Fisheries New Zealand
Tini a Tangaroa

Review of Sustainability Measures for East Coast Tarakihi (TAR 2, TAR 3 and eastern portions of TAR 1 and TAR 7) for 2022/23

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East Coast Tarakihi (TAR 1 (East), TAR 2, TAR 3 and TAR 7 (East))

Nemadactylus macropterus, tarakihi

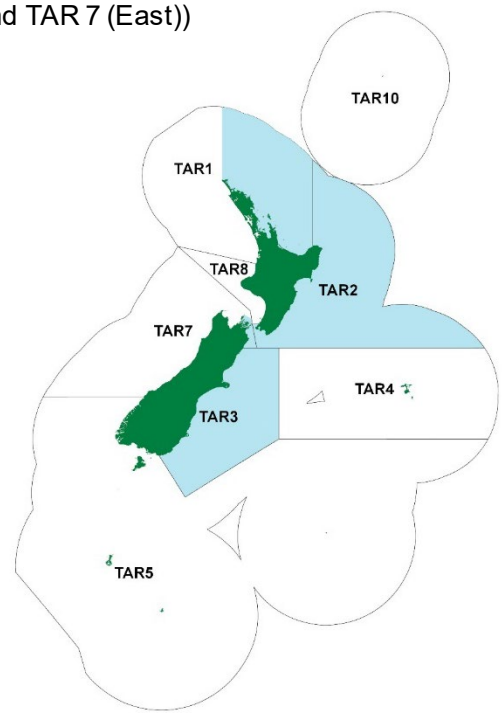

Figure 1: Quota Management Areas (QMAs) for East Coast tarakihi, with the TAR 2, TAR 3 and the eastern portions of TAR 1 and TAR 7 highlighted. A tarakihi is pictured on the left.

2 Summary

1. Fisheries New Zealand (FNZ) is reviewing sustainability measures for East Coast tarakihi in Quota Management Areas (QMA) TAR 2, TAR 3 and the eastern portions of TAR 1 and TAR 7 for the 1 October 2022 fishing year (Figure 1).

2. East Coast tarakihi is a shared fishery, caught by customary Māori, recreational, and commercial fishers. The most recent stocks assessment, November 2021, provided an estimate of 19.3% SB_0[1] for the 2020/2021 fishing year.

3. As a part of the 2018 sustainability round, the Minister at the time decided to initiate a two-staged plan to rebuild tarakihi abundance back to a target level of 40% SB_0. This approach was to provide the commercial fishing industry an opportunity to plan and adjust their operations before any additional changes.

4. This two-staged plan included a 20% cut to the Total Allowable Commercial Catch (TACC) and a direction to the industry to develop a package of measures to support the rebuild, which could be considered as part of the 2019 sustainability round. At the time the Minister indicated that a further 35% reduction would be required in 2019.

5. In 2019, the Minister implemented the second stage of the plan, which included a further 10% reduction to the TACC. During the 2019 review, the Minister also agreed to the implementation of the Eastern Tarakihi Management Strategy & Rebuild Plan 2019 (the Industry Rebuild Plan)[2]. The Industry Rebuild Plan consisted of a series of voluntary measures aimed at reducing the rebuild timeframe, and committed to a shorter rebuild period of 20 years with an interim target of 35% SB_0.

[1] SB_0, also known as virgin biomass, is the theoretical carrying capacity of the recruited or vulnerable biomass of a fish stock. In some cases, it refers to the average biomass of the stock in the years before fishing started. More generally, it is the average over recent years of the biomass that theoretically would have occurred if the stock had never been fished.
[2] Fisheries Inshore New Zealand; Southern Inshore Fisheries; Te Ohu Kaimoana. (2019). Eastern Tarakihi Management Strategy and Rebuild Plan.

6. To provide a higher level of confidence in the Industry Rebuild Plan, the Minister also requested that industry deploy on-board cameras to monitor a significant majority of the catch in the areas with the highest level of juvenile tarakihi (TAR 2 and TAR 3).

7. At the time it was too soon to track any changes in abundance due to the 2018 and 2019 decisions. However, based solely on these reductions, the stock was predicted to rebuild to the target (40% SB_0) in 25 years.

8. In December 2019, Forest and Bird filed proceedings seeking a judicial review of the Minister's 2019 decision, arguing that the catch limit reductions were not sufficient to allow East Coast tarakihi to rebuild within a "period appropriate to the stock".

9. In June 2021, the High Court found in favour of Forest and Bird and directed the Minister to review the Total Allowable Catch (TAC) and TACC settings for East Coast tarakihi in 2021, having regard to findings in the judgement.

10. In light of the planned November 2021 stock assessment, the High Court granted a stay of its decision until 1 October 2022 to enable the Minister to consider this assessment for the October 2022 review.

11. Following the High Court decision, Fisheries Inshore New Zealand (an organisation representing the inshore commercial fishing industry) filed an appeal of the June 2021 High Court decision. This was heard in March 2022 by the Court of Appeal, which is yet to issue its decision.

12. The most recent stock assessment noted that the fishing mortality rate[3] declined considerably in 2019 and 2020, following reductions in TACCs, although current fishing mortality rates are estimated to remain high (above the fishing related mortality reference level that corresponds to the default target biomass of 40% SB_0).

13. This paper has regard to findings contained in the High Court judgment, and proposes 3 options for consideration as outlined in Table 1.

14. In undertaking this review, FNZ is proposing further reductions to the TACCs for East Coast tarakihi to ensure the stock rebuilds within a period appropriate to the stock.

15. FNZ welcomes feedback and submissions on the options proposed, or any other alternatives. Consultation closes at 5pm on 12 July 2022.

16. Note that the consultation period for East Coast tarakihi differs from other fish stocks being consulted on for the October 2022 Sustainability Round.

[3] The fishing mortality rate is the proportion of a fish stock removed by fishing.

Table 1: Summary of options proposed for East Coast tarakihi from 1 October 2022. Numbers are all in tonnes.

Stock	Option	TAC	TACC	Customary	Recreational:	Other mortality
East Coast TAR Combined	Current setting	5205	4355	193	221	436
	Option 1	3803 ↓ (1402 t)	3081 ↓ (1274 t)	193	221	308 ↓ (128 t)
	Option 2	4561 ↓ (644 t)	3770 ↓ (585 t)	193	221	377 ↓ (59 t)
	Option 3	4864 ↓ (341 t)	4045 ↓ (310 t)	193	221	405 ↓ (31 t)
TAR 1*	Current setting	1333	1045	73	110	105
	Option 1	1137 ↓ (196 t)	867 ↓ (178 t)	73	110	87 ↓ (18 t)
	Option 2	1259 ↓ (74 t)	978 ↓ (67 t)	73	110	98 ↓ (7 t)
	Option 3	1308 ↓ (25 t)	1023 ↓ (22 t)	73	110	102 ↓ (3 t)
TAR 2	Current setting	1658	1350	100	73	135
	Option 1	1030 ↓ (628 t)	779 ↓ (571 t)	100	73	78 ↓ (57 t)
	Option 2	1387 ↓ (271 t)	1104 ↓ (246 t)	100	73	110 ↓ (25 t)
	Option 3	1529 ↓ (129 t)	1233 ↓ (117 t)	100	73	123 ↓ (12 t)
TAR 3	Current setting	1060	936	15	15	94
	Option 1	569 ↓ (491 t)	490 ↓ (446 t)	15	15	49 ↓ (45 t)
	Option 2	793 ↓ (267 t)	694 ↓ (242 t)	15	15	69 ↓ (25 t)
	Option 3	883 ↓ (177 t)	775 ↓ (161 t)	15	15	78 ↓ (16 t)
TAR 7*	Current setting	1154	1024	5	23	102
	Option 1	1068 ↓ (86 t)	945 ↓ (79 t)	5	23	95 ↓ (7 t)
	Option 2	1121 ↓ (33 t)	994 ↓ (30 t)	5	23	99 ↓ (3 t)
	Option 3	1143 ↓ (11 t)	1014 ↓ (10 t)	5	23	101 ↓ (1 t)

* *Catch limit reductions are proposed to come exclusively from the eastern portions of the TAR 1 and TAR 7 stocks, the proposed reductions for these areas are outlined in below*

Stock	Option	TAC	TACC	QMA Split^	
				East	West
TAR 1	Current setting	1333	1045	466	579
	Option 1	1137 ↓ (196 t)	867 ↓ (178 t)	288 ↓ (178 t)	579
	Option 2	1259 ↓ (74 t)	978 ↓ (67 t)	399 ↓ (67 t)	579
	Option 3	1308 ↓ (25 t)	1023 ↓ (22 t)	444 ↓ (22 t)	579
TAR 7	Current setting	1154	1024	161	863
	Option 1	1068 ↓ (86 t)	945 ↓ (79 t)	82 ↓ (79t)	863
	Option 2	1121 ↓ (33 t)	994 ↓ (30 t)	131 ↓ (30 t)	863
	Option 3	1143 ↓ (11 t)	1014 ↓ (10 t)	151 ↓ (10 t)	863

^ *The proportions by which the east and west zones are split have been calculated based on historical catch.*

3 About the stock

3.1 Fishery characteristics

17. Tarakihi are caught in coastal waters off the North and South Island in depths from 50 metres (m) to 250 m. Due to inshore habitat preferences, and the relative ease of harvest, tarakihi is an important species to customary, recreational and commercial fishers. However, more than 80% of the combined TAC is caught by the commercial sector.

18. Spatial analysis of the age composition of commercial and research tarakihi catches have revealed that tarakihi off the east coasts of both the North and South Islands represent a single biological stock, which is separate from tarakihi occurring on the west coasts of the North and South Islands. The extent of the interaction between tarakihi stocks around coastal New Zealand is unknown.

19. Target commercial fishing for tarakihi is mainly confined to the inshore domestic trawl, as well as a targeted setnet fishery off Kaikōura. Commercial catch and effort data from the 2020/21 fishing year indicates that these fleets catch roughly 96% of all commercial tarakihi landings, with 91% of this attributed to bottom trawl.

20. Recreational catch is predominantly caught via rod and line from boats.

21. Customary take of tarakihi is largely unknown, however, tarakihi are considered an important taonga species to many iwi.

3.2 Biology

22. Tarakihi is a relatively long-lived species, with a maximum age of 40+ years. The first 8 years is a period of rapid growth, with tarakihi reaching minimum legal size (MLS) (25 cm fork length) at 4 years and sexual maturity, on average, at 6 years of age and 33 cm in length.

23. Under the Harvest Strategy Standard[4] (HSS) the biological characteristics and natural mortality rate of tarakihi indicate that it is a low productivity species, meaning it is less resilient to high levels of fishing pressure than high productivity species.

24. Spatial analysis of the age composition and catch per unit effort (CPUE) data from commercial and research tarakihi catches have indicated that tarakihi off the East Coasts of both the North and South Islands exist as a combined biological stock, which is separate from tarakihi occurring on the west coasts. As a result, TAR 2, TAR 3, and the Eastern portions of TAR 1 and TAR 7, are assessed and managed as single stock.

25. While there is sufficient information available to support this hypothesis, FNZ acknowledges the broader stock structure around mainland New Zealand is poorly understood.

26. A recent study[5] examined the genetic structure of the whole New Zealand tarakihi population across 14 locations. While weak genetic breaks were detected between certain populations, no clear genetic structure was detected for the overall New Zealand population. The study concluded that tarakihi have a high level of genetic diversity, appear to have a historically large and stable population with a long evolutionary history, and further studies would be required to improve the understanding of stock status and connectivity.

27. Two main spawning grounds have been identified, one from Cape Runaway to East Cape (North Island), and the other from Cape Campbell to Pegasus Bay (South Island). However, some spawning is likely to occur throughout the distributional range. Tarakihi have a long pelagic phase, where larvae and juveniles are pelagic for up to 9 months before settling. Primary nursery areas for the east coast tarakihi stock are found in the Canterbury Bight and

[4] Harvest Strategy Standard for New Zealand Fisheries. October 2008. Ministry for Primary Industries.
[5] Papa, Y., Halliwell, A. G., Morrison, M. A., Wellenreuther, M., & Ritchie, P. A. (2021). Phylogeographic structure and historical demography of tarakihi (Nemadactylus macropterus) and king tarakihi (Nemadactylus n. sp.) in New Zealand. New Zealand Journal of Marine and Freshwater Research, 1-25.

Pegasus Bay. Juveniles move out to deeper water at about 3-5 years of age, which is when they enter the fishery.

28. Along the East Coast of the South Island (TAR 3), a high proportion of the bottom trawl catch is composed of immature fish. In contrast, the seasonal Kaikōura setnet fishery is composed mainly of mature fish. Tagging studies indicate that adults and juveniles can move significant distances. Results of tagging data, and the analysis of age composition of commercial bottom trawl and survey catches along the East Coast of New Zealand, suggest that juvenile tarakihi move progressively northward from the Canterbury Bight to East Northland. The level of connectivity between sub-populations and the differential fishing pressure may have implications for rebuilding the stock.

29. There is considerable variation in the relative abundance of individual age classes of tarakihi taken in trawl surveys in the Canterbury Bight, indicating high inter-annual variability in recruitment. Recruitment is considered to be most strongly influenced by prevailing oceanographic conditions during the long pelagic phase of larval and post-larval tarakihi.

30. Tarakihi primarily predate on a variety of marine invertebrates and are prey species for a wide range of finfish species in coastal ecosystems.

3.3 Management background

31. The commercial fishery developed with the introduction of steam trawlers in the 1890s, and by the mid-1930s, annual catches had increased to about 2,000 tonnes.

32. For the East Coast tarakihi stock, catches peaked from the 1940s to 1980 at around 5,000 to 6,000 tonnes per annum. Since 1989/90, following introduction to the Quota Management System (QMS) in 1986, the total annual catches from the East Coast stock have been around 3,000 to 4,000 tonnes per annum.

33. For more information about the QMS go to https://www.mpi.govt.nz/law-and-policy/legal-overviews/fisheries/quota-management-system/.

4 Status of the stock

4.1 Stock assessments

34. The 2017 stock assessment represented the first fully quantitative stock assessment for East Coast tarakihi. Previous attempts had been unsuccessful due to limited data from trawl surveys and stock age composition studies.

35. The 2017 stock assessment integrated all available commercial catch and CPUE, commercial catch-at-age data, recreational catch estimates, relative biomass estimates, and catch-at-age data from fishery-independent surveys from the East Coast of the South Island. There have been further updates to the stock assessment in 2018, 2019, and 2021. The November 2021 stock assessment updated and refined the previous assessments with the inclusion of recent fishery catches, recent fishery age compositions, updated CPUE indices, and recent east coast South Island trawl survey abundance indices and age composition.

36. In 2018, the abundance of the stock was estimated at 17% SB_0, below the level that would support the maximum sustainable yield (MSY)[6], which for tarakihi is 40% of the unfished biomass (40% SB_0)[7]. The 2019 stock assessment provided an estimate of 15.9% SB_0.

37. The difference between 15.9% SB_0 in 2019[8] and 17% SB_0 in 2018[9] does not necessarily represent a reduction in abundance given uncertainties in assessments, but more likely

[6] Maximum sustainable yield is the largest long-term average catch or yield that can be taken from a stock under prevailing ecological and environmental conditions, and the current selectivity patterns exhibited by fisheries. It is the maximum amount of fishing that a stock can sustain without impairing its renewability through natural growth and reproduction.
[7] This is the biomass target about which the East Coast tarakihi stock should fluctuate.
[8] The 2019 stock assessment estimated the spawning biomass of the stock in the 2017/18 fishing year.
[9] The 2018 stock assessment estimated the spawning biomass of the stock in the 2016/17 fishing year.

indicates a more accurate estimation of abundance as a result of refinements to the modelling and new data.

38. The stock assessments provide the basis for the abundance estimate for East Coast tarakihi. The assessment models have been thoroughly peer reviewed and accepted by the FNZ Inshore Stock Assessment Working Group and the Fisheries Assessment Plenary. They have provided the basis for the 2018 and 2019 decisions, and FNZ considers they represent the best available information.

39. The abundance of East Coast tarakihi was most recently estimated at 19.3% SB_0[10], which is below the soft limit of 20% SB_0[11] and the management target of 40% SB_0.

40. The stock assessments have indicated that the stock has been below the soft limit since the early 2000s and had an overall downward trend for approximately 30 years, reaching its lowest point around 2014. Over the same time period, fishing mortality had been rapidly increasing and in 2018, overfishing was assessed as being 'Virtually Certain' to be occurring.

41. The 2021 stock assessment noted that fishing mortality rates declined considerably in 2019 and 2020, following reductions in TACCs, although current fishing mortality rates are estimated to remain high (above the fishing related mortality reference level that corresponds to the stock default target biomass of 40% SB_0).

42. Projections from 2018, based on 2017/18 fishing year catch levels, suggested that the stock is rebuilding, and the biomass will have a 50% probability of reaching a target of 40% SB_0 in approximately 35 years (refer Figure 2). This projection did not account for the TAC/TACC cuts made as a part of the October 2019 sustainability round.

43. As with any fish stock assessment, there are uncertainties around the estimated stock structure and other assumptions in the assessment model. These lead to uncertainty in estimates of stock status, demonstrated by the grey shading in Figure 2. There is greater uncertainty around projections of future stock status based on alternative TACC options, unpredictable fluctuations in recruitment and environmental factors (red shading in Figure 2).

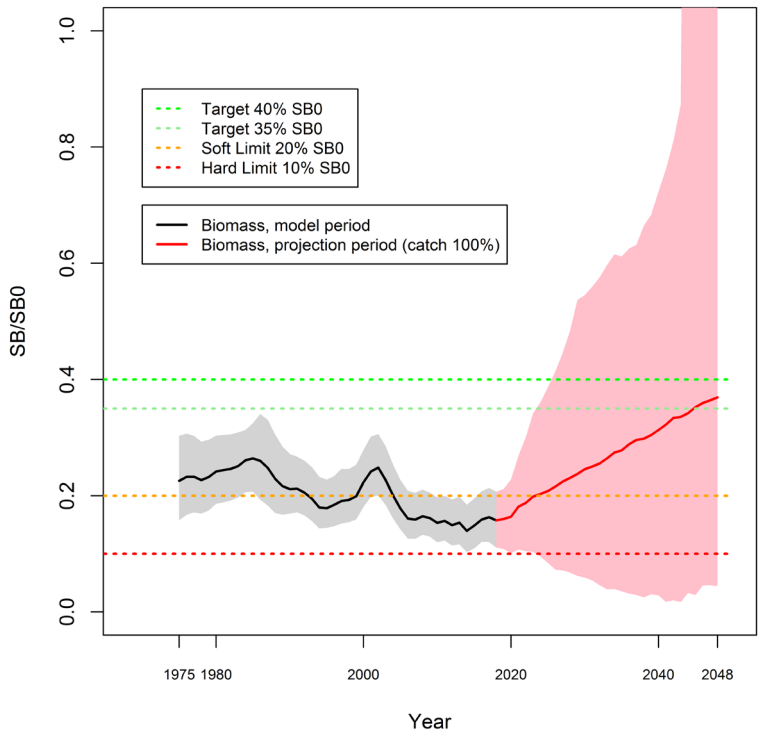

Figure 2: Spawning biomass levels. The projection, from 2018 forward is based on 2018/19 fishing year catch and the confidence intervals (red shading) reflect uncertainty in recent and future spawning success and subsequent recruitment.

[10] A stock assessment of eastern tarakihi for 2021. 2022. Langley. New Zealand Fisheries Assessment Report 2022/07.
[11] The soft limit is a biomass limit, below which the requirement for a formal, time-constrained rebuilding plan is triggered.

4.2 Rebuild Strategy

4.2.1 Target

44. The general objective of section 13(2) of the Act[12] is that stocks are maintained at or above a level that can produce the MSY or moved towards that level within a period appropriate to the stock. The HSS recommends a default MSY biomass target of 40% of the unfished biomass (40% SB_0) for long-lived stocks such as tarakihi, in the absence of a robust peer reviewed alternative.

45. FNZ considers a biomass target of 40% SB_0 robust and that it constitutes best available information, noting that an alternative species-specific target may be considered if supported by scientifically robust and peer-reviewed information to agree an MSY compatible reference point for the stock. However, there is no such alternative species-specific target for East Coast tarakihi at this time.

4.2.2 Appropriate period

46. When a stock is below the level that can produce the maximum sustainable yield, the Act identifies the need to consider a time period for rebuilding that is appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock.

47. In June 2021 the High Court found that a "period appropriate to the stock" should be assessed before deciding the way and rate a fish stock is rebuilt to its management target. Social, cultural, and economic factors are only relevant when considering the way and rate of rebuild. They are not relevant factors when determining the period appropriate to the stock.

48. The HSS provides further guidance in relation to rebuilding stocks that are below the soft limit. The HSS, published in 2008, provides standards that represent the minimum performance level determined to be acceptable for a comprehensive sustainable fisheries management regime. The HSS stipulates that any determination should be based on, and consistent with, international best practice.

49. East Coast tarakihi is below the level associated with MSY (based on the default target of 40% SB_0) and below the soft limit (20% SB_0). For stocks that have fallen below the soft limit, the HSS recommends that a formal, time-constrained rebuilding plan is adopted, which should aim to restore the stock to, at least, the target level of biomass within a timeframe of between T_{min} (minimum time to achieve rebuild to target in the absence of all fishing related mortality) and $2*T_{min}$ (twice the minimum time).

50. T_{min} reflects the extent to which a stock has fallen below the target, the biological characteristics of the stock that limit the rate of rebuild, and the prevailing environmental conditions that also affect the rate of rebuilding.

51. Tarakihi are long-lived but grow relatively rapidly in their first 8 years. Due to the rapid growth of tarakihi, there is a potential, from a biological and environmental perspective, to rebuild the stock in a shorter timeframe than some other species. Projections suggest the East Coast tarakihi stock could reach 40% SB_0 within 5 years in the absence of fishing (T_{min}). Applying the default approach of the HSS would suggest a rebuilding period of between 5 to 10 years.

52. A review of international best practice for rebuilding timeframes for stocks that have fallen below biomass limits in countries with strong fisheries management systems indicates that a mixture of multiples of T_{min} and generation times (in New Zealand defined as the average time taken for an individual to replace itself within a stock or population) are used. For example:

    - Canada[13] requires rebuilding plans to be in place for stocks that are in the 'Critical Zone' (i.e. below the soft limit), with the aim of having a high probability of the stock growing out of the Critical Zone within a reasonable timeframe. Canada have used 1.5-2 generations as a rebuilding timeframe since 2009. Furthermore, a recent Canadian Department of

[12] The Fisheries Act 1996. Section 13(2) sets out the operating parameters for the Minister to set a TAC for a stock.
[13] Fishery Decision-Making Framework Incorporating the Precautionary Approach 2009. Government of Canada.

Fisheries and Oceans workshop report[14] suggested that the maximum rebuild time (T_{max}) should likely not be capped at 2*T_{min}, and that the use of 2-3 *T_{min} can be considered based on international practice and experience. The report went on to say that if 2-3 *T_{min} cannot be calculated then 1.5 to 2 generation time[15] can be an appropriate rebuild period instead.

- The Marine Stewardship Council (MSC) Fisheries Standard sets out requirements that a fishery must meet to enable it to claim and certify that it is well-managed and sustainable. For stocks that are not at or fluctuating around a level consistent with MSY, the Performance Indicator seeks to verify that there is evidence of stock rebuilding within a specified timeframe. The standard sets the rebuild timeframe as the shorter period of either 20 years or twice the generation time[16].

- The European International Commission for the Exploration of the Sea (ICES), which provides scientific advice to European countries, suggests a maximum rebuilding period of X * T_{min}, where X>1. A recent ICES workshop evaluating fishery rebuild plans[17] reviewed appropriate rebuild times that can be considered. Attendees could not reach full agreement on the value of X but noted that 2*T_{min} and T_{min} plus one generation time were rebuild periods used in other jurisdictions of developed countries.

- As is the case with New Zealand's HSS, the Australian Harvest Strategy Policy (HSP)[18] and associated guidelines[19] specifies a rebuild timeframe should typically be between T_{min} and twice T_{min} as an appropriate time period to rebuild a stock. Where T_{min} cannot be estimated, the HSP states that it may be appropriate that a rebuilding time frame is defined as the lesser of the mean [average] generation time plus 10 years, or three times the mean generation time. The HSP only specifies the timeframe required to rebuild above the limit reference point (equivalent to New Zealand's soft limit) with a reasonable level of certainty.

- The Magnuson-Stevens Act[20] employed by the United States of America (the US) indicates that the rebuilding time period shall not exceed 10 years, except where biology of the stock, other environmental conditions, or management measures under an international agreement to which the US participates, dictate otherwise. The associated National Standard 1 Guidelines further elaborate that if T_{min} is less than 10 years, then a rebuilding period of 10 years is allowed, but if T_{min} exceeds 10 years, the rebuilding period can be as long as T_{min} plus one generation (where the generation time is the average time taken for an individual to replace itself within a stock or population). The latter has been used extensively since it was first approved in 1998 as part of the National Standard 1 Guidelines that were implemented at that time.

- For both the US and ICES, the rebuilding timeframe is the time to reach the management target from a level below a biomass limit that is equivalent to the soft limit, whereas for Canada and Australia, the rebuilding timeframe is the time to simply exceed the biomass (soft) limit.

53. Table 2 summarises the possible rebuild time periods for East Coast tarakihi when applied to the international fishery management systems discussed in point 52. Note this table is divided by the management system's target biomass that is required by the authority's rebuild protocol; biomass limit (equivalent to the soft limit) and management target (B_{MSY}[21], in this instance 40% SB_0).

[14] DFO. 2021. Proceedings of the national peer review of science guidelines to support development of rebuilding plans for Canadian fish stocks; January 14-16, 2020. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2021/022.
[15] Canada defines generation time as the average age of first maturity, whereas other entities generally use the weighted average of mature females, which can be considerably longer.
[16] The MSC defines a generation time as the average age of a reproductive individual in an unexploited stock.
[17] ICES workshop on guidelines and methods for the evaluation of Rebuilding plans 2020.
[18] Commonwealth Fisheries Harvest Strategy Policy 2018.
[19] Guidelines for the Implementation of the Commonwealth Fisheries Harvest Strategy Policy 2018.
[20] Magnuson-Stevens Fishery Conservation and Management Act 2007.
[21] The average stock biomass that results from taking an average catch of the maximum sustainable yield (MSY).

Table 2: Summary of applying East Coast tarakihi stock to rebuild protocols of authorities with strong fisheries management systems, within their applicable targets.

	Rebuild time period required to reach target (years)	
Management system	**Biomass Limit (approx. 20% SB_0)**	**Management Target (B_{MSY} proxy or higher)**
Australia	5 – 10	
Canada	7.5 – 10	
European International Commission for the Exploration of the Sea		10 – 19.7
Marine Stewardship Council		20
New Zealand (Harvest Strategy Standard)		5 – 10
United States of America		10 – 19.7

54. A shorter rebuild time closer to 5 years (T_{min}) may be more appropriate for a stock which is below the hard limit. FNZ does not think this is necessary as the stock is above the hard limit and projected to increase under current catch levels. Therefore, FNZ considers 10 years (2* T_{min}) to be the appropriate minimum limit for the rebuild period for the East Coast tarakihi stock.

55. For East Coast tarakihi, FNZ considers the generation time relevant when determining an appropriate period as it provides a measure of the potential growth rate of a population.

56. The generation time for East Coast tarakihi, based on the weighted average age of a mature female in an unexploited population, has been calculated as 14.7 years. Use of T_{min} plus one generation time gives a maximum rebuilding period of 19.7 years. Use of 1.5 generation times gives a maximum rebuilding period of 22 years. Use of 2 generation times gives a maximum rebuilding period of 29.4 years. Use of 2-3 *T_{min} gives a maximum rebuilding time of 10-15 years.

57. Taking this information into consideration, along with the low productivity of tarakihi and the high inter-annual variability in recruitment (refer to section 3.2) FNZ considers that the use of T_{min} plus one generation time is appropriate as the upper limit for the rebuild period.

58. FNZ considers that any time period in the range of 10-19.7 years would be appropriate for rebuilding the East Coast tarakihi stock.

4.2.3 Probability

59. The HSS recommends that stocks that have fallen below the soft limit should be rebuilt back to at least the target level, in a timeframe between T_{min} and 2*T_{min}, with an acceptable probability.

60. The operational guidelines for the HSS state that the minimum standard for a rebuilding plan is that 70% of the projected trajectories will result in the achievement of a target based on MSY-compatible reference points or better within the rebuild timeframe. According to the HSS, a probability of 70% may be needed to ensure that not only the biomass, but also the age structure is fully rebuilt. This will be able to be ascertained as the stock approaches the rebuilding target in the future and is only a probability to ensure that rebuilding has been fully-achieved, rather than an aim for a rebuilding strategy.

61. The HSS defines the target as "*a biomass or fishing mortality level that management actions are designed to achieve with at least a 50% probability".*

62. The June 2021 High Court found, while reviewing the Minister's 2019 decision on tarakihi, that it was not an error of law for the Minister to adopt a TACC that had modelled a 50 per cent probability of achieving the target (40% SB_0)[22].

63. FNZ suggests that a probability of 50% of having achieved the target may be considered reasonable for East Coast tarakihi given the current status of the stock, the size of the rebuild required, and the uncertainly caused by natural variations in recruitment and environmental conditions.

64. Projections over the extent of a rebuild period become less certain the further out in time they are made, given unpredictable fluctuations in recruitment and environmental factors. Generally, projections of 1-5 years are reasonably reliable with anything beyond that becoming significantly less certain. An example of this is shown in Figure 2 whereby the confidence intervals for projections of East Coast tarakihi abundance increase markedly in later years of the projection.

65. The uncertainty associated with longer term projections (as demonstrated in Figure 2) can have ramifications for the longer-term outlook of the rebuild strategy. When considering a rebuilding strategy for a stock as depleted as East Coast tarakihi, the main objective should be to take decisive action to move the stock sufficiently far above both the hard and soft limits as soon as possible and, in particular, to minimise the risk of the stock declining further. Once the stock has a high probability of being above these limits, it could be justified from a stock and sustainability perspective to then proceed more slowly towards the target (note some other jurisdictions, as discussed in section 4.2.2, are only required to rebuild their stocks to above their respective soft limits within the defined time period).

66. When referring to the probability of rebuild, a 50% probability does not mean a 50% chance of rebuild versus a 50% chance of not rebuilding at all. Rather, the 50% probability level should be thought of as the median of a distribution around the target. In other words, there will be a 49% probability of being somewhat above the target and a 49% chance of being somewhat below. There will also be a 20% probability of being well above and a 20% chance of being well below.

67. When calculating T_{min} itself this also uses a 50% probability. FNZ notes that higher probability in the calculation of T_{min}, would result in T_{min} being a longer time period.

68. The use of a 50% probability level for reaching the target within the specified timeframe is also consistent with international best practice and is recognised in other management jurisdictions. For example:

    - The US: The US National Standard 1 Guidelines state that the minimum time for rebuilding a stock means the amount of time the stock or stock complex is expected to take to rebuild to its MSY biomass level in the absence of any fishing mortality. The guidelines state that in this context, the term "expected" means to have at least a 50 percent probability of attaining MSY, where such probabilities can be calculated.

4.2.4 Way and rate

69. The Act identifies the need to consider the way in which and rate at which a stock is moved towards or above a level that can produce maximum sustainable yield, having regard to the interdependence of stocks. In considering the way and rate the Minister must have regard to such social, cultural and economic factors as he or she considers relevant.

70. Interdependencies of stocks broadly fall in two categories;

    - Ecological interdependence: when stocks have a competitive or a predator-prey relationship; and

    - Technological interdependence: when fleets with different characteristics (e.g., fishing power and/or gear types) target different components of a single stock (e.g., juveniles or adults) or different species of a mixed stock, or when a fleet catches species coexisting within the same space regardless of whether or not they are interdependent on an ecological level.

[22] Royal Forest and Bird Protection Society of New Zealand Incorporated v Minister of Fisheries [2021] NZHC 1427 at [127]

71. Tarakihi is taken as a target and bycatch species in a number of inshore fisheries, which results in a technological interdependence between the East Coast tarakihi stock and other key commercial stocks. Any modification in the TACCs for tarakihi will have impacts on other bycatch and target species. Industry has raised concerns about the risk of tarakihi becoming a choke[23] species. This is likely to result in catch of species caught in combination with tarakihi becoming constrained, unless ways to avoid tarakihi can be found. Subsequent flow-on economic impacts associated with other species are also anticipated.

72. Approaches to the way in which and rate at which a stock is moved towards the target include, but are not limited to, different rates of reductions to TACs and TACCs (e.g. immediate or gradual/phased), gear modifications/restrictions (e.g. to increase selectivity), and closed areas (e.g. spawning or nursing grounds).

73. FNZ expects that restoring the East Coast tarakihi stock will bring the following potential longer-term benefits:

- Increased resilience of tarakihi to years of poor or below average recruitment and to the negative effects of climate change, potentially resulting in a more stable fishery;
- Improved catch rates in the long term for all sectors;
- Higher revenues for the fishing industry through a fully rebuilt stock which will enable higher catch rates;
- Tarakihi becoming more widespread in key commercial fishing grounds and areas accessible to customary and recreational fishers;
- Lower costs of fishing due to decreased searching time and higher catch rates as abundance increases.

74. While there will be social, cultural, and economic benefits from a rebuilt stock, catch reductions can also have immediate, substantial impacts. These impacts are likely to be felt by commercial fishers and quota holders who are engaged in fisheries targeting East Coast tarakihi and where it is taken as bycatch.

75. Impacts from reductions in TACs, TACCs and allowances can be mitigated by taking a phased approach to their implementation, as long as this adheres to the rebuild period appropriate to the stock. That is, a reduction in October 2022 and then a further reduction in October 2023.

- Such a way and rate could reduce short-term social, cultural and economic impacts associated with these reductions. This would provide industry time to plan for the change by adjusting their budgets and operations, including their ACE distribution and harvesting plans.
- FNZ notes that the Minister can only at this time make a decision about the TACs, TACCs and allowances for the 2022/23 fishing year. A separate decision would need to be made about future year reductions and consideration of any new information available between now and the time of the next review, to ensure the rebuild of the stock to the target within an appropriate period.

76. Many inshore vessels target tarakihi as their primary catch. The ability for industry to adapt to catch limit reductions in East Coast tarakihi is unknown and varies in severity depending on the size of the reduction chosen. Fishers will need to modify their operations, although the level of individual impact would vary depending on how important tarakihi is within the mix of catch, access to Annual Catch Entitlement (ACE), and the ability to adjust to other target species.

77. It is a legislative requirement that all QMS species caught, unless specifically listed in Schedule 6 of the Act or below MLS, are landed and accounted for with ACE (or a deemed value cost paid). There is a risk that reductions in tarakihi ACE may create incentives to discard tarakihi,

[23] In a mixed fishery, a choke species is a stock whose available quota is exhausted while other stocks still have available quota to the fisher. In this instance it restricts the fisher's ability to continue to fish for stocks where quota is still available.

while fishers continue to target other species. However, tarakihi tend to be caught at deeper depths than many other inshore species, giving fishers some opportunity to adapt to catching tarakihi less frequently (also see section 12.1).

78. Science information indicates that East Coast tarakihi comprises a single biological stock and as a result FNZ seeks to manage TAR 2, TAR 3 and the eastern portions of TAR 1 and TAR 7 together.

79. To ensure catch reductions directly support the rebuild, it is important that they are targeted to the eastern portions of TAR 1 and TAR 7, while not affecting the western portions to which the rebuild objectives do not apply to.

80. Managing catch at a level that is smaller than the QMA can be difficult if voluntary arrangements with industry are not in place. Since 2018 a voluntary catch splitting arrangement with industry has been operated (Table 3 and Figure 3), providing a mechanism for the commercial catch reductions for TAR 1 and TAR 7 to be taken exclusively from the eastern portion of these stocks.

Table 3: Current catch splitting arrangements for TAR 1 and TAR 7.

Stock	Total TACC (tonnes)	East (tonnes)	West (tonnes)
TAR 1	1,045	466	579
TAR 7	1,024	161	863

81. The proportions by which the east and west zones are split have been calculated based on historical catch.

82. Without voluntary catch splitting arrangements, alternative solutions may need to be found for achieving this objective. This could include making greater catch reductions across the entire QMA to ensure a corresponding reduction in the eastern portion; or to consider altering QMAs under other mechanisms within the Act.

83. Adherence to the catch split arrangement is monitored using electronic catch and position reporting. This arrangement has been successfully monitored and implemented, and for the last complete fishing year (2020/21):

- TAR 1 (East) sub-area catch limit was 3% under caught; and
- TAR 7 (East) sub-area catch limit was 5% over caught.

84. FNZ notes that precedents exist for voluntary catch-spreading agreements, including in hoki and orange roughy fisheries, which have been operated successfully for a number of years. When implemented successfully, voluntary catch splitting arrangements provide a responsive mechanism for achieving catch reductions at sub-Quota Management Area (sub-QMA) level[24].

[24] The alternative option would be to consider a regulatory alteration to quota management areas, under either section 25A or 25B of the Act.

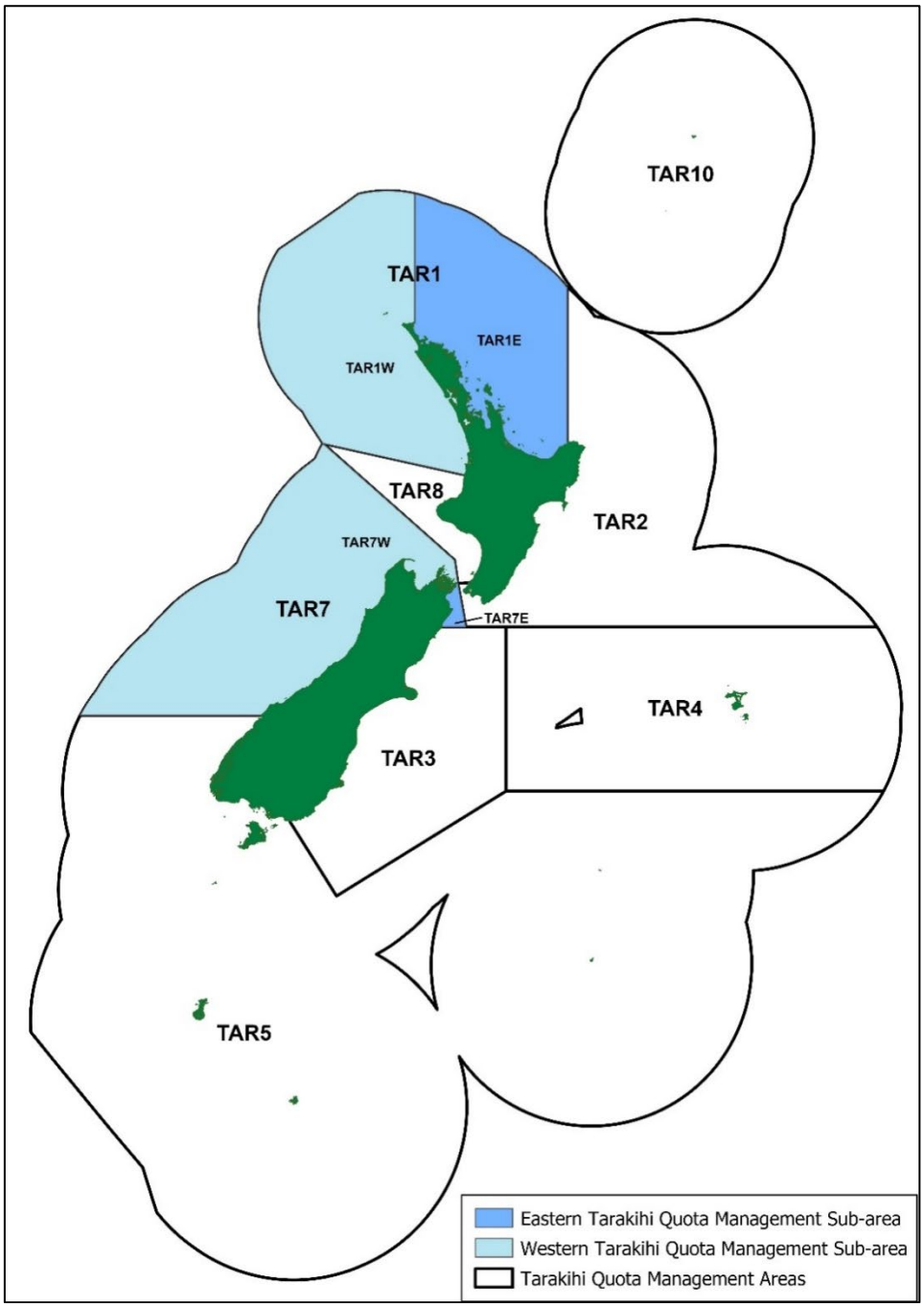

Figure 3: Tarakihi Quota Management Areas, with East and West portions of TAR 1 and TAR 7 highlighted.

Voluntary Additional Measures

85. The Industry Rebuild Plan[25] was developed by Fisheries Inshore New Zealand, Te Ohu Kaimoana and Southern Inshore Fisheries. It represents the industry's commitment to the sustainable management of the East Coast tarakihi fishery, and a desire to work with FNZ to provide for the rebuild of the fishery, while also maintaining a viable inshore fishing industry.

86. The High Court in June 2021 found that steps taken independently by the industry, which have the effect of speeding up the rebuild of the stock, can only be taken into account when considering the way and rate of the rebuild under s 13(2)(b)(i) of the Act[26].

[25] Fisheries Inshore New Zealand; Southern Inshore Fisheries; Te Ohu Kaimoana. (2019). Eastern Tarakihi Management Strategy and Rebuild Plan.
[26] Royal Forest and Bird Protection Society of New Zealand Incorporated v Minister of Fisheries [2021] NZHC 1427 at [189]

87. The Industry Rebuild Plan comprises a series of voluntary measures aimed at improving the management of the fishery, while also adopting alternative approaches to contribute to the rebuild beyond simply reducing catch limits. These measures offer alternative ways of rebuilding the stock that could improve the rate of the rebuild. The core elements include:

- Commitment to a time constrained rebuild;
- Catch Splitting – West/East Split;
- Reporting sub Minimum Legal Size;
- Selectivity Research;
- Move on Rule;
- Voluntary Closed Areas;
- Enhancing Science; and
- On-board cameras.

88. As these measures have only been in place since the 2019/20 fishing year, their efficacy remains uncertain at present. As more information becomes available it may be possible to quantify the effect these measures have on the rate of rebuild.

89. Fisheries Inshore New Zealand, Te Ohu Kaimoana and Southern Inshore Fisheries have committed to quarterly reporting outlining progress towards meeting key performance indicators in the Industry Rebuild Plan[27]. These are available on the Ministry for Primary Industries website via the link in the footnote.

90. Industry has recently advised FNZ of their continued commitment to the rebuild of the East Coast tarakihi stock.

91. Industry have committed to shelve approximately 10% of their East Coast tarakihi allowance, and has collectively transferred 9.65% of that allowance into a separate FishServe[28] account following the normal and well-established shelving procedures. This has been verified independently by FNZ and is publicly available information via FishServe. Industry have stated that they remain committed to using shelving where appropriate as a dynamic management tool to support the ongoing rebuild of the east coast TAR fishery.

92. The Industry Rebuild Plan, and the Industry commitment to shelving approximately 10% of their allowance, is not a relevant consideration for the Minister in determining the rebuild period appropriate to the stock. However, FNZ considers it important to highlight the additional measures that have been undertaken in recent years, to support the rebuild of East Coast tarakihi to a sustainable level.

5 Catch information and current settings within the TAC

5.1 Commercial

93. Nationally, tarakihi is the third most valuable inshore commercial finfish fishery, following snapper and blue cod. More than 80% of the TAC is taken in commercial fisheries, both as a target and bycatch species. Most tarakihi is sold on the domestic market, while approximately 11% is exported.

94. In the 2020/21 fishing year just under 2,790 tonnes was commercially harvested from the eastern tarakihi stock, with 16% caught from TAR 1 (east), 49% from TAR 2, 28% from TAR 3 and 6% from TAR 7 (Cook Strait).

[27] Publications of quarterly progress reports are available on the MPI website East coast tarakihi: rebuilding numbers.
[28] FishServe provides administrative services to the New Zealand commercial fishing industry.

95. In the 2020/21 fishing year, the number of vessels targeting tarakihi was 20 in TAR 1 (east), 22 in TAR 2, 23 in TAR 3 and 8 in TAR 7 (east).

96. The MLS for commercial caught tarakihi is 25 cm. Any tarakihi below the MLS must be returned to the sea and, since the introduction of electronic reporting in 2019, fishers must record an estimate of the quantity of undersize tarakihi returned for each fishing event where undersize tarakihi is caught.

97. Inshore domestic trawling of East Coast tarakihi is a mixed species fishery, therefore tarakihi stocks have interdependence with multiple other fish stocks in the form of bycatch. These include; barracouta, flatfish, gemfish, gurnard, John dory, red cod, snapper, trevally and blue warehou. The tarakihi target setnet fishery bycatch also includes small amounts of ling and spiny dogfish.

5.2 Customary Māori

98. Tarakihi is an important species for customary fishing and is identified as a taonga (treasured) species in several Iwi Fisheries Plans that apply to the East Coast of the North and South Islands[29]. Customary non-commercial catch in the East Coast tarakihi fishery makes up only a small quantity of total removals (less than 5%). Based on the best available information, the current settings are considered to meet the needs of tangata whenua. There are no proposals to change the current allowances for customary non-commercial catch.

99. Best available information shows only 33 customary authorisations for tarakihi have been reported over the last 10 years and based on this information alone customary catch would be less than one tonne annually.

100. FNZ promotes the implementation of the Customary Fishing Regulations across the tarakihi stocks, and strengthening the reporting capability of Kaitiaki authorising customary harvest.

101. FNZ seeks further information from tangata whenua to inform final advice to the Minister on setting the customary allowance.

5.3 Recreational

102. Tarakihi is one of the top five inshore recreational finfish species throughout New Zealand. However, recreational allowances in the East Coast tarakihi fishery make up only a small part of the TAC (less than 5%).

103. Recreational fishing of tarakihi is managed through daily bag limits. Depending on the area, tarakihi is included in a combined maximum daily bag limit. This is either 20 or 30 finfish per person per day. Within the combined daily bag limit there is an individual daily bag limit for tarakihi of either 10 (Kaikōura Marine Area), 15 (South East Area) or 20 (other areas within East Coast tarakihi). Nationally, there is a MLS of 25 cm (fork length) and a minimum net mesh size of 100 mm.

104. FNZ notes that in 2018 the allowances for recreational fishers were reduced in TAR 1 and TAR 2 from 487 to 110 tonnes, and 150 to 73 tonnes respectively. The TAR 3 allowance of 15 tonnes was retained, while the TAR 7 allowance was set for the first time. These changes were made to align the recreational allowances with the results of the 2011/2012 Recreational National Panel Survey. Since then, no further adjustments have been made to both the recreational allowances and recreational bag limits for the East Coast tarakihi stocks.

105. The National Panel Survey of Marine Recreational Fishers (NPS) represents the best available information on recreational harvest, providing a snapshot of fishing activity over a fishing year. FNZ notes that recreational catch is also likely to vary from year to year due to factors such as weather and availability, in addition to being influenced by the overall level of biomass. The results of the 2017-18 survey show that the combined recreational harvest across the four relevant tarakihi stocks is approximately 198 tonnes.

[29] Te Waka a Māui me Ōna Toka, Mai I Ngā Kuri a Whārei ki Tihirau, Ngā Hapū ō Te Uru, and Te Hiku ō te Ika Iwi Fisheries Plans

106. Table 4 shows the 2017-18 NPS estimate of recreational harvest compared against the current recreational allowance for each relevant tarakihi stock. For TAR 1, TAR 3 and TAR 7 recreational harvest was below the current allowance, and quite significantly in TAR 1. For TAR 2 the survey estimated 110 tonnes was harvested recreationally, above the recreational allowance of 73 tonnes.

Table 4: Estimates of recreational catch from the 2017-18 National Panel Survey of Marine Recreational Fishers compared to the current recreational allowances. Numbers are in tonnes unless specified.

Stock	Current Allowance	National Panel Survey	Difference (%)
TAR 1	110	62.23 (± 8.71)	- 43.43
TAR 2	73	110.23 (± 24.25)	+51.00
TAR 3	15	5.18 (± 1.66)	-65.47
TAR 7	23	20.57 (± 3.70)	-10.57
Combined	**221**	**198.21**	**-10.31**

107. FNZ notes that the combined recreational harvest of East Coast tarakihi is lower than that of the combined recreational allowance, being 90% of the allowance. Given the uncertainties associated with harvest estimates and that recreational harvest varies year to year FNZ is not proposing to change the current allowances for recreational catch at this time. However, there may be a case for modifying the allowances across the QMAs to reflect estimated catch.

108. FNZ welcomes feedback on this matter. There is a planned rerun of the National Panel Survey of Marine Recreational Fishers for the 2022/2023 fishing year that will provide updated estimates of recreational tarakihi catch. Ongoing monitoring of recreational catch will be important as the stock rebuilds. It is expected that recreational catch will increase as tarakihi abundance grows. This is also discussed in section 12.2.

5.4 Other sources of mortality caused by fishing

109. The allowance for other sources of mortality caused by fishing is intended to provide for unrecorded mortality of fish associated with fishing, including incidental mortality from fishing methods or illegal fishing. This is naturally difficult to quantify when considering the range of contributing sources and as a result there is uncertainty in the estimates used to set this allowance for tarakihi.

110. The previous Minister indicated a preference for standardising the other mortality allowance for inshore trawl fish stocks at an amount that equates to 10% of the TACC, unless there is evidence to suggest otherwise. The 2018 Science Working Group also used 10% of the commercial catch for estimating other mortality in the tarakihi assessment. The other mortality allowances for all East Coast tarakihi stocks align with this approach, and there is no new evidence to suggest that different levels would be more appropriate.

111. Note that other mortality is often uncertain. For deepwater fisheries with high observer coverage, other mortality might be set at 1% because data suggests that there is very little other mortality occurring. For inshore trawl fisheries with low coverage, there is generally more uncertainty, which is why the previous Minister of fisheries in 2018 decided that the allowance should be set at an amount that equates to around 10% of the TACC for inshore trawl caught stocks.

112. Based on fishing event level data, observer coverage for all of the East Coast tarakihi stocks has been below 10% (between 0.1% and 7.2%) over the last 5 fishing years. FNZ deems this not sufficient to provide any further consideration of the other mortality allowance for East Coast tarakihi at this time. The planned camera rollout (see section 12.1) is likely to improve our understanding of other sources of mortality caused by fishing, which may provide an opportunity to review this setting in future.

6 Treaty of Waitangi obligations

6.1 Input and participation of tangata whenua

113. Seeking input and participation of Māori is not discretionary but arises as a legal obligation from section 10 of the Treaty of Waitangi Fisheries Claims Settlement Act of 1992 and section 12 of the Fisheries Act 1996. The Minister is required to have particular regard for Kaitiakitanga from the perspective of tangata whenua.

114. Input and participation into the sustainability decision-making process is provided mainly through Iwi Fisheries Forums, which have been established for that purpose.

115. Each Iwi Fisheries Forum can develop an Iwi Fisheries Forum Plan that describes how the iwi in the Forum exercise kaitiakitanga over the fisheries of importance to them, and their objectives for the management of their interest in fisheries[30]. Iwi Fisheries Forums may also be used as entities to engage iwi with an interest in fisheries.

116. FNZ is currently engaging with Iwi Fisheries Forums for feedback on the review of East Coast tarakihi.

6.2 Kaitiakitanga

117. Under section 12(1)(b) of the Fisheries Act 1996, the Minister must have particular regard to kaitiakitanga before setting or varying any sustainability measure. Under the Act, kaitiakitanga is the exercise of guardianship, and in relation to any fisheries resources, includes the ethic of stewardship based on the nature of the resources, as exercised by the appropriate tangata whenua in accordance with tikanga Māori.

Iwi Fisheries Forum Plans

118. Information provided by Iwi Fisheries Forums and iwi views on the management of fisheries resources and fish stocks, as set out in Iwi Fisheries Plans, are one of the ways that tangata whenua exercise kaitiakitanga in respect to fish stocks.

119. The relevant Iwi Fisheries Forum Plans provide a view of the objectives and outcomes iwi seek from the management of the tarakihi fishery. They can also provide an indication of how iwi exercise kaitiakitanga over fisheries resources, as can iwi views from Forum meetings and submissions received from iwi.

120. FNZ considers that the management options presented in this consultation paper contribute towards the objectives of relevant Iwi Fisheries Plans, which generally relate to the maintenance of healthy and sustainable fisheries. This is further illustrated in Table 5 below.

[30] Not all Iwi Fisheries Forums have developed plans at this stage, though work in this area is ongoing.

Table 5: Objectives and outcomes iwi seek from the management of the tarakihi fishery from Iwi or Forum Fish Plans.

Iwi Fisheries Forum	Relevant Management Objectives contained in Iwi Fisheries Forum Plan
Te Waka a Māui me Ōna Toka	• Create thriving customary non-commercial fisheries that support the cultural wellbeing of South Island iwi and our whānau; • Develop environmentally responsible, productive, sustainable and culturally appropriate commercial fisheries that create long-term commercial benefits and economic development opportunities for South Island iwi; and • Restore, maintain and enhance the mauri and wairua of fisheries throughout the South Island.
Mai I Ngā Kuri a Whārei ki Tihirau	• Iwi fisheries management activities support the growth and wellbeing of our people; • Iwi are actively engaged with others to increase their potential within environmental limits; and • The fisheries environment is healthy and supports a sustainable fishery.
Nga Hapu o Te Uru	• Support and help deliver the fisheries plan's vision to 'preserve, sustain and enhance the fisheries me ona tikanga', and deliver a key outcome/objective which is to ensure that the 'Fishery and its environment is healthy and sustainable'.
Te Hiku o te Ika	• objectives to support and provide for the interests of iwi in the far north. The management options proposed for tarakihi support and help deliver the fisheries plan's objectives.

Customary fisheries areas

121. Mātaitai reserves, taiāpure and temporary closures are customary management tools that also provide for kaitiakitanga. The Minister is required to take these into account when making allowances for customary non-commercial fishing interests.

122. There are 30 mātaitai reserves and eight taiāpure within the East Coast tarakihi fishery (Table 6). Outside of the broad prohibition on commercial fishing activity within mātaitai reserves, none of these customary management areas have any specific restrictions on the taking of tarakihi. The overall aim of the proposed options is to ensure sustainability and promote the ongoing availability of tarakihi throughout the QMA, including within these areas.

Table 6: Customary fisheries areas within East Coast TAR.

Name		Management Type
Te Puna Mātaitai	Whakaraupō Mātaitai	**Mātaitai Reserve** *Commercial fishing is not permitted within mātaitai reserves unless regulations state otherwise.*
Te Maunga o Mauao Mātaitai	Rapaki Bay Mātaitai	
Te Rae o Kohi Mātaitai	Koukourārata Mātaitai	
Raukokere Mātaitai	Wairewa Mātaitai	
Te Kopa o Rongokānapa Mātaitai	Te Kaio Mātaitai	
Te Tapui Mātaitai O Hakihea	Ōpihi Mātaitai	
Horokaka Mātaitai	Waitarakao Mātaitai	
Toka Tāmure Mātaitai	Te Ahi Tarakihi Mātaitai	
Te Hoe Mātaitai	Tuhawaiki Mātaitai	
Moremore Mātaitai	Waihao Mātaitai	
Te Waha o te Marangai Mātaitai	Moeraki Mātaitai	
Mangamaunu Mātaitai	Waikouaiti Mātaitai	
Kahutara Mātaitai	Ōtāhau Mātaitai	
Oaro Mātaitai	Puna-wai-Tōriki Mātaitai	
Tūtaeputaputa Mātaitai	Waikawa Harbour Mātaitai	
Waikare Inlet Taiāpure	Te Taumanu o Te Waka a Māui Taiāpure	**Taiāpure** *All types of fishing are permitted within a Taiāpure. The management committee can recommend that regulations be set for commercial, recreational and customary fishing.*
Maketu Taiāpure	Oaro-Haumuri Taiāpure	
Porangahau Taiāpure	Akaroa Harbour Taiāpure	
Palliser Bay Taiāpure	East Otago Taiāpure	

7 Current and proposed settings within the TAC

7.1 Current settings

Stock	TAC	TACC	Customary	Recreational	Other mortality
East Coast TAR Combined	**5205**	**4355**	**193**	**221**	**436**
TAR 1	**1333**	**1045**	**73**	**110**	**105**
TAR 2	**1658**	**1350**	**100**	**73**	**135**
TAR 3	**1060**	**936**	**15**	**15**	**94**
TAR 7	**1154**	**1024**	**5**	**23**	**102**

Stock	TAC	TACC	QMA Split*	
			East	West
TAR 1	**1333**	**1045**	**466**	**579**
TAR 7	**1154**	**1024**	**161**	**863**

Note all figures are in tonnes.
* The proportions by which the east and west zones are split have been calculated based on historical catch.

123. Note that the status quo for East Coast tarakihi is not being proposed as an option for the October 2022 Minister's decision. The recent stock assessment and projections show that, under the current commercial catch levels, the stock is expected to be above the soft limit (20% SB_0) with a greater than 50% probability by 2026 (4 years) and 40% SB_0 with a greater than

50% probability by 2044 (22 years). However, because the East Coast tarakihi stock is currently below the soft limit, FNZ is obligated to rebuild the stock to 40% SB_0 within a time period appropriate to the stock. FNZ does not consider 22 years is an appropriate rebuild time period for the East Coast tarakihi stock at this time (see sections 4.2 and 7.2).

Table 7: Summary of proposed target, rebuild timeframe, and the associated way and rate of meeting those targets under proposed options.

	Option 1	Option 2	Option 3
Target biomass	40% SB_0 by 2032	40% SB_0 by 2037	40% SB_0 by 2042
Rebuild timeframe (years)	10 years or 2*T_{min}	15 years or 3*T_{min}	19.7 years or T_{min} plus one generation time
Rebuild way and rate	40 percent catch reductions in TAR 2 and TAR 3, and the eastern portions of TAR 1 and TAR 7 implemented in 2022/23. In practice, this amounts to a 27 and 29 percent reduction in the combined TAC and TACC respectively, implemented in 2022/23.	15 percent catch reductions in TAR 2 and TAR 3, and the eastern portions of TAR 1 and TAR 7 implemented in 2022/23. In practice, this amounts to a 12 and 13 percent reduction in the combined TAC and TACC respectively, implemented in 2022/23.	5 percent catch reductions in TAR 2 and TAR 3, and the eastern portions of TAR 1 and TAR 7 implemented in 2022/23. In practice, this amounts to a 7 percent reduction in the combined TAC and TACC respectively, implemented in 2022/23.
Probability of achieving target within rebuild timeframe	55%	53%	56%

124. Projection analysis based on current and alternative catch levels, undertaken in March 2022, was used to determine the catch levels required under each option to achieve a rebuild to target stock size (40% SB_0) within the time period appropriate to the stock with an acceptable probability. These projections were also used to determine the time predicted to reach the soft limit of 20% SB_0.

125. Based on the analysis of period appropriate and probability above, FNZ consider that each of the options would rebuild the stock within a period appropriate to the stock and with an acceptable probability.

126. FNZ is interested in stakeholder feedback pertaining to which approach is most appropriate for the rebuild of East Coast tarakihi, or whether other approaches are preferred.

127. Furthermore, regardless of which option is selected, FNZ is committed to regular monitoring and review of the East Coast tarakihi fishery to ensure the continued rebuild of the stock.

7.2 Rebuild strategy objectives

128. Section 13 of the Act gives the Minister the power to set or vary a TAC and defines relevant considerations that the Minister must take into account when making decisions. Furthermore, section 20 provides guidance on the setting or varying of any TACC.

129. The HSS provides further guidance in relation to rebuilding stocks that are below MSY and below the soft limit. Although not legally binding, the High Court has recently held that the HSS is a mandatory relevant consideration for the Minister when setting a TAC under section 13 of the Act[31].

[31] Royal Forest and Bird Protection Society of New Zealand Incorporated v Minister of Fisheries [2021] NZHC 1354 at [153].

130. The following sections outline the key rebuild objectives, and the associated relevant considerations.

Target

131. FNZ considers a biomass target of 40% SB_0 robust and that it constitutes best available information, noting that an alternative, species-specific target maybe considered if supported by scientifically robust and peer-reviewed information. The target of 40% SB_0 is reflected in all options proposed.

Acceptable Probability

132. The HSS Operational Guidelines provide that the minimum standard for a rebuilding plan is that 70% of the projected trajectories will result in the achievement of a target based on MSY-compatible reference points or better within the timeframe of T_{min} to 2*T_{min}; however this is only to ensure that a stock and its age structure are fully-rebuilt.

133. The HSS also defines target as "*a biomass or fishing mortality level that management actions are designed to achieve with at least a 50% probability".*

134. The June 2021 High Court decision found, whilst reviewing the Minister's 2019 decision on tarakihi, that it was not an error of law for the Minister to adopt a TACC that had modelled a 50 per cent probability of achieving the target (40% SB_0).

135. FNZ considers a probability of at least 50% also acceptable to measure progress towards achieving the rebuild target at the outset. This approach recognises the current status of the East Coast tarakihi stock, the size of the rebuild required, natural variation caused by fluctuations in recruitment and environmental conditions, and associated uncertainties.

136. For probability of rebuild, a 50% probability does not mean a 50% chance of rebuild versus a 50% chance of not rebuilding at all. Rather, the 50% probability level should be thought of as the median of a distribution around the target. In other words, there will be a 49% probability of being somewhat above the target and a 49% chance of being somewhat below.

137. The use of a 50% probability level for reaching the target within the specified timeframe is also consistent with international best practice and is recognised in other management jurisdictions.

Rebuild period

138. Section 13(2)(b)(ii) of the Act requires the Minister to set a TAC that enables the level of any stock, whose current level is below that which can produce MSY, to be altered within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock.

139. The HSS recommends that a rebuilding plan should aim to restore the stock to, at least, the target level of biomass within a timeframe of between T_{min} (minimum time to achieve rebuild to target in the absence of fishing) and 2*T_{min} (twice the minimum time). For East Coast tarakihi, the estimate given the current level of depletion and recent recruitment is a T_{min} of 5 years. Applying the default approach of the HSS would suggest a rebuilding period of between 5 and 10 years.

140. A shorter rebuild time closer to 5 years (T_{min}) may be more appropriate for a stock which is below the hard limit. FNZ does not think this is necessary as the stock is above the hard limit and projected to increase under current catch levels. Therefore, FNZ considers 10 years (2* T_{min}) to be the appropriate minimum limit for the rebuild period for the East Coast tarakihi stock.

141. A review of developed countries with strong fisheries management systems for rebuilding timeframes for stocks that have fallen below biomass limits indicates that a mixture of multiples

of T_{min} and generation times (the average time taken for an individual to replace itself within a stock or population) are used.

142. Taking into consideration the low productivity of tarakihi and the high inter-annual variability in recruitment, FNZ considers that the use of T_{min} plus one generation time is appropriate as the upper limit to the rebuild period, and that any period in the range of 10-19.7 years would be appropriate for rebuilding the East Coast tarakihi stock (refer to section 4.4.2).

143. FNZ considers that the use of 3*T_{min} (or 15 years) is an appropriate rebuild period as it is within the upper limit to the rebuild period (T_{min} plus one generation time). It is more precautionary than the upper range of the appropriate periods identified and will result in the benefits of a fully rebuilt stock accruing sooner.

144. Option 1 proposes a rebuild period of 10 years. FNZ considers this timeframe to be more appropriate than a shorter period as it applies the default approach of 2* T_{min} as recommended by the HSS. A shorter rebuild time closer to 5 years (T_{min}) may be more appropriate for a stock which is below the hard limit. FNZ does not think this is necessary as the stock is above the hard limit and projected to increase under current catch levels.

145. Option 2 proposes a rebuild period of 15 years. FNZ notes that 19.7 years (T_{min} plus one generation time) is almost double that of 2* T_{min} and considers a shorter period of 15 years to be an appropriate option to be considered. It is more precautionary than the upper range of the appropriate periods identified and will result in the benefits of a fully rebuilt stock accruing sooner.

146. Option 3 proposes a rebuild period of 19.7 years. With a mixture of multiples of T_{min} and generation times being used in other jurisdictions and authorities with strong fisheries management systems, FNZ considers that 19.7 years (T_{min} plus one generation time) as the appropriate upper limit to be considered for the East Coast tarakihi rebuild.

147. FNZ notes that under current commercial catches, the stock is expected to be above the soft limit with a greater than 50% probability in 2026. This is based on the March 2022 projections that incorporates the November 2021 stock assessment. FNZ therefore considers the options proposed will ensure the stock increases above the soft limit more quickly and with greater certainty.

Way and rate

148. To ensure catch reductions directly support the rebuild, it is important they are targeted to the eastern portions of TAR 1 and TAR 7, while not affecting the western portions which the rebuild objectives do not apply to. This approach is reflected in all options proposed.

149. Without voluntary catch splitting arrangements, alternative solutions may need to be found for achieving this objective. This could include taking catch greater reductions across the entire QMAs to ensure a corresponding reduction in the eastern portion; or consideration for altering QMAs under other mechanisms within the Act.

7.3 Option 1

Target	40% SB_0 by 2032
Rebuild timeframe (years)	10 years or 2*T_{min}
Way and rate	40 percent catch reductions in TAR 2 and TAR 3, and the eastern portions of TAR 1 and TAR 7 implemented in 2022/23. In practice, this amounts to a 27 and 29 percent reduction in the combined TAC and TACCs respectively, implemented in 2022/23.

Stock	TAC	TACC	Customary	Recreational:	Other mortality
East Coast TAR Combined	**3803** ↓ (1402 t)	**3081** ↓ (1274 t)	**193**	**221**	**308** ↓ (128 t)
TAR 1	**1137** ↓ (196 t)	**867** ↓ (178 t)	**73**	**110**	**87** ↓ (18 t)
TAR 2	**1030** ↓ (628 t)	**779** ↓ (571 t)	**100**	**73**	**78** ↓ (57 t)
TAR 3	**569** ↓ (491 t)	**490** ↓ (446 t)	**15**	**15**	**49** ↓ (45 t)
TAR 7	**1068** ↓ (86 t)	**945** ↓ (79 t)	**5**	**23**	**95** ↓ (7 t)

Stock	TAC	TACC	QMA TACC Split	
			East	West
TAR 1	**1137** ↓ (196 t)	**867** ↓ (178 t)	**288** ↓ (178 t)	**579**
TAR 7	**1068** ↓ (86 t)	**945** ↓ (79 t)	**82** ↓ (79t)	**863**

150. Option 1 proposes to reduce the combined TACs, TACCs and allowances for other sources of mortality caused by fishing, as follows:

(a) A reduction in the combined TACs by 27% from 5,205 tonnes to 3,803 tonnes;

(b) A reduction in the combined TACCs by 29% from 4,355 tonnes to 3,081 tonnes; and

(c) A reduction in the combined allowances for other sources of mortality caused by fishing from 436 tonnes to 308 tonnes (equivalent to 10% of the TACC of each QMA).

151. The allowances for customary fishing are proposed to remain at current levels. The proposed allowances are considered likely to provide for current and aspirational use by customary fishers.

152. Recreational allowances make up less than 5% of the East Coast Tarakihi TAC. FNZ notes that while estimates of TAR 2 recreational harvest are greater than the allowance, the combined harvest of East Coast tarakihi is lower than that of the combined allowance (being 90%).

153. Given the uncertainties associated with harvest estimates, and that recreational harvest varies year to year, FNZ is not proposing to change the current allowances for recreational catch (see section 12.2).

154. Information to set the allowance for all other mortality caused by fishing is limited. The previous Minister had a preference that this should be equivalent to 10% of TACC for inshore stocks that are predominantly taken by trawl. Additionally, a 2018 Science Working Group also used 10% of the commercial catch for estimating other mortality in the tarakihi assessment. As such FNZ is proposing the allowances for all other sources of mortality caused by fishing reflect this (refer to section 5.4).

155. Option 1 proposes a single cut based on the current projections, that would allow the stocks to rebuild to 40% SB_0 within 10 years, which is $2*T_{min}$, with a probability of 55%. Under this option, the stock is expected to be above the soft limit by 2024 with a probability of 57%.

156. FNZ considers Option 1 has the following benefits:

(a) Stock rebuild likely to be initiated sooner.

(b) Stock will be rebuilt in the fastest time.

(c) Further reductions in catch during the rebuild are not anticipated.

(d) Higher probability of stock increasing above soft limit in a shorter period of time.

157. FNZ considers Option 1 has the lowest sustainability risk of the three options. However, the way and rate proposed in this option poses higher immediate social, cultural and economic impacts and does not allow further time for fishers to adjust to lower catch limits.

7.4 Option 2

Target	40% SB_0 by 2037
Rebuild timeframe (years)	15 years or 3*T_{min}
Way and rate	15 percent catch reductions in TAR 2 and TAR 3, and the eastern portions of TAR 1 and TAR 7 implemented in 2022/23. In practice, this amounts to a 12 and 13 percent reduction in the combined TAC and TACCs respectively, implemented in 2022/23.

Stock	TAC	TACC	Customary	Recreational:	Other mortality
East Coast TAR Combined	**4561** ↓ (644 t)	**3770** ↓ (585 t)	**193**	**221**	**377** ↓ (59 t)
TAR 1	**1259** ↓ (74 t)	**978** ↓ (67 t)	**73**	**110**	**98** ↓ (7 t)
TAR 2	**1387** ↓ (271 t)	**1104** ↓ (246 t)	**100**	**73**	**110** ↓ (25 t)
TAR 3	**793** ↓ (267 t)	**694** ↓ (242 t)	**15**	**15**	**69** ↓ (25 t)
TAR 7	**1121** ↓ (33 t)	**994** ↓ (30 t)	**5**	**23**	**99** ↓ (3 t)

Stock	TAC	TACC	QMA TACC Split	
			East	West
TAR 1	**1259** ↓ (74 t)	**978** ↓ (67 t)	**399** ↓ (67 t)	**579**
TAR 2	**1121** ↓ (33 t)	**994** ↓ (30 t)	**131** ↓ (30 t)	**863**

158. Option 2 proposes a single cut reduction to the combined TACs, TACCs and allowances for other sources of mortality caused by fishing, as follows:

(a) A reduction in the combined TACs by 12% from 5,205 tonnes to 4,561 tonnes;

(b) A reduction in the combined TACCs by 13% from 4,355 tonnes to 3,770 tonnes; and

(c) A reduction in the combined allowances for other sources of mortality caused by fishing from 436 tonnes to 377 tonnes.

159. As with other proposed options, no changes are proposed to the allowances for customary and recreational fishing under Option 2. The proposed allowance for other sources of mortality caused by fishing applies the same approach for all options (equivalent to 10% of the TACC of each QMA).

160. Option 2 proposes a single cut based on the projections that would allow the stock to rebuild to 40% SB_0 within 15 years, which is 3*T_{min}, with a probability of 53%. Under this option, the stock is expected to be above the soft limit by 2025 with a probability of 60%.

161. FNZ considers Option 2 has the following benefits:

(a) Stock rebuild likely to be initiated soon and completed within an appropriate time frame.

(b) Acceptable probability of stock increasing above the soft limit within an appropriate time frame.

(c) The proposal of a 15 year time period with a probability greater than 50% is more precautionary than the upper range of the appropriate periods identified (option 3) and will result in the benefits of a fully rebuilt stock accruing sooner.

(d) Further reductions in catch during the rebuild period are not anticipated.

162. FNZ considers that the way and rate proposed in Option 2 results in lower immediate social, cultural and economic impacts, while ensuring the sustainability of the stock within a rebuild period appropriate to the stock.

7.5 Option 3

Target	40% SB_0 by 2042
Rebuild timeframe (years)	*19.7 years or* T_{min} plus one generation time
Way and rate	5 percent catch reductions in TAR 2 and TAR 3, and the eastern portions of TAR 1 and TAR 7 implemented in 2022/23. In practice, this amounts to a 7 percent reduction in the combined TAC and TACCs respectively, implemented in 2022/23.

Stock	TAC	TACC	Customary	Recreational:	Other mortality
East Coast TAR Combined	**4864** ↓ (341 t)	**4045** ↓ (310 t)	**193**	**221**	**405** ↓ (31 t)
TAR 1	**1308** ↓ (25 t)	**1023** ↓ (22 t)	**73**	**110**	**102** ↓ (3 t)
TAR 2	**1529** ↓ (129 t)	**1233** ↓ (117 t)	**100**	**73**	**123** ↓ (12 t)
TAR 3	**883** ↓ (177 t)	**775** ↓ (161 t)	**15**	**15**	**78** ↓ (16 t)
TAR 7	**1143** ↓ (11 t)	**1014** ↓ (10 t)	**5**	**23**	**101** ↓ (1 t)

Stock	TAC	TACC	QMA TACC Split	
			East	West
TAR 1	**1308** ↓ (25 t)	**1023** ↓ (22 t)	**444** ↓ (22 t)	**579**
TAR 2	**1143** ↓ (11 t)	**1014** ↓ (10 t)	**151** ↓ (10 t)	**863**

163. Option 3 proposes to reduce the combined TACs, TACCs and allowances for other sources of mortality caused by fishing, as follows:

(a) A reduction in the combined TACs by 7% from 5,205 tonnes to 4,864 tonnes;

(b) A reduction in the combined TACCs by 7% from 4,355 tonnes to 4,045 tonnes; and

(c) A reduction in the combined allowances for other sources of mortality caused by fishing from 436 tonnes to 405 tonnes.

164. As with other proposed options, no changes are proposed to the allowances for customary and recreational fishing under Option 3. The proposed allowance for other sources of mortality caused by fishing applies the same approach for all options (equal to 10% of the TACC of each QMA).

165. Option 3 proposes a single cut based on the projections that would allow the stock to rebuild to 40% SB_0 within 19.7 years, which T_{min} plus one generation time, with a probability of 56%. Under this option, the stock is expected to be above the soft limit by 2026 with a probability of 60%.

166. FNZ considers that the rebuild period proposed under Option 3 is appropriate for the stock as it is the upper range of what is considered appropriate (with T_{min} plus one generation time equalling 19.7 years).

167. Option 3 reduces the TACCs less than Option 1 and 2, and thus has lower annual economic costs, noting that the costs associated with the overall rebuild period are also spread out over a longer timeframe.

168. FNZ considers Option 3 has the following benefits:

    (a) Accounts for unpredictable fluctuations in recruitment and environmental conditions, while ensuring the stock is rebuilt to the target within an appropriate timeframe.

    (b) Acceptable probability of stock increasing above the soft limit within an appropriate time frame.

    (c) Further reductions in catch during the rebuild period are not anticipated.

    (d) Provides the best opportunity for industry to manage the flow-on effects (social and financial) of reduced TACCs.

169. FNZ considers that the way and rate proposed in Option 3 will result in lower social, cultural and economic impacts, while ensuring the sustainability of the stock within a period appropriate to the stock.

8 Environmental interactions

170. The environmental principles[32], which must be taken into account when considering sustainability measures for East Coast Tarakihi are as follows:

    (a) Associated or dependent species should be maintained above a level that ensures their long-term viability (in particular marine mammals, seabirds, fish and invertebrate bycatch).

    (b) Biological diversity of the aquatic environment should be maintained (in particular the benthic impacts from fishing); and

    (c) Habitats of particular significance for fisheries management should be protected.

171. FNZ notes that environmental factors, such as a decline in water quality (through temperature changes, reduced oxygen levels) and sediment deposition from runoff) in enclosed bays and sheltered harbours, may be affecting tarakihi recruitment. FNZ does not have a direct role in managing these environmental impacts. Nonetheless, FNZ monitors these activities and where necessary advocates for approaches and practices that mitigate impacts on fish species and the habitats they depend on. The FNZ Coastal Planning Team provides engagement with the

[32] Environmental principles. Section 9 of the Fisheries Act 1996.

RMA[33] coastal planning processes to support marine management decisions that protect fisheries habitat.

8.1 Marine Mammals

172. The proposed changes to the TACs and TACCs for tarakihi may result in an overall reduction in trawl effort in some areas, therefore, impacts on marine mammals may be reduced.

173. East Coast tarakihi encompasses areas associated with multiple marine mammal species, including the Hector's dolphin (on the East Coast of the South Island). Marine mammal interactions are reported by fishers or on-board observers and are closely monitored by FNZ. In the 2020/21 fishing year there were four captures of marine mammals reported by vessels targeting tarakihi on the East Coast of New Zealand. The options proposed in this paper are unlikely to result in increased captures.

174. The Hector's and Māui dolphin Threat Management Plan (TMP) guides management approaches for addressing both non-fishing and fishing-related impacts on Hector's and Māui dolphins. The residual risk to the Hector's dolphin from trawling and setnetting in East Coast tarakihi is considered low and is largely managed under trawl and setnet restrictions along the East Coast South Island.

175. In late 2021, FNZ consulted on additional measures to manage the risk of fishing-related mortality to Hector's dolphins in the South Island. This included a new management approach in areas not closed to set net or trawl fishing that aims to encourage fishers to avoid all Hector's dolphin bycatch. With the consultation process now closed submissions are currently being reviewed.

8.2 Seabirds

176. Management of seabird interactions with New Zealand's commercial fisheries is guided by the National Plan of Action – Seabirds 2020 (NPOA-Seabirds). The NPOA-Seabirds sets out the New Zealand government's commitment to reducing fishing-related captures and associated mortality of seabirds. The vision of the NPOA-Seabirds is that New Zealanders work towards zero fishing-related seabird mortalities.

177. Management actions and research under the NPOA-Seabirds are guided and prioritised based on the seabird risk assessment that breaks down the risks to seabird populations by fishery groups. The most recent seabird risk assessment was published in 2020[34].

178. The inshore trawl fishery, including tarakihi target fishing, is responsible for a substantial portion of risk, particularly to black petrels and flesh-footed shearwaters.

179. There are a range of initiatives in place to reduce the risk of seabird captures in inshore trawl fisheries. This includes work done by the black petrel working group and the development of Mitigation Standards to support fishers to identify the most effective mitigation techniques for their operations.

180. The proposed changes to the TAC and TACC for tarakihi are unlikely to result in any increase to seabird interactions with vessels.

8.3 Fish bycatch

181. Tarakihi are taken as a target and bycatch in a number of fisheries. Reductions in TACCs for tarakihi may lead to a shift in fishing effort to other species, such as red cod, barracouta and flatfish (TAR 3 and 7) or red gurnard, snapper and trevally (TAR 2). However, catch of these species are sustainably managed through the TAC and TACC set for these individual stocks.

182. A shift in fishing behaviour to other species is of particular importance for SNA 1, as it is currently under rebuild due to low abundance. Snapper has a wide depth profile and is caught in combination with several other species, including tarakihi. While this is a relevant consideration,

[33] Resource Management Act
[34] Assessment of the risk of commercial fisheries to New Zealand seabirds, 2006–07 to 2016–17.

FNZ views that this does not prevent sustainability measures being put in place for East Coast tarakihi fishery. Active monitoring of SNA 1 is also occurring and will ensure any unintended consequences for this associated stock are managed.

8.4 Benthic impacts

183. Tarakihi are principally caught by bottom trawl, which can directly impact on the biological diversity of the benthic environment. However, the proposed changes are unlikely to increase trawl effort. Bottom trawling in this fishery is also typically confined to areas that have been consistently fished over time (rather than areas of relatively undisturbed biodiversity). It is important to note that inshore trawl effort may shift to other areas in an effort to avoid tarakihi, FNZ will continue to monitor trawl activity including any shifts in behaviour.

184. Research has characterised both New Zealand's benthic environment and the level of benthic impact from fishing activity, summarised in the Aquatic Environment and Biodiversity Annual Review[35]. The environmental impacts of fishing are summarised annually by FNZ and we will continue to monitor the bottom trawl footprint of fisheries.

185. Tarakihi are also targeted in a small setnet fishery, specifically in TAR 3 off Kaikōura. Whether setnetting has an impact on the benthic habitat is not well studied, but it is thought to be unlikely.

8.5 Habitats of particular significance for fisheries management

186. Habitats used by tarakihi that are of particular significance for fisheries management are likely to include spawning and nursery areas, as these habitats and their attributes might be critical for successful recruitment and maintaining stock productivity. However, the specific spawning behaviours and habitat attributes important for supporting recruitment are not well understood.

187. Female tarakihi mature at 6 years, after which they produce large numbers of pelagic (floating) eggs several times during each summer/autumn spawning season. Three main spawning grounds have been identified: Cape Runaway to East Cape, Cape Campbell to Pegasus Bay, and the west coast of the South Island near Jackson Bay. Spawning fish have also been sampled from the Bay of Plenty and east Northland and limited spawning probably occurs throughout the distributional range of tarakihi around New Zealand.

188. Following a 7-12 month pelagic phase, where the fertilised eggs, larvae and juvenile fish tend to remain in surface waters, East Coast tarakihi mainly settle in nursery grounds (generally in shallower inshore waters) off the East Coast of the South Island, primarily biogenic habitats in the Canterbury Bight and Pegasus Bay. As they grow older, they move progressively further northward, with the highest proportions of older fish found off east Northland.

189. Bottom contact fishing activity is likely to have some impact on the nursey grounds highlighted above which are also likely to be subjected to land-based stressors such as pollution and sedimentation. This may impact the survival of juvenile tarakihi and hence recruitment to the East Coast tarakihi stocks.

190. It is important to note, that the entire East Coast South Island is subject to commercial setnet closures out to 4 nautical miles (nm) from shore. Additional setnet restrictions (extended to 12 nm) were implemented at Pegasus Bay and the Canterbury Bight to Timaru in 2020. These closures may further reduce the likelihood of benthic habitat impacts in these areas.

191. While not directly implemented to protect tarakihi habitats, there are 17 marine reserves that fall within the East Coast tarakihi area. There reserves are free from fishing activity that would otherwise impact their respective habitats. Commercial and recreational take from these areas is prohibited.

192. FNZ considers that the options proposed are unlikely to pose a threat to the areas identified as potential habitats of significance. Table 8 summarises the available information on potential

[35] Aquatic environment and biodiversity annual review (AEBAR) – 2019/20
https://www.mpi.govt.nz/dmsdocument/40980-Aquatic-Environment-and-Biodiversity-Annual-Review-201920

habitats of significance for East Coast tarakihi, the threats faced, and the existing protection in place.

Table 8: Summary of available information on potential habitats of particular significance for East Coast tarakihi (TAR 1, 2, 3, 7).

Fish Stocks	TAR 1, 2, 3, 7
Potential habitat of particular significance	• Shallower (20-100m) inshore biogenic habitat – potential locations Canterbury Bight and Pegasus Bay.
Attributes of habitat	• Likely to provide shelter, refuge from predation, and access to food for juveniles.
Reasons for particular significance	• Potential juvenile nursery area • Connectivity with spawning areas, • Successful spawning and growth/survival of juveniles is critical to maintaining the productivity of the stocks.
Risks/Threats	• Mobile bottom-contact fishing methods can impact biogenic habitats, however the specific habitat attributes important for tarakihi are not well understood. • Inputs of pollutants and sediments from land-based sources.
Existing protection measures	• Several areas within the shallower inshore waters are closed to mobile bottom-contacting fishing methods[36], including prohibited trawling at the mouth of the Waimakariri River in Pegasus Bay[37]. • Setnet restrictions are in place along the entire East Coast of the South Island. Including additional restrictions in Pegasus Bay and the Canterbury Bight to Timaru. • The new National Policy Statement on Freshwater Management and the National Environmental Standards for Freshwater, which came into effect on 3 September 2020, should lead to improved water quality in shallow harbours and estuaries and other shallower inshore waters. • The Fisheries New Zealand Coastal Planning Team provides engagement with the RMA coastal planning processes to support marine management decisions that protect fisheries habitat. • Under the industry rebuild plan, four areas on the East Coast North Island were identified as locations where juvenile tarakihi are prevalent in the catch. The industry rebuild plan has implemented voluntary closures to commercial tarakihi fishing in these areas as an additional measure towards sustainability.

9 Relevant plans, strategies, statements and context

193. Section 11 of the Act sets out various matters that the Minister must take into account or have regard to when setting or varying any sustainability measures (such as a TAC). These include any effects of fishing on the stock and the aquatic environment, the natural variability of the stock concerned, and any relevant fisheries plans. A number of these matters are discussed in other sections of this document, but other relevant matters are discussed below.

9.1 Draft National Inshore Finfish Fisheries Plan

194. The National Inshore Finfish Fisheries Plan (the Plan), currently being finalised, provides guidance on management objectives and strategies for finfish species including tarakihi. The Plan will guide the operational management of inshore finfish fisheries for the next five years and is aimed at progressing New Zealand towards more ecosystem-based fisheries management.

[36] Link to South Island fishing restrictions in place due to the TMP can be found here: https://www.mpi.govt.nz/dmsdocument/40886-MPI-Dolphin-TMP-Factsheet-South-Island-June-2020
[37] Section 4 Trawling prohibited. Fisheries (South-East Area Commercial Fishing) Regulations 1986.

195. Stocks are grouped within the Plan, with management approaches and objectives tailored accordingly for each group.

196. TAR 1, 2, 3 and the eastern portion of TAR 7, all fall under Group 1, which recognises stocks that provide the greatest benefit and are highly desirable to all sectors. They are managed to provide for utilisation, while mitigating the increased risk to their sustainability as a consequence of high levels of fishing pressure. The status of Group 1 stocks is determined using fully quantitative stock assessments to provide high levels of information.

9.2 Hauraki Gulf Marine Park Act

197. Section 7 of the Hauraki Gulf Marine Park Act 2000 recognises the national significance of the Hauraki Gulf and section 8 sets out objectives for management of the Hauraki Gulf Marine Park.

198. The boundaries of the Hauraki Gulf Marine Park also intersect with TAR 1, however, there is little commercial fishing for tarakihi within the park area. FNZ considers that the proposals to rebuild the biomass of the East Coast tarakihi stock are consistent with the objectives of the Hauraki Gulf Marine Park Act.

9.3 Regional Plans

199. There are eight Regional Councils that have coastline within the boundaries of East Coast tarakihi. Each of these regions have plans[38] to manage the coastal and freshwater environments, including terrestrial and coastal linkages, ecosystems and habitats.

200. FNZ notes that the Marlborough District Council has included in its Coastal Plan measures to exclude trawling and dredging from specified areas within the Marlborough Sounds, which is within TAR 7. Similarly, the Bay of Plenty Regional Council has included measures to exclude some types of fishing from inshore areas, which includes TAR 1.

201. FNZ considers that the proposed management options presented are consistent with the objectives of relevant regional plans, which generally relate to the maintenance of healthy and sustainable ecosystems to provide for the needs of current and future generations.

9.4 Te Mana o te Taiao (Aotearoa New Zealand Biodiversity Strategy)

202. Te Mana o te Taiao – the Aotearoa New Zealand Biodiversity Strategy[39] sets a strategic direction for the protection, restoration and sustainable use of biodiversity, particularly indigenous biodiversity, in Aotearoa New Zealand. The Strategy sets a number of objectives across three timeframes and is complimented with an implementation plan[40] that identifies central and local government actions required to achieve these. The most objectives relevant to setting sustainability measures for the East Coast tarakihi stock are objectives 10 and 12:

    Objective 10: Ecosystems and species are protected, restored, resilient and connected from mountain tops to ocean depths.

    Objective 12: Natural resources are managed sustainably.

203. The Ministry for Primary Industries (MPI) is undertaking work to support this strategy, as well as the requirement under the Fisheries Act to avoid, remedy or mitigate adverse effects on the aquatic environment. The Environmental Interactions section in this paper provides information on relevant interactions with the wider aquatic environment for the East Coast tarakihi stock.

[38] The eight relevant regional councils have plans that include: Northland Regional Coastal Plan, Bay of Plenty Regional Coastal Environment Plan, Gisborne Region Tairāwhiti Resource Management Plan, Hawke's Bay Regional Coastal Environment Plan, Hawke's Bay Marine and Coastal Group Roadmap Wellington Region Coastal Plan, Marlborough District Council Coastal Monitoring Strategy, Marlborough District Council Ecologically Significant Marine Habitats, Environment Canterbury Regional Coastal Environment Plan and Otago Regional Council Coast for Otago Plan.
[39] Te Mana o Te Taiao - Aotearoa New Zealand Biodiversity Strategy 2020. Department of Conservation.
[40] Te Mana o Te Taiao – Aotearoa New Zealand Biodiversity Strategy Implementation Plan. Department of Conservation.

10 Economic considerations

204. Assessment of national and regional economic impacts associated with proposed options relating to the 2019 review of sustainability measures for the East Coast tarakihi stock was published in August 2019[41].

205. The relative short-term loss in commercial revenue under the three rebuild options is summarised in Table 9. These have been calculated from the proposed TACC changes and the respective port prices within tarakihi QMAs for the 2020/2021 fishing year. The potential impacts range between $0.991 million and $4.162 million per annum.

206. It is important to note that the indicative costs are a very basic analysis of potential economic impacts and does not take into account regional or flow on impacts. Additionally, there is the possibility that impacts will reduce over time as fishers adapt their behaviour, respond to fishing technology and strive for greater fishing precision.

Table 9: indicative revenue loss of options from the proposed TACCs reductions.

Option	Stock	TACC	Change (t)	Indicative revenue change ($ p.a.)
Option 1	TAR 1	867	178	521,487
	TAR 2	779	571	2,168,829
	TAR 3	490	446	1,261,556
	TAR 7	945	79	210,164
	TOTAL	**3081**	**1274**	**4,162,035**
Option 2	TAR 1	978	67	196,290
	TAR 2	1104	246	934,382
	TAR 3	694	242	684,521
	TAR 7	994	30	79,809
	TOTAL	**3770**	**585**	**1,895,002**
Option 3	TAR 1	1023	22	64,453
	TAR 2	1233	117	444,401
	TAR 3	775	161	455,405
	TAR 7	1014	10	26,603
	TOTAL	**4045**	**310**	**990,862**

11 Deemed values

207. Deemed values are the price paid by fishers for each kilogram of unprocessed fish landed in excess of a fisher's ACE holdings. The purpose of the deemed values regime is to provide incentives for individual fishers to acquire or maintain sufficient ACE to cover catch taken over the course of the year, while allowing flexibility in the timing of balancing, promoting efficiency, and encouraging accurate catch reporting.

208. The Deemed Value Guidelines set out the operational policy FNZ uses to inform the development of advice to the Minister on the setting of deemed values.

209. The current deemed value rates of East Coast tarakihi are shown below in Table 10.

[41] Economic impacts of 2019 Review of Sustainability Measures – East Coast Tarakihi. A Computable General Equilibrium analysis and forecast model. NZIER report to Fisheries New Zealand. August 2019.

Table 10: Deemed value rates for East Coast tarakihi.

Stock	Interim	Differential rates ($/kg) for excess catch (% of ACE)		
		100-110%	110-120%	200%+
TAR 1	3.1500	3.5000	4.2500	5.7500
TAR 2	3.1500	3.5000	4.2500	5.7500
TAR 3	2.2500	2.5000	4.0000	5.5000
TAR 7	2.2500	2.5000	4.0000	5.5000

210. FNZ considers the deemed values are set at a level consistent with a rebuilding stock and do not propose any changes.

211. According to data from 2020/21, the current annual deemed value rates[42] of East Coast tarakihi are either near to or exceed both the average ACE prices (TAR 1 $1.23/kg, TAR 2 $1.55/kg, TAR 3 $0.53/kg and TAR 7 $0.81/kg) and the average port prices (TAR 1 $2.93/kg, TAR 2 $3.80/kg, TAR 3 $2.83/kg and TAR 7 $2.66/kg) for East Coast tarakihi stocks. These stocks also have stringent differential deemed values applied which provide greater incentives to fishers to ensure they fish within their individual entitlements.

212. FNZ acknowledges that if the TACC is reduced, subsequent changes in fishing behaviour and the ACE market may result in the need for the deemed value to be re-evaluated in the future.

12 Uncertainties, risks and other considerations

12.1 Fisheries Amendment Bill and On-board cameras

213. The Fisheries Amendment Bill[43], currently before Select Committee, is part of the wider fisheries reform programme. Its goal is to encourage better fishing practices. It aims to update and strengthen New Zealand's fisheries management system. The Bill proposes to change the current rules and policies by:

(a) tightening commercial fishing rules for landings and discards;

(b) creating new rules and regulations for offences and penalties;

(c) introducing new mechanisms for commercial and recreational management decision-making;

(d) enabling the further use of on-board cameras on vessels; and

(e) creating a new defence to help save marine mammals and protected sharks and rays

214. The Minister recently announced key details of the nationwide rollout of cameras on commercial fishing vessels[44]. It is expected that the independent information they will provide will support the reputation of New Zealand's fishing industry, the sustainability of New Zealand's fisheries and provide for more confident management decisions.

215. This will include vessels that use the following methods:

- Set net vessels (8 metres or larger), surface longline, and bottom longline vessels.
- Trawlers of 32 metres or less, except those targeting scampi, and danish and purse seine vessels.

[42] The annual deemed value rate being the $/kg paid for excess catch at 100-110% of ACE.
[43] Fisheries Amendment Bill. Ministry for Primary Industries
[44] Rollout of cameras on fishing vessels to begin. Honourable David Parker, Minister for Oceans and Fisheries.

216. In the context of the East Coast tarakihi stock, it is expected that cameras[45] will be installed and transmitting footage on fishing vessels within the following schedule:

- Fishing vessels that setnet and trawl within TAR 3 and the eastern portion of TAR 7 by June 2023.
- Fishing vessels that bottom longline within the eastern portion of TAR 1 by November 2023.
- Fishing vessels that trawl or longline within the eastern portion of TAR 1 and TAR 2 by June 2024.
- Fishing vessels that setnet within the eastern portion of TAR 1 and TAR 2 by November 2024.

217. It is expected that the On-board camera rollout, and the wider Fisheries Amendment Bill, will enhance the East Coast tarakihi stock rebuild by providing for better verified information to underpin fisheries management decisions, and encourage better fishing practices.

12.2 Recreational controls

218. As the East Coast tarakihi rebuild progresses, the recreational sector is likely to experience the benefits of increasing abundance in the fishery. This could result in increasing recreational catch, particularly when current bag limits are not being fully utilised by the sector. Significant increases in recreational catch has the potential to jeopardise the rebuild of East Coast tarakihi.

219. With the proposal not suggesting to adjust the recreational allowances at this time, particularly in TAR 2, FNZ is suggesting that recreational allowances and associated management controls are reviewed at a later date. This could be after the result of a planned rerun of the National Panel Survey of Marine Recreational Fishers for the 2022/2023 fishing year, which should provide updated estimates of recreational tarakihi catch and compliment any such review.

12.3 Preferential allocation rights (28N rights)

220. There are 1.915 tonnes of preferential allocation rights (28N rights) in TAR 2. Preferential allocation rights were granted to permit holders under section 28N of the Fisheries Act 1983 who elected to take administrative rather than compensated reductions to their catch allocations.

221. When the TACC is increased for a stock that has 28N rights associated with it, the quota shares of owners who do not have 28N rights are reduced and redistributed to the holders of 28N rights. As the options in this paper suggest reducing the TACC, 28N rights for TAR 2 are not expected to be triggered by this sustainability round. However, if the TACCs for these stocks are increased in future, the distribution of their 28N rights will be impacted (28N rights holders will gain the first right to the increase).

13 Questions for submitters

- Do you think the periods appropriate to the stock outlined in the options are suitable? Why?
- Do you think the different approaches to way and rate in the three options are appropriate? Why?
- 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?

[45] On-board cameras for commercial fishing vessels. Ministry for Primary Industries

- Are the allowances for customary Māori, recreational and other sources of mortality appropriate? Why?
- Do you think the proposals recognise and provide for the exercise of kaitiakitanga by tangata whenua? Are there any changes that could better reflect kaitiakitanga?
- 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?

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

14 How to get more information and have your say

223. FNZ invites you to make a submission on the proposals set out in this discussion document. Consultation closes at 5pm on 12 July 2022.

224. Please see FNZ's sustainability consultation webpage (https://www.mpi.govt.nz/consultations/review-of-east-coast-tarakihi-sustainability-measures-for-1-october-2022/) for related information, a helpful submissions template, and information on how to submit your feedback. If you cannot access to the webpage or require hard copies of documents or any other information, please email FMSubmissions@mpi.govt.nz.

15 Legal basis for managing fisheries in New Zealand

225. The Fisheries Act 1996 provides the legal basis for managing fisheries in New Zealand, including the Minister's responsibilities for setting and varying sustainability measures. See the separate document *Overview of legislative requirements and other considerations* at https://www.mpi.govt.nz/dmsdocument/51712 for more information.

16 Referenced reports

Department of Conservation and Fisheries New Zealand (2019). Hector's and Māui Dolphin Threat Management Plan. Latest review accessible at: https://www.mpi.govt.nz/consultations/hectorsand-maui-dolphins-threat-management-plan-review/

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

Eastern Tarakihi Management Strategy and Rebuild Plan 2019. Accessible at: https://www.mpi.govt.nz/dmsdocument/37200/direct

Fisheries New Zealand (2008) Harvest Strategy Standard for New Zealand Fisheries. Accessible at: https://www.mpi.govt.nz/dmsdocument/728/direct

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Fisheries New Zealand (2020). Aquatic Environment and Biodiversity Annual Review 2019–20. Compiled by the Aquatic Environment Team, Fisheries Science and Information, Fisheries New Zealand, Wellington New Zealand. 765 p. Accessible at:

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Fisheries New Zealand (2019). Draft National Inshore Finfish Fisheries Plan. Accessible at: https://www.mpi.govt.nz/consultations/draft-national-inshore-finfish-fisheries-plan/

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