou in SWA 3 / SWA 4 during the five years between 2019/20 and 2023/24.

136. When targeted, silver warehou comprises the majority of the catch. The non-target species that are taken are mostly QMS species such as hoki and spiny dogfish. There are currently no known sustainability concerns for the species taken as non-target catch in silver warehou target tows in SWA 3 / SWA 4.

Biological diversity of the environment

137. The trawl fisheries that take silver warehou in SWA 3 / SWA 4 can interact with the seabed and the associated benthic environment. The nature and extent of those impacts depends on a range of factors such as seafloor type (e.g. mud/sand/rock), gear type, types of organisms and habitats encountered, and oceanographic characteristics. Contact of the trawl gear can lead to incidental catch of benthic organisms such as sponges.

138. In the five fishing years between 2019/20 and 2023/24, fishers reported catching 329 kg of sponges while targeting silver warehou in SWA 3 / SWA 4. They also recorded around 50 kg of corals.

139. An observer was on board for 37% of tows in fisheries targeting hoki, squid, barracouta and silver warehou within SWA3 between the 2019/20 – 2023/24 fishing years. Bycatch of corals, sponges or bryozoans were reported in 11% of events where observers were on board and in 6% of all events over this period. During the 2023/24 fishing year observers reported 10.3 tonnes of sponges, 268 kg of coral and 9 kg of bryozoans.

140. An observer was on board for 68% of tows in fisheries targeting hoki, squid, barracouta and silver warehou within SWA4 between the 2019/20 – 2023/24 fishing years. Bycatch of corals, sponges or bryozoans were reported in 13% of events where observers were on board and in 13% of all events over this period. During the 2023/24 fishing year observers reported 8.2 tonnes of sponges, 93 kg of coral and 10 kg of bryozoans.

141. The impact of tows on the benthic environment is mitigated by the spatial concentration of the fishery: most activity involves fishing within previously fished areas. In particular, the squid trawl fishery takes place in discrete areas over a relatively narrow depth range. Additionally, trawl vessels greater than 46 metres in length are prohibited from operating in the Territorial Sea as well as several areas outside the Territorial Sea.

142. As already noted, all options that would result in a TAC increase are not expected to result in any significant change in fishing effort within SWA 3 / SWA 4. The trawl footprint is mapped and monitored annually.

Potential habitat of particular significance for fisheries management

143. Using the best available information, FNZ has identified several potential HoPS in the SWA 3 and SWA 4 QMAs that are within the depth range of silver warehou. A description of the 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 Tables 7 (shallower waters) and 8 (deeper waters).

Table 7: Inshore areas identified as potential habitat of particular significance for fisheries management relevant to SWA 3 / SWA 4.

The Hay Paddock, Canterbury Bight, and Pegasus Bay (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. **Reasons for particular significance** • Nursery for juvenile fish, including tarakihi (Vooren, 1975; Anderson, 2019). 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 given the mobility of tarakihi as they move from southern to central New Zealand (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. **Existing protection measures** • Trawl restrictions: Trawling by vessels over 46 m long is prohibited - Fisheries (South-East Area Commercial Fishing) Regulations 1986: 4A. **Evidence** • Vooren (1975), Anderson et al., (2019), Jones et al., (2016), Jones et al., (2018), McKenzie et al., (2021), FNZ Plenary (2025).
Blueskin Bay (possibly historical - 1956) and the Canterbury Bight (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 (FNZ - Plenary, 2025). **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 (FNZ - Plenary, 2025). 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** • Trawl restrictions: 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), and Morrison et al., (2014)
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 (Batson and Probert, 2000). • Small blue cod use Otago shelf habitat for food and shelter. It is uncertain whether these sites meet a nursery definition. **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** • Trawl restrictions: Trawling by vessels over 46 m long is prohibited - Fisheries (South-East Area Commercial Fishing) Regulations 1986: 4A and Fisheries (Commercial Fishing) Regulations 2001: 72. **Evidence** • Anderson, et al., (2019), Batson and Probert (2000), Jones et al., (2018), Morrison et al., (2014).

Table 8: Deepwater areas identified as potential habitat of particular significance for fisheries management relevant to SWA 3 / SWA 4.

Chatham Rise, 200 – 600 m water depth (hoki
Attributes of habitat • The Chatham Rise is a broad, bathymetric feature that is a region of high primary productivity (Murphy et al., 2001). This is attributed to the presence of the subtropical convergence above it (e.g. Heath 1985, Uddstrom and Oien 1999). • The importance of the area is due to it being the main nursery area for juvenile hoki in the EEZ (Livingston et al., 1992). Hoki is New Zealand's largest and most important finfish fishery. **Risks/Threats** • Changes in environmental conditions would likely be the main risk to hoki recruitment. • As the habitat characteristics that make the areas of the Chatham Rise favourable for juvenile hoki are uncertain, the impact bottom contact fishing would have on these areas is not known. **Existing protection measures** • As noted earlier, a range of management measures is in place that are relevant to this habitat. These include the mid-Chatham Rise benthic protection area, regulations that prohibit trawling by vessels greater than 46m in length on the western Chatham Rise, and in the Territorial Sea (relevant to the Chatham Islands) and an industry initiative that prohibits the targeting of hoki around the Mernoo Bank and the Canterbury Banks by vessels greater than 28 m in length. **Evidence** • Heath 1985, Livingston et al., 1992, Murphy et al., 2001, Uddstrom and Oien 1999

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.

Edwards, C.T.T; Peatman, T.; Goad, D.; Webber, D.N. (2023). Update to the risk assessment for New Zealand seabirds. New Zealand Aquatic Environment and Biodiversity Report 314.

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

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

Fisheries New Zealand (2025). Fisheries Assessment Plenary, May 2025: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. Reports accessible at: https://www.mpi.govt.nz/fishing-aquaculture/fisheries-management/fish-stock-status/plenary-reports-for-individual-species. SWA 3 & 4 chapter available at: https://www.mpi.govt.nz/dmsdocument/69966-Fisheries-Assessment-Plenary-May-2025-Volume-3-SILVER-WAREHOU-SWA.

Heath, RA (1985). A review of the physical oceanography of the seas around New Zealand–1982. New Zealand Journal of Marine and Freshwater Research 19: 79–124

Heinemann A; Gray, A (2024). National Panel Survey of Recreational Marine Fishers 2022-23. New Zealand Fisheries Assessment Report 2024/51

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.

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.

Livingston, ME; Schofield, KA; Sullivan, KJ (1992). The discrimination of hoki (*Macruronus novaezelandiae*) groups in New Zealand using morphometrics and age-growth parameters. New Zealand Fisheries Assessment Research Document 92/18. 29 p. (Unpublished report held in NIWA library, Wellington.)

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 (2001). Phytoplankton distributions around New Zealand derived from SeaWiFS remotely-sensed ocean colour data. New Zealand Journal of Marine and Freshwater Research 35: 343−362

Sutton P. (2001). Detailed structure of the Subtropical Front over Chatham Rise, east of New Zealand. Journal of Geophysical Research 106(C12): 31045−31056

Uddstrom, MJ; 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. Journal of Geophysical Research 104(C9): 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.

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