27th July 2018

SUBMISSION ON THE PROPOSAL FOR TAC AND TACC CHANGES FOR THE EAST COAST TARAKIHI FISHERY (TAR1E, TAR2, TAR3, TAR7E)

Background

1. Fisheries New Zealand (*Fisheries NZ*) has issued Discussion Paper No. 2018/01 on Sustainability Controls for 1 October 2018 stocks, and invited responses to the proposals that were released for consultation on 2 July 2018. This response is in relation to the proposed TAC/TACC changes for east coast tarakihi and is presented on behalf of Fisheries Inshore New Zealand (*FINZ*), Te Ohu Kaimoana and Southern Inshore Fisheries Management Company (*Southern Inshore*).

2. Industry has provided both input and engagement on TAR and clearly articulated the range of complexities both in terms of management and science associated with this fishery. It has then formed a TAR Management Strategy (*TAR Strategy*) that provides tailored solutions to these complexities. Throughout this process, industry has demonstrated a commitment to engaging with the results of the 2017 stock assessment in order to determine the most appropriate management outcome for all stakeholders.

3. Industry collectively and inclusively formed a TAR Strategy that addresses the scientific uncertainties, the concerns of fishers on the water as well as the potential socio-economic consequences. The TAR Strategy provides an adaptive management approach that provides innovative solutions to the spatial complexities of the stock while promoting recovery.

4. During Fisheries NZ's pre-consultation meetings (late April / early May 2018) industry outlined its concerns and highlighted the iterative management process that would both ensure the sustainability of the stock (through measures to rebuild the stock appropriately), while still allowing suitable utilisation that would provide social, economic and cultural benefits. The industry TAR Strategy was provided to Fisheries NZ prior to the release of the consultation document to inform the development of their consultation document.

5. This response addresses:

   Section 1 – Stock assessment and associated scientific uncertainties

   Section 2 – Management and policy

   Section 3 – Impacts on industry, small business and local economies

   Section 4 – Review of the management options

   Section 5 – Commitment to innovation

SECTION 1 – STOCK ASSESSMENT AND ASSOCIATED UNCERTAINTIES

6. The results of the stock assessment indicate that the biomass has been reasonably stable with a moderate declining trend for over 40 years since 1975. It shows the spawning biomass reached its peak of *c*. 27% B_0 in the mid-1980s but has remained below the default soft limit since the mid-2000s. The spawning biomass has increased slightly from its lowest level in 2014 following above average recruitment in 2011/12 (**Error! Reference source not found.**1).

7. While the fishery is at *c*. 17% B_0, there is no immediate sustainability risk. The modelling indicates that if the current catch continued at 2016/17 levels (i.e. no catch reduction) the fishery would only decrease to 15.5% B_0 by the time of the next scheduled stock assessment in 2020/21. As with all fisheries management, there will always be uncertainty around such projections, but it indicates that there is adequate time for a thoughtful and appropriate management strategy to be developed and implemented for the east coast TAR fishery. To ensure the long-term sustainability of the fishery, industry is committed to making significant reductions in catch to meet the requirements under the Fisheries Act, while also addressing scientific uncertainties through a proactive research plan.

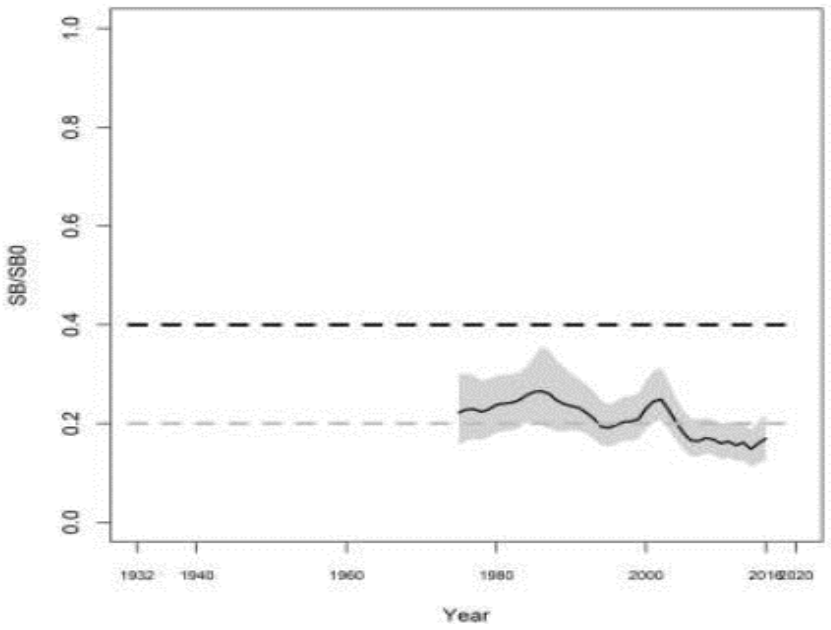


Figure 1: Spawning biomass (SB) as a proportion of unfished biomass (SB_0).

Scientific uncertainties

8. The Fisheries NZ consultation document acknowledges that the assessment is based on a number of assumptions and uncertainties, and specifically highlights those "around the stock structure and other assumptions in the assessment model" (para 980). However, no information is provided to further these statements or indeed set out a management strategy or research proposal to address these uncertainties. Consequently, submitters who have not been actively engaged like the industry will be unable to make an informed submission.

9. Industry has repeatedly stressed that assumptions and uncertainties need to be addressed through targeted research to better inform management. The updated TAR Strategy attached to this submission addresses these uncertainties and proposes solutions to the complex fishery management issues associated with east coast TAR (Annex 1).

10. Fisheries NZ's management options are based on rebuilding the TAR stocks within set timeframes, and this is done in reliance on 10-year projections from the stock assessment. The uncertainty associated with these projections is so significant, that it is unreasonable to rely on this information as the basis for current management (Figure 2).

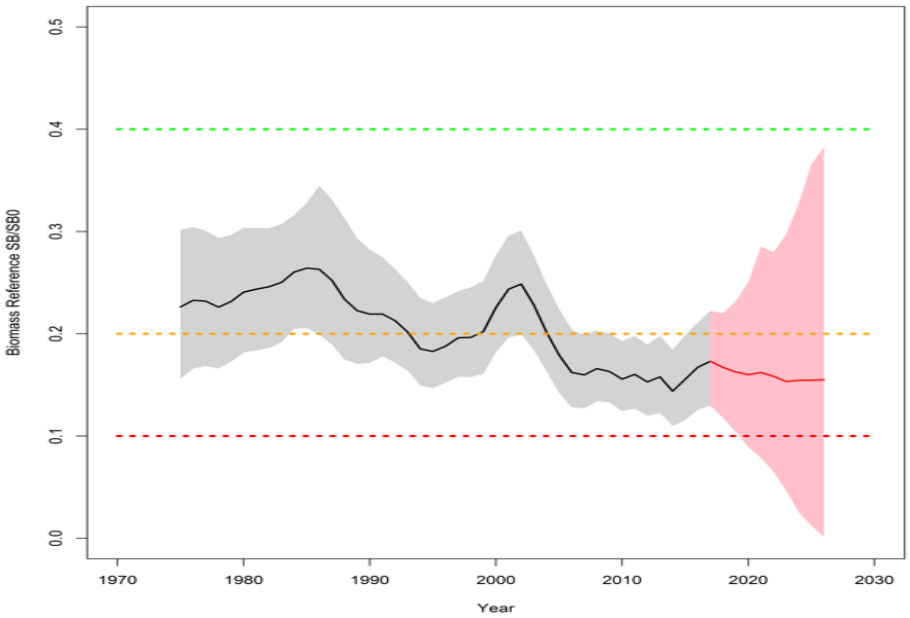


Figure 2: Stock projections from 2018 model.

11. Figure 2 illustrates that after 10-year period the stock could be anywhere between *c*. 0% and 38% B_0. This uncertainty is so great that implementing a long-term management response that relies on this information is unreasonable.

12. Rather industry advocate for a cautious approach, managing to an appropriate timeframe that enables the collection of data to better inform the next stock assessment. This three-year timeframe recognises that managing to a longer timeframe is far too risky given the level of uncertainty in forward projections in the stock assessment model. It is concerning that Fisheries NZ have proposed options that manage to such highly uncertain deviations.

13. The TAR Strategy sets out solutions that will assist in addressing the key scientific uncertainties as summarised below:

    - **Uncertainty:** "The level of connectivity between sub-populations and the differential fishing pressure may have implications for the rebuilding of the stock." (Para 961 of consultation document)

      Industry solution: Investing in genetic research (See Section 9 of the TAR Strategy which provides research to address this) and differential reductions in catch reflecting abundance.

    - **Uncertainty:** level of recruitment and catches of undersize TAR

      Industry solution: Investing in genetic research (See Section 9 of the TAR Strategy which provides research to address this); early voluntary recording of undersize TAR by area and time, rapid CPUE analyses to check abundance and ability to adjust voluntary catch reductions.

    - **Uncertainty:** Stock status projections

      Industry solution: Manage to an appropriate timeframe to reflect the uncertainty in managing to future projections that have a wide confidence interval. This uncertainty is addressed further below in Section 2.

14. Some of the research to address these uncertainties is already underway, but would be accelerated under the industry's TAR Strategy. Given the importance of stock structure and recruitment to the management of TAR fisheries, we consider this information should be obtained as a priority as part of an iterative management approach as suggest in the TAR Strategy. Obtaining this information would not involve any significant cost or delay, and further, it is warranted given the importance of the fishery, and the lack of any impending sustainability concern.

SECTION 2 – MANAGEMENT AND POLICY

Management target

15. Section 13 of the Fisheries Act sets out the Minister's responsibilities regarding the target biomass for a stock, that being at or above B_{MSY}. It is accepted that deterministic B_{MSY} for TAR is 21.5% B_0; however, this may be too low as a management target because it may not appropriately take into account variations in both productivity and the environment.

16. Rather than calculating B_{MSY}, Fisheries NZ has simply asserted that B_{MSY} is 40% B_0 in reliance upon the Harvest Strategy Standard (HSS) guideline. This is done without any evidence relating to TAR, or to the calculated measure of deterministic B_{MSY} of 21.5% B_0.

17. Even if reliance is placed solely on the HSS guideline, fishery managers are required to set targets as modified by relevant factors.[1] The consultation document does not reflect this aspect of the HSS guideline. The use of the HSS guideline default fails to recognise the interdependence of stocks, any environmental conditions affecting the stocks, the assessed level of deterministic B_{MSY}, or any information specific to the TAR fisheries; as such, it is unreasonable to solely rely on a generic default target for these stocks.

18. Further, the HSS guideline identifies that management targets and rebuild plans are species-specific and require an assessment by species on a case-by-case basis: "there is no single target level applicable for all species and stocks".[2] This was a view publicly stated by Fisheries NZ scientists at the Napier cross-sector consultation meeting on the 18th July, where they agreed that a species-specific target is more appropriate.

19. The industry management strategy provides the only option that proposes to calculate "real-world B_{MSY}" through the use of a management strategy evaluation (MSE). We emphasise that the trajectory of the

[1] Ministry of Fisheries (2011). Operation Guidelines for New Zealand's Harvest Strategy Standard – Revision 1 at page 27.

[2] Ministry of Fisheries (2011). Operation Guidelines for New Zealand's Harvest Strategy Standard – Revision 1 at page 2.

proposed rebuild is subject to the MSE that would be available next year. In the interim, shelving of ACE (setting aside and not fishing 20% of the current catch) increases our flexibility to react to these results.

20. The HSS guideline default is not a "real-world biomass level that will produce MSY" as stated in the consultation document. Such a real-world B_{MSY} estimate would be calculated through our proposed MSE. This is recognised in the HSS guideline that acknowledges the use of management strategy evaluation as a "process of evaluating alternative management strategies against one or more operating models (simulation models of the real world) is termed a "management strategy evaluation" (MSE)."[3] Pages 66-67 of the HSS Guidelines acknowledge the value of MSE as a powerful mechanism to take into account the robustness of alternative management procedures identifying management strategies that are resilient to uncertainties in scientific understanding.

21. We submit that a management target is perhaps the most fundamental element of managing a fishery. To progress such significant management proposals without investing the time and effort to calculate the statutory management target is difficult to justify. This is particularly so for a fishery as important as TAR in New Zealand—a fish that is harvested and consumed throughout the country.

22. Furthermore, obtaining this information would not involve any significant cost or delay and is warranted given the importance of the fishery, and the lack of any impending sustainability concern. We have received quotes from reputed fisheries scientists that estimate this work could be conducted for between $50,000 and $75,000 and, once qualified people are available, would take approximately three weeks for one FTE to complete.

23. We submit that any action taken to reduce TACs by the substantial volumes Fisheries NZ proposes should be based on the best available information. That should include calculating the statutory management target, B_{MSY}, which can be done with relative ease. In the interim, we consider it only appropriate to adopt an iterative and considered management approach as identified in the industry's TAR Strategy.

Catch splitting

24. The TAR assessment applies only to the eastern portions of TAR1 and TAR7. Fisheries NZ state that the rebuilding strategy requires catch reductions in specific areas of these QMAs to be effective (para 1026). Despite this requirement, Fisheries NZ has proposed no definitive method to implement the necessary catch spreading, and at paragraph 1029 of the consultation document requests advice from submitters on how to implement catch spreading in TAR1 and TAR7.

25. Notwithstanding the need for the catch reductions, Fisheries NZ also suggests that the requirement to split catch in TAR7 could perhaps be ignored given the complexity involved. This appears to be based on the view that the TAR7 eastern catch is 247 tonnes which is 5.2% of total eastern TAR catch (but far larger portion of TAR7).

26. We submit that ignoring this is inappropriate. It also directly in contrast to the hyper-accuracy on display in other aspects of the consultation paper such as the rationale for the different TACCs between FNZ Options 1 and 2 (see para 1025).

27. As part of the industry TAR Strategy, we have proposed to implement a robust catch spreading arrangement that would designate east and west ACE in both TAR1 and TAR7. This is proposed as part of the overall management approach.

28N rights

28. When the QMS was introduced, the ITQ for each stock was based on a set tonnage that could be caught by each quota owner. It soon became apparent that the total allowable commercial catch for a number of fisheries exceeded the capacity of those fisheries and the Crown acted to reduce the catch.

29. The regime at that time required the Government to buy quota back to retire it. The Government chose to change the law and provide quota owners with the choice of accepting a fixed price (below the market price) in exchange for the surrender of their quota, or putting a specific amount of their quota "on hold" until the TACC for the fishery was subsequently increased. Once the fishery recovered, the "quota on hold" would have priority access to the increase, before any further sale on the open market. Once "refunded" in this way, that quota would have the same rights as other quota. This quota and the associated rights and processes were set out in section 28N in the *Fisheries Act 1983*. Many affected quota owners took the latter path of having the amount of their quota that the government wanted reduced declared to be subject to 28N conditions.

[3] Ministry of Fisheries (2008). Harvest Strategy Standard for New Zealand Fisheries, October 2008 at [7].

30. Subsequently, the Crown changed the Quota Management System so that the amount of quota any individual held in a fishery was translated into perpetual proportional shares in the TACC of that fishery, rather than just for an explicit volume of fish in the fishery for that year. The effect of this last change, when combined with s 28N rights, was to transfer liability for resolving 28N rights from the Crown to quota owners who do not hold 28N rights. This is because the law now provides that when a TACC increases for 28N fisheries those quota owners that hold 28N rights receive all the increase until the total of the 28N rights for that fishery is exhausted. This is achieved by transferring quota shares from normal quota owners to the quota owners holding 28N rights i.e. normal quota owners have quota shares taken off them so they permanently have a reduced percentage of the total fishery and the 28N rights holding quota owners receive the those shares meaning they then permanently have an increased percentage of the total fishery.

31. The Deed of Settlement was signed in 1992 and was put into effect through the *Treaty of Waitangi (Fisheries Claims) Settlement Act 1992*. However, the *Fisheries Act 1983* was not amended to reflect the settlement obligations, and 28N rights were subsequently carried through into the *Fisheries Act 1996*.

32. Ultimately, this situation means that where a fishery, that has 28N rights within it, has its TACC reduced, then in the absence of any other change, when the fishery recovers and the TACC is subsequently increased, then the 28N rights are invoked and the proportionate share of quota that iwi hold will be reduced. This is a permanent reduction in the proportional share that iwi have in the TACC of that fishery. That is directly contrary to:

    a) the agreement in the Fisheries Settlement, and

    b) furthering the agreements expressed in the Deed of Settlement (see section 3 and 4 of *Treaty of Waitangi (Fisheries Claims) Settlement Act 1992*).

33. This undermines the agreement between the Crown and Māori, that Māori would receive 10% of all stocks in the QMS at the time of the interim fisheries settlement in 1989.

34. In light of the Minister's obligations under section 5(b) of the *Fisheries Act 1996,* and the relationship through other legislation to the Deed of Settlement, the Minister must be advised that, before he makes any decision under the Fisheries Act that will as a consequence trigger 28N rights, all other options to achieve the same effect but not trigger 28N rights should be examined and, wherever possible, used. If the Ministry fails to examine and recommend options that are not contrary to the Settlement, that will obviously have the effect of permanently undermining the Fisheries Settlement. This must be avoided. This issue is relevant for a number of fisheries that are being reviewed as part of the 2018 sustainability round, including TAR2.

35. Where the potential for a breach of the Settlement exists because of 28N rights exists, Te Ohu Kaimoana's position is that the Ministry has the responsibility to examine and wherever possible pursue strategies to ensure there is no breach or erosion of the Settlement.

36. In summary of key management complexities are:

- **Management complexity:** Lack of a specific management target and an inappropriate reliance on generic policy.

  Industry solution: Conduct a management strategy evaluation to calculate the relative biomass that will provide the maximum sustainable yield for tarakihi as the *Fisheries Act* requires.

- **Management complexity**: Unreasonable reliance on very uncertain stock status projections.

  Industry solution: Implement an iterative management response that allows for continued collection of information and a viable commercial fishery.

- **Management complexity**: Catch splitting between TAR 1 and TAR 7 but no recommended way to achieve it.

  Industry solution: Implement industry's TAR Strategy that includes a robust catch spreading arrangement that would designated east and west ACE in both TAR1 and TAR7.

- **Management complexity**: Existing 28N rights.

  Solution: Choose an option to assist the fishery to recover that will not invoke the 28N mechanism and commence discussions with Te Ohu Kaimoana to address this matter before making any changes to TACCs.

SECTION 3 – IMPACTS ON THE INDUSTRY, SMALL BUSINESSES AND LOCAL ECONOMIES

37. The quantum of the TACC reductions proposed will have a significant impact on the lives of many New Zealanders. This is not a faceless issue. The possible consequences of these decisions require analysis that is then taken account of as part of the Minister's obligations under the Act.

38. TAR is the third most valuable inshore finfish species in New Zealand (paragraph 967 of the consultation document), yet the social and economic assessment in the consultation document provided is simplistic at best. A key concern with the analysis provided is that it models only the immediate direct impact on fishers using the revenue loss based on just port price. This provides a simple but understated view of financial impact and does not account for the role of TAR in the wider operations of fishers.

39. We understand that Fisheries NZ has contracted a firm to assess the economic impacts in more detail; we welcome that analysis. The Minister undertook to make that analysis available to industry and other sectors, and we formally request the opportunity to consider that work prior to any advice being provided to the Minister. We also note that at the time of writing, we are not aware that any fishers or quota owners have been contacted by any research organisations. Given the potential impact of the changes being advocated, we consider that this work should extend beyond a desktop analysis.

40. It would have been preferable that this information was provided as part of the consultation process considering the potential implications for the New Zealand market. Businesses will be significantly affected by the range of Options provided by Fisheries NZ. Regionally, small businesses and local families will be the most affected.

41. East coast tarakihi is a very important component of inshore fisheries and is predominantly caught as part of a mixed species fishery. TAR is the economic backbone of the many inshore vessels' annual catch plan. Reductions on the scale proposed by the Fisheries NZ options will mean significant reductions in the fleet—there is no ability to swap catch to other fishstocks (even though some are increasing in abundance—the current TACC settings for those stocks and the deemed value regime currently prevents that.

42. For the east coast TAR fishery, the measures undertaken must move to rebuild the fishery to the management target (which has not been calculated), but at a rate that has regard to social, cultural and economic factors. The absence of robust analysis would prevent the Minister from exercising that judgement; the Fisheries NZ's options presuppose what decision might be appropriate for the Minister to make.

43. We submit that the TACC reductions of the scale proposed by Fisheries NZ cannot be justified on social, cultural or economic grounds, particularly given the absence of any immediate sustainability concern and the history of the fishery. Further, such drastic cuts could reduce the ability to monitoring of the fishery, which is reliant on CPUE, and thus reduce the efficacy of future management.

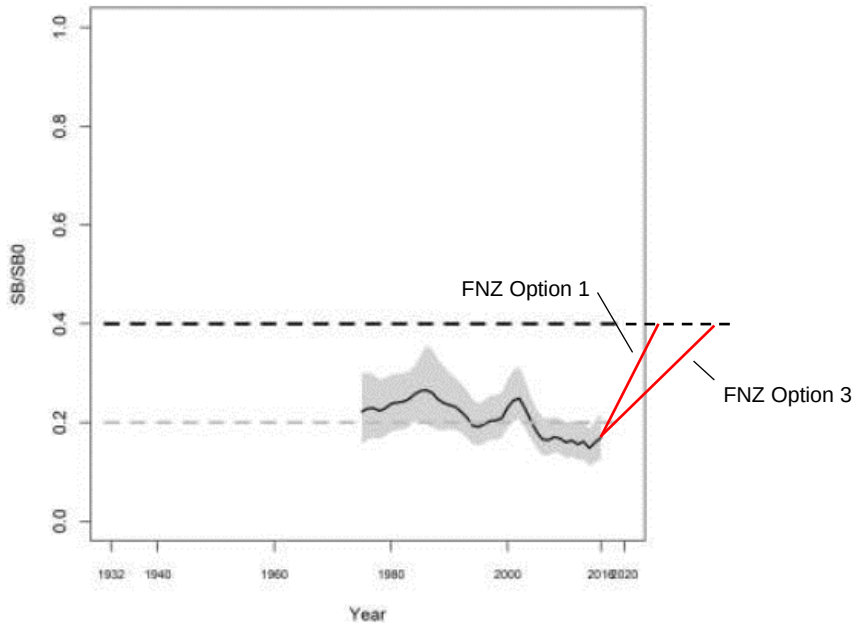


Figure 3: Fisheries NZ's proposed rebuild options in the context of historical biomass estimates.

44. Figure 3 illustrates the severity of the action that Fisheries NZ are proposing. The rebuild target is far above the historical peak of the fishery, and the rate of rebuild is extreme when the relatively stable 40-year history of the stock is considered. Such extreme management options should be supported by more robust social, cultural and economic analyses, and be based on more robust and less uncertain scientific information (see Figure 2 on page 2).

45. Management measures affecting TAR on the scale proposed by Fisheries NZ need to reflect the interdependent effects that any cut in catch will have on the ability of fishers to then catch other species. Depending on the area being fished, the impacts of management measures on TAR will differ. A summary of information from all areas has indicated that the species affected by this management decision include, but are not limited to: SNA, TRE, SCH, HPB, JDO, BAR and RCO. The reality of the situation is that fishers will have to avoid areas of TAR which will impact other species. For example, in TAR 2 it is likely that fishers will have to move inshore to avoid TAR and as such will be fishing more in waters habited by shallower species such as SNA and GUR.

46. These statements are not an argument that industry will not make changes, we have demonstrated we want management changes in the industry TAR Strategy. Rather, they are to ensure that Fisheries NZ and the Minister are cognisant of the impacts of such severe management options. Even the industry proposal will impact on the fishery in the same way but to a lesser degree.

47. We are aware from earlier research that 88% of New Zealanders eat fish at least once a month (more than 45% percent of us every week) while the best estimates have less than 12% of us catching it ourselves. This means that a substantial portion of us buy our fish.

48. 90% of TAR is domestically sold, forming an important part of the domestic market across New Zealand. This domestic market is another of the socio-economic factors that the Minister should have regard to and reflects not just the direct impacts on the fishing industry but also the flow on effects to the wider seafood sector and community within New Zealand. We are aware that one significant supermarket chain will be making its own submission on the proposed changes.

49. We submit that an in-depth socio-economic study is necessary to inform the management of such important stocks, it is imperative that the work contracted by Fisheries NZ be completed, disseminated and discussed prior to management decisions being made.

SECTION 4 – REVIEW OF THE MANAGEMENT OPTIONS

50. The three management options Fisheries NZ propose lack the sophistication that we would expect for a fishery as important as TAR; particularly with the range of uncertainty and complexity involved. This position is based on the following points:

    a) A simplistic proportional catch reduction in all QMAs demonstrates a lack of understanding, or unwillingness to reflect the spatial differences in the fishery. There is no clear rationale provided for the proposed proportional catch reductions. This approach is a step backwards in fine scale, evidence-based fisheries management.

       Industry solution: Differential catch reductions to reflect catch history, CPUE and equity between the different QMAs (See Section 6 of the Industry TAR Strategy).

    b) The consultation document is inadequate in addressing the complexities of catch splitting. Table 2 in the consultation paper proposes catch limits for TAR1E and TAR7E, yet these areas are not defined. Paragraph 996 requests submitters to provide “practical means of monitoring and constraining catch in TAR 1(east) and 7 (Cook Strait) so as to give effect to the catch reductions”. Elsewhere, Fisheries NZ suggest that catch splitting in TAR7 could be ignored altogether. To propose catch reductions without having considered the mechanisms to implement them does not indicate well thought through robust fisheries management.

       Industry solution: Implement industry’s TAR Strategy that includes catch spreading arrangements (See Section 6 of the Industry Management Strategy).

    c) The consultation paper does not provide any additional information to better inform the management of the stock. While there is already programmed research that will provide information on east coast TAR, the paper identifies no additional research services to improve knowledge of the stock structure or management initiatives to address complex fishery management issues.

       Industry solution: The industry TAR Strategy includes a suite of research measures to provide information to ensure that the next stock assessment in three years can address scientific assumptions and uncertainties in the current model (See Section 9 of the industry TAR Strategy).

d) There is inadequate recognition of the impact of the proposed TAR cuts on the industry, including no recognition of the impact of the proposed Options on other stocks and fisheries within New Zealand.

Industry solution: Take an iterative management approach whereby appropriate management decisions are made to reflect socio-economic factors whilst ensuring sustainability in conjunction with collection of additional data to better inform management decisions (See Sections 6 and 9 of the industry TAR Strategy). This allows industry to adjust their operations as necessary to accommodate the catch reductions and offer the best chance of continued access to a portfolio of species, and to continue collecting the necessary CPUE data that the stock assessment relies on.

e) A simplistic view of deemed values that does not reflect the reality of the port price and market drivers. There is no consideration or analysis of the following key issues: the increased difficulty for fishers to avoid TAR, especially in areas where the CPUE is increasing; the potential constraints on ACE availability; the need to adequately disincentivise over-catch of the new limits, and the need to incentivise accurate recording of catches and disposals so as to better inform the model.

Industry solution: A deemed value review that reflects the different port prices, different fish sizes and the need to gain good information on stock abundance whilst ensuring that the ramping in each QMA is appropriate (See Section 6 of the industry TAR Strategy).

Fisheries NZ options

51. Fisheries NZ has proposed a series of severe catch reductions as summarised below.

TAR1 (includes east and west coast)	Option 1	32% TACC reduction – ongoing for 10 years
	Option 2	35% TACC reduction (over three years) and then for the next 7 years
	Option 3	22% TACC reduction ongoing for 20 years
TAR2	Option 1	59% TACC reduction – ongoing for 10 years
	Option 2	64% TACC reduction (over three years) and then for the next 7 years
	Option 3	41% TACC reduction ongoing for 20 years
TAR3	Option 1	59% TACC reduction– ongoing for 10 years
	Option 2	63% TACC reduction (over three years) and then for the next 7 years
	Option 3	40% TACC reduction - ongoing for 20 years
TAR7 (includes west coast and Cook Strait)	Option 1	13% TACC reduction– ongoing for 10 years
	Option 2	14% TACC reduction (over three years) and then for the next 7 years
	Option 3	8% TACC reduction - ongoing for 20 years

52. For the reasons outlined above, we consider that Options 1, 2 and 3 proposed by FNZ are unacceptable and fall short of robust and responsible fisheries management.

53. We would also note that it will not be possible to take one of Fisheries NZ's Options and then add in the other measures included in the industry strategy. Cuts of the magnitude being suggested above will mean there is no ability for the industry to pay for extra research or management.

Industry TAR Management Strategy

54. Industry has provided a TAR Management Strategy that was referenced in the consultation document. Industry remain committed to this Strategy and attached an updated version that has been expanded to provide further clarity on implementation.

55. The TAR Strategy is a comprehensive package of measures. Industry participants have made clear that they will not provide the resourcing and actions needed to make it work successfully if parts of it are used in conjunction with the Fisheries NZ proposed reductions in catch. The commitment is to industry, as a whole, delivering all parts of its Strategy.

56. The key elements of the Industry management strategy are:

    a) Voluntary catch reductions

    b) Catch spreading arrangements

    c) A Management Strategy Evaluation (MSE) to determine real world B_{MSY}

    d) Deemed value review (see pages 16 and 17 of the attached TAR Strategy)

    e) A suite of additional management and research measures

57. With the consultation document focusing its comments only on the shelving aspect of the industry strategy (as opposed to providing an adequate assessment of the strategy as a whole), the shelving aspect of the management strategy is specifically addressed below.

58. We note that in the very short time that has been available to us, we have already obtained a very strong commitment from industry to implement the proposed shelving, catch spreading and reporting obligations as set out in the TAR Strategy. In less than four days, the vast majority of quota shares have made the necessary commitments and we will obtain additional support within the next few days to further strengthen our ability.

Shelving

59. Fisheries Inshore New Zealand, Southern Inshore and Te Ohu Kaimoana consider that formal shelving of ACE to a neutral third party as proposed in the industry TAR Strategy is a viable way of reducing the commercial catch. The Minister of Fisheries is obliged to take this into account in accordance with the provisions of section 11 before deciding whether additional measures are needed. If the Minister is satisfied that the approach will adequately mitigate a risk to sustainability, there is no legislative obligation to choose from the list of statutory sustainability measures set out is section 11(3). This would also mean that the Minister would not be directed to either section 13 or 14 in order to vary a TAC for one or more stocks.

60. Shelving ACE provides potential to respond to fisheries management challenges in near real time, improves buy-in to the full suite of management measures from quota owners, and addresses short term changes in abundance, without placing Settlement and quota assets at risk. In many instances it is a superior tool to the blunt approach of reducing TACs and TACCs, because its effectiveness can be enhanced through being part of a fine-scale management package.

61. We interpret the Fisheries Act to be structured in a way that enables the Minister to give full consideration of the relevant fisheries management regime for a particular stock (or stocks) before considering whether or not a sustainability measure should even be proposed. We consider that the Act enables far more responsive fisheries management than can be achieved through a blunt TAC/TACC reduction, by recognising the potential for iwi or industry-led actions to better address sustainability concerns.

62. In particular, section 11(1) requires that before proposing to set or vary a sustainability measure for one or more stocks, the Minister must take into account range of matters, including the effects of fishing on the aquatic environment. The former Ministry of Fisheries developed and consulted on a series of policy definitions on the "Front End" of the *Fisheries Act 1996* and in relation to section 11(1)(a), confirmed that it provided for "existing or proposed measures that currently, or potentially, manage any adverse effects of fishing to be taken into account before the need for a sustainability measure to be determined".

63. This interpretation of section 11(1) was subsequently used to support the use of shelving ACE as a means of effecting a reduction in the commercial catch in the PAU7 fishery as part of the decisions made by the Minister of Fisheries in 2003. However, in more recent times the shelving of ACE has not been supported by MPI, although the rationale for this position has not been given publicly.

64. The remaining elements of the industry TAR Strategy (2 to 5) as detailed in paragraph 56 of this response are covered in more detail in the attached updated Strategy:

SECTION 5 – COMMITMENT TO INNOVATION

65. The TAR Strategy is a demonstration of Industry's commitment to innovation through the support for genetic studies, research into improved net configuration for both selectivity and minimising benthic impacts.

66. Further examples of Industry's commitment to improved selectivity can be seen through the commitment to develop PSH over the last five years as well as the industry-based research into other low-cost measures to improve selectivity through net trials in Hawke's Bay (Annex Two). An allied part of this latter work also linked this improvement into an Electronic Reporting App for catch effort data so that selectivity at a vessel and fleet level can be more readily included in analysis of the fishery. Unfortunately, the changing

requirements and timelines with the Ministry's IEMRS programme means that work is no longer available and will need to be repeated in the next stages of digital monitoring.

67. In addition to these initiatives, this work has been expanded with industry supporting research in Area2 by other vessels over the last two years. The speed of this work has however been hampered by the delays in obtaining special permits (one instance took nearly six months) and the lack of access to MPI observers to accurately monitor the work.

68. With the increasing awareness of this work and other pressures, a number of fishers have changed the gear they are fishing with. The current documentation associated with catch effort reporting does not adequately record these improvements and there is no comprehensive database anywhere. A review of the fleet involved in the TAR fishery demonstrates that there is a variety of gear configurations being used. Fishers already innovate to ensure that the gear they use is appropriate for the fishery and conditions they are involved in.

69. To further support grassroots innovation of the inshore fleet, industry has developed a gear innovation pathway that is currently in draft form but will form the basis of a framework to promote continued innovation within the NZ industry. This provides a framework that facilitates innovation (Annex Three).

70. Furthermore, industry has been in talks with NIWA about the potential to support a Trawl Gear Selectivity Modelling project (as outlined in the TAR Strategy) that would develop predictive models of trawl cod-end selectivity for New Zealand species to help inform commercial fishing practices and management decisions.

71. Whilst Fisheries Inshore NZ has committed to innovation on behalf of the industry it should be recognised that the more severe management options will mean that quota owners will have significantly less capital to leverage innovation and will impact the ability to incentivise improved management.

TAR MANAGEMENT STRATEGY

2018 – 2021

CONTENTS

EXECUTIVE SUMMARY 3
1 STOCK ASSESSMENT 4
2 MANAGEMENT CONTEXT 5
3 SCIENTIFIC UNCERTAINTIES 7
4 MANAGEMENT COMPLEXITIES 10
5 MANAGEMENT STRATEGY 13
6 PROPOSED MANAGEMENT MEASURES 15
7 PROPOSED RESEARCH PROJECTS 18
8 MANAGEMENT STRATEGY IMPLEMENTATION TIMEFRAME 20
9 APPENDICES 21

EXECUTIVE SUMMARY

1. This management strategy is a commitment by industry to increase the status of the eastern Tarakihi fishstocks towards "real world" B_{MSY} before the next TAR stock assessment proposed for 2020/21.[1]

2. There will be an iterative process of collecting more information to better inform the next TAR stock assessment.

3. The management strategy is a commitment to enabling the best-informed fishery management decisions whilst moving the stock towards B_{MSY} in line with the requirements of the Fisheries Act 1996.

4. Following the outcomes of the first fully quantitative assessment for east coast TAR, there is an acknowledgement by the commercial industry that a management strategy is required. This needs to address the outcome of the assessment while also addressing the uncertainties associated with the stock assessment model.

5. The management strategy objectives are to:

   a) Increase the east coast TAR biomass by at least 12% by the next stock assessment (and in doing so increase the stock status to circa 20% B_0 within three years); and

   b) Improve the knowledge about the stock to reduce uncertainties, fine tune management measures to ensure their effectiveness and allow more informed management decisions in future.

6. The objectives will be achieved through a commitment to implement a suite of management and research measures. These include collectively reducing catch in designated areas as well as research and monitoring programmes to ensure that fishery management decisions are made with increasing certainty.

7. The complexities associated with east coast TAR mean that a range of management measures and research is required to provide an appropriate management package—particularly regarding the relationship between stock structure and QMAs.

8. We see this strategy as a package of measures that will collectively deliver robust management of TAR fisheries. This package represents a multi-year management approach rather than a one-off management event; we consider this represents the most appropriate way to manage inshore fisheries and support similar such management plans being replicated in other important inshore fisheries.

9. This management strategy reflects the combined views of Fisheries Inshore New Zealand Ltd, Te Ohu Kaimoana and Southern Inshore Fisheries Management Company Ltd.

[1] Real world, or stochastic B_{MSY} is preferred to a target of deterministic B_{MSY}. The latter is currently estimated to be 21.5% B_0 and has the disadvantage of not appropriately incorporating the natural variability in various stock parameters.

1 STOCK ASSESSMENT

10. The first fully quantitative assessment for east coast TAR (Project TAR2016-01) was completed in November 2017 and adopted at the November Plenary.

11. The stock assessment assumes that tarakihi spawn in three main spawning grounds: Cape Runaway to East Cape, Cape Campbell to Pegasus Bay, and the west coast of the South Island near Jackson Bay. To explain the productivity of the fishery, the hypothesis is that significant numbers of these larvae then move southward from East Cape (across Cook Strait) and Campbell Bay by some unknown mechanism to recruit into the nursery for east coast TAR fishery found south of Banks Peninsula.[2]

12. The current stock hypothesis is that the Canterbury Bight/Pegasus Bay area represents the main nursery area for the entire eastern stock unit. The hypothesis regarding stock structure is that there is considerable northward movement of fish from the east coast of the South Island to the Wairarapa coast, East Cape and Bay of Plenty.

13. This hypothesis is supported by the available age composition data that shows a progressive increase in the proportion of older fish in the catches as you move north. CPUE analysis indicates a time lag in CPUE trends that support the observed age composition.[3]

14. The results of the stock assessment also indicate that the stock biomass has been reasonably stable with a moderate declining trend for over 40 years since 1975. It also now shows that the spawning biomass (SB) has remained below the default soft limit since the mid-2000s and reached its peak of c. 27% B_0 in the mid-1980s. The spawning biomass has increased slightly from its lowest level in 2014 following above average recruitment in 2011–2012 (**Error! Reference source not found.**1).

15. Current (2015/16) spawning biomass is estimated to be at 17% of the unexploited, equilibrium biomass level (SB_{2016}/SB_0 = 0.170) from the base case model.

16. There is a low probability (12.6%) that the spawning biomass is above the soft limit (20% SB_0). There is no risk that the spawning biomass is below the hard limit (10% SB_0).

17. An update to the 2017 assessment model and the associated CPUE analysis to include 2016/17 fishing year was completed in April 2018 to ensure the most up to date information is available.[5] The same base model for the assessment was used: a single region model starting in 1975. This indicates the current state to be 17.3% B_0.

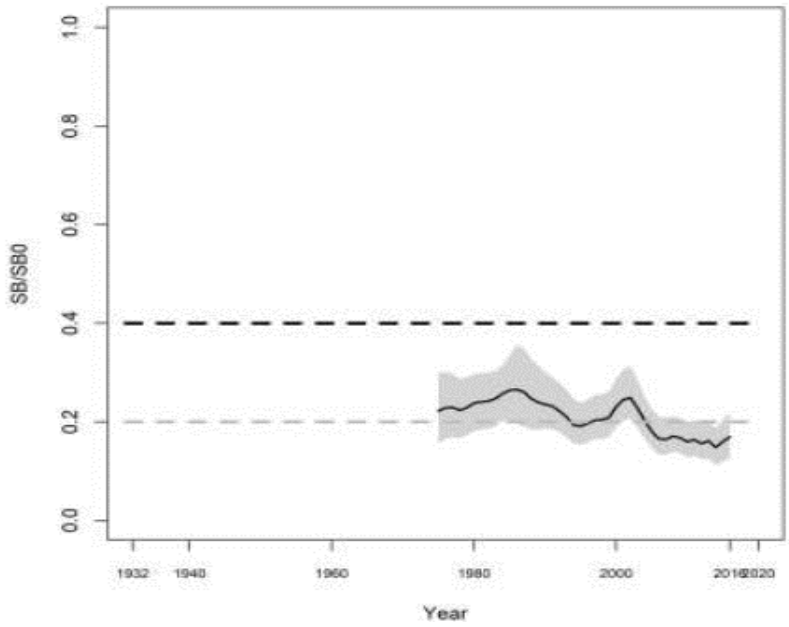


Figure 1: Spawning biomass (SB) as a proportion of unfished biomass (SB_0).

[2] New Zealand Fisheries Assessment Report 2018/05 Langley, A.D (2018) Stock assessment of tarakihi off the east coast of mainland New Zealand. March 2018. ISBN 978-1-77665-797-1.

[3] SINS-WG-2018-18. Langley, A.D (2018) Stock assessment of east coast tarakihi – an update for 2018. 24 April 2018.

2 MANAGEMENT CONTEXT

Principal Legal Guidance

18. This management strategy reflects the legal framework provided in the Fisheries Act 1996 (the Act). The core sections Act are:

Section 8(1)
The purpose of this Act is to provide for the utilisation of fisheries resources while ensuring sustainability.

Section 13(2)
The Minister shall set a total allowable catch that—

(a) maintains the stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; or

(b) enables the level of any stock whose current level is below that which can produce the maximum sustainable yield to be altered—

(i) in a way and at a rate that will result in the stock being restored to or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks; and

(ii) within a period appropriate to the stock, having regard to the biological characteristics of the stock and any environmental conditions affecting the stock; or

(c) enables the level of any stock whose current level is above that which can produce the maximum sustainable yield to be altered in a way and at a rate that will result in the stock moving towards or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks.

Section 13(3)
In considering the way in which and rate at which a stock is moved towards or above a level that can produce maximum sustainable yield under subsection (2)(b) or (c), or (2A) (if applicable), the Minister shall have regard to such social, cultural, and economic factors as he or she considers relevant.

Section 10
All persons exercising or performing functions, duties, or powers under this Act, in relation to the utilisation of fisheries resources or ensuring sustainability, shall take into account the following information principles:

(a) decisions should be based on the best available information:

(b) decision makers should consider any uncertainty in the information available in any case:

(c) decision makers should be cautious when information is uncertain, unreliable, or inadequate:

(d) the absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of this Act.

Policy context

19. The stock assessment of tarakihi off the east coast of mainland New Zealand will require the Minister to take action to ensure the stock rebuilds to the level that can produce the maximum sustainable yield.

20. MPI use its Harvest Strategy Standard (HSS) as the default policy guidance document to develop a rebuild plan for a fishery in this position.[4]

[4] Harvest Strategy Standard for New Zealand Fisheries (2008). Ministry of Fisheries – October 2008 at [24].

Acceptable Proxy for B_{MSY}

21. No single target is applicable for all species and stocks.[5] Management targets for individual stocks have to be specific on the biological characteristics of the stock.

22. The HSS uses a default position of 40% B_0 for all 'low' productivity stocks. The deterministic B_{MSY} for tarakihi is calculated to be 21.5% B_0. It is acknowledged that this may be inappropriate because it may not appropriately take into account variations in both productivity and the environment. However, stochastic B_{MSY} for the TAR stock is not known.

23. Acknowledging the previous point, an appropriate priority management measure is to develop a Management Strategy Evaluation (MSE) to determine stochastic B_{MSY} for east coast TAR. The HSS guideline recognises that "MSEs are fully-compatible with the Harvest Strategy Standard".[6]

24. Noting that the fishery has never been above 27% B_0 since 1975 (the entire time period used for the stock assessment), it is considered more appropriate to conduct the necessary work to determine an appropriate estimate of real-world B_{MSY} than to work to a default value, given the impact of the latter.

Way and Rate

25. In addition, the Act does not require that measures are only taken based on the biology and state of the fishery, it provides that in addition to this, the Minister should have regard to the relevant economic, social and cultural impacts when deciding upon the way and rate at which a stock is rebuilt to the target level.[7]

26. The two above points have been addressed in Section 6 of this management strategy.

---

5 Operational Guidelines for New Zealand's Harvest Strategy Standard (2011). Ministry of Fisheries June 2011 at page 2.

6 Harvest Strategy Standard for New Zealand Fisheries (2008). Ministry of Fisheries – October 2008 at [25].

7 Fisheries Act, section 13(3).

3 SCIENTIFIC UNCERTAINTIES

27. The stock assessment has been accepted by Fisheries New Zealand's Northern Inshore Science Working Group. However, there are recognised scientific uncertainties within the model.

28. Specifically, the stock hypothesis still has a range of assumptions that need more research to increase certainty before the next stock assessment. The proposed additional research and analysis that form part of this management strategy are addressed in the following Section.

Connectivity

29. A key hypothesis in the assessment is that the larvae from spawning fish on the east coast make their way back to South of Banks Peninsula and subsequently recruit into the fishery.

30. Despite this being the core hypothesis of the stock assessment, the mechanism that supports this is not understood or proven.[8] Annala (1987) noted that larvae from the west coast South Island spawning grounds may be transported north or south. Behringer & Xue (2004) noted that passive drift from spawning locations (off the east Northland, the Bay of Plenty and East Cape) resulted in eastward displacement well offshore from the east coast of the North Island.

31. There is a lack of direct observations to support this hypothesis. The 2017 WG report states "Few larval and post-larval tarakihi have been caught and identified".[9] Further research is required to provide additional data to either prove or disprove this hypothesis (see Section 9).

CPUE

32. The stock assessment was strongly dependent on CPUE indices as the primary index of stock abundance. CPUE indices in the model provide "a reasonable index of stock abundance".[10]

33. Concerns have been raised however that the CPUE data in the model does not accurately reflect fishing practice, with fishers highlighting numerous uncertainties regarding the utility of the CPUE data. Specific CPUE uncertainties identified were associated with gear specifications.

34. For example, in TAR3 new vessels have entered the fishery that are fishing in different locations and have different configurations to the vessels they have replaced. As these vessels have entered the fishery less than five years ago, they are not included in the core vessel fleet that is used in the CPUE analysis. Similarly, vessels using PSH technology have also been excluded. These new TAR3 vessels and the use of this PSH technology are expected to be an ongoing feature in this fishery.

35. In recognition of the uncertainty in the CPUE accurately reflecting the fishery, it is important that further research is conducted. Further scientific research is required to ensure the CPUE analysis accurately reflects the east coast TAR fishery (see Section 9).

Age Composition Data

36. The model results are strongly informed by the age composition data from the commercial fishery. The stock assessment assertion is that "The fisheries in Canterbury Bight/Pegasus Bay are dominated by younger fish and there is a progressive increase in the proportion of older fish in the catches from TAR2, the Bay of Plenty and east Northland."[11]

---

8 New Zealand Fisheries Assessment Report 2018/05 Langley, A.D (2018). Stock assessment of tarakihi off the east coast of mainland New Zealand. March 2018. ISBN 978-1-77665-797-1.

9 *Ibid*.

10 *Ibid*. at – Section 6.

11 New Zealand Fisheries Assessment Report 2018/05 Langley, A.D (2018) Stock assessment of tarakihi off the east coast of mainland New Zealand. March 2018. ISBN 978-1-77665-797-1 at – Section 4.6 [27].

37. However, the representativeness of the age composition data used to support the model's hypothesis of connectivity has been questioned by fishers from all QMAs:

    - TAR1 fishers proposed an alternative hypothesis that the Bay of Plenty and East Cape were receiving juveniles from the Kermadecs; this was based on historical observations of juvenile TAR catches from fishers fishing on the way to the Kermadecs
    - TAR2 fishers highlighted that the presence of significant juvenile TAR grounds in TAR2 and this has not been reflected in the model
    - TAR3 fishers identified that the catch sampling does not reflect the higher proportion of older fish in the TAR3 fishery

38. Industry is committed to collecting new age composition data and will be actively engaged in this process to ensure that the concerns raised in the previous bullet points are addressed in the proposed catch sampling programme (see Section 9).

Recruitment

39. The most recent TAR FAR acknowledges the uncertainty around recruitment: the "estimates of recruitment in the most recent years (2013–2015) were poorly determined."[12] The uncertainty around recruitment is confirmed by the statement "estimates of recent potential yields are relatively uncertain due to the uncertainty associated with estimates of recent recruitment."

40. Figure 2 emphasises that uncertainty. The biennial ECSI trawl survey is the only early source of recruitment information. Further work is required to address the uncertainty associated with TAR recruitment (see Section 9).

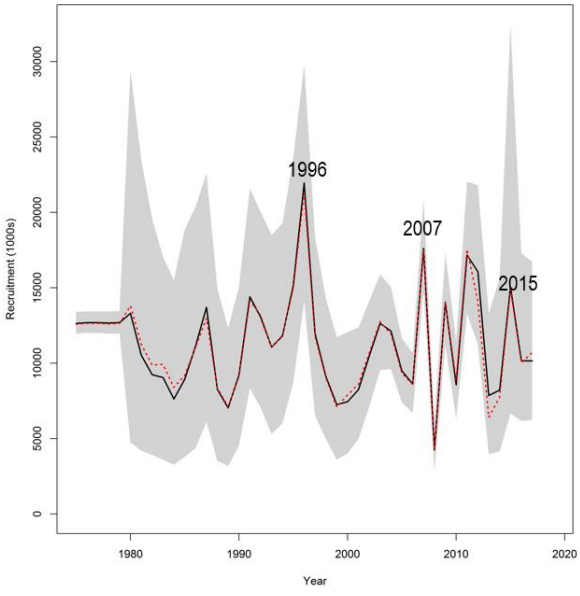


Figure 2. Modelled TAR recruitment.

[12] *Ibid*. at Section 5.5.5 [55].

Selectivity

41. There is the potential for improvement in survivorship of juvenile tarakihi via reductions in sub-MLS catch due to changes to both spatial and temporal distribution of fishing (vs historical) and other selectivity measures including use of larger mesh and differently oriented mesh in the lengthener and cod ends. This potentially represents an increase in recruitment from estimated average level (R_0).[13]

42. Indicative results from the provisional work contracted by industry demonstrates that the annual estimate of sub-MLS TAR catch from the Canterbury Bight has remained reasonably stable since 2007. At the same time, the ratio of sublegal to landed catch has reduced. This can only mean there is less sub-MLS catch in relation to legal catch in 2016 than in 2008.

43. These results support anecdotal information from TAR3 fishers that the CPUE data do not reflect recent changes in fishing practices in TAR3. This emphasises the need for further research to accurately understand selectivity and its impacts on recruitment (see Section 3).

Projections

44. As a result of the biological characteristics of TAR, the default rebuild period under the HSS guideline is 10 years. Projected stock biomass over 10 years has been used to model the state of the fishery for a variety of reductions in catch.

45. These 10-year stock projections (as shown in Figure 3) identify that long-term projections for TAR have such variance that the fishery could achieve either of two extremes – rebuild to 40% B_0 or be extinct—if measures were simply adopted now with no further refinement within the 10 years.

46. It is considered inappropriate fisheries management to manage to these levels of uncertainty in the projections. This management strategy provides a timeframe for implementing measures that addresses the level of uncertainty in projections whilst also providing for an appropriate stock rebuild.

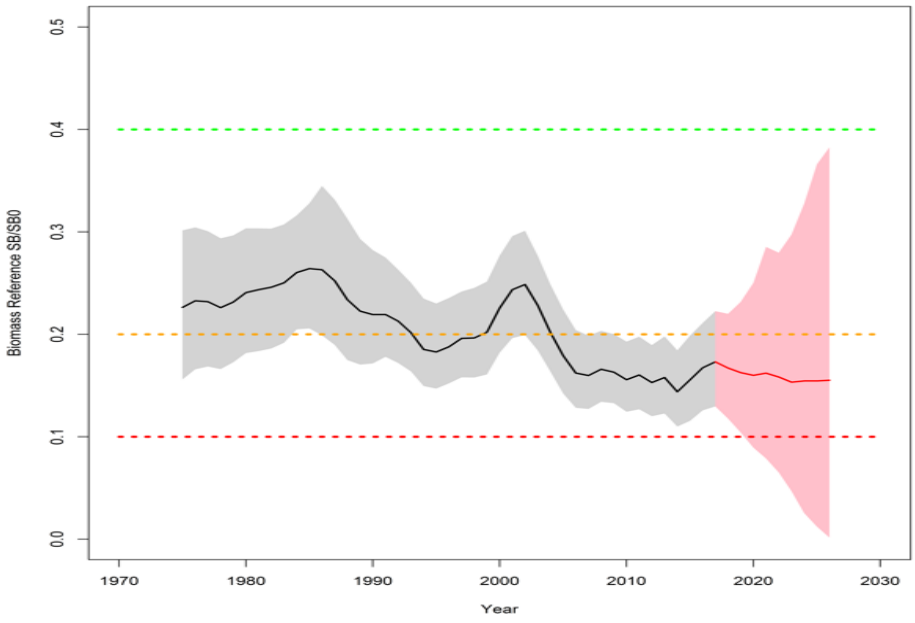


Figure 3. Stock projections from 2018 model.

[13] SINS-WG-2018-18 Langley, A.D (2018) Stock assessment of east coast tarakihi – an update for 2018. 24 April 2018.

4 MANAGEMENT COMPLEXITIES

Disconnect between management areas and stock structure

47. The stock assessment includes four QMAs. However, two of those QMAs are only partially represented in the model: TAR1E (circa 60% of TAR1) and TAR7E (circa 25% of TAR7). TAR1W catches are not included in the model, whilst the TAR7 catches in the model only relate to the eastern Cook Strait.

48. Further to this, the stock structure used in the model combines TAR2 and TAR caught in BPLE into the same region. From a management perspective this is a problem as any changes to TAR2 are being impacted by the difference CPUE trend seen in BPLE (which is part of TAR1E). These areas are managed separately and the combining of these areas scientifically does not address the management differences (Figure 4).

49. The Minister is required to manage at the QMA level. Given this, to make management changes to TAR1 or TAR7 there are three options:

    1. Apply the cut across the whole QMA;

    2. Change to regulations to split the QMAs;

    3. Voluntary catch spreading agreements promoted and enforced by industry.

50. Option 1 would mean applying cuts to areas outside of the stock assessment which is not an equitable approach. Option 2 is not feasible because the timeframes required to achieve a regulatory change mean that this is not possible before the 1 October 2018.

51. Agreement to implementing voluntary catch spreading arrangements put into place by industry has been considered and agreed as part of finalising this industry management strategy.

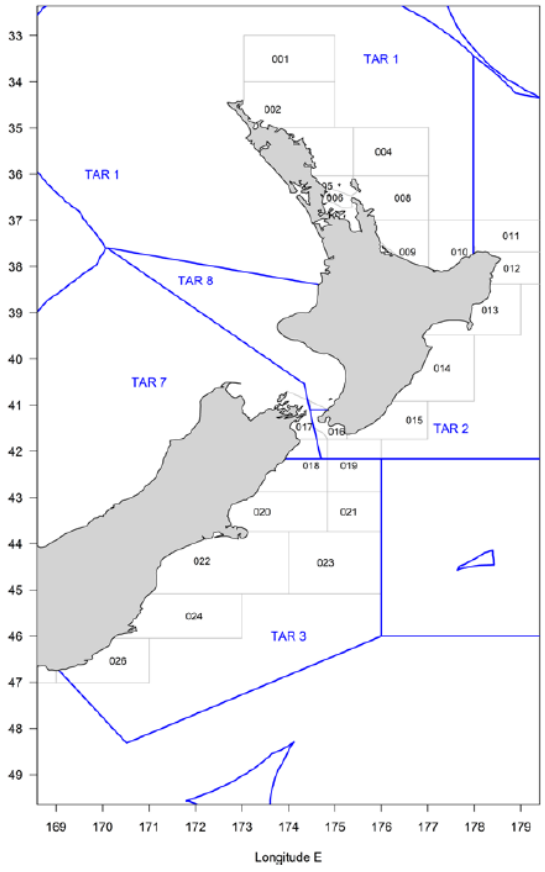
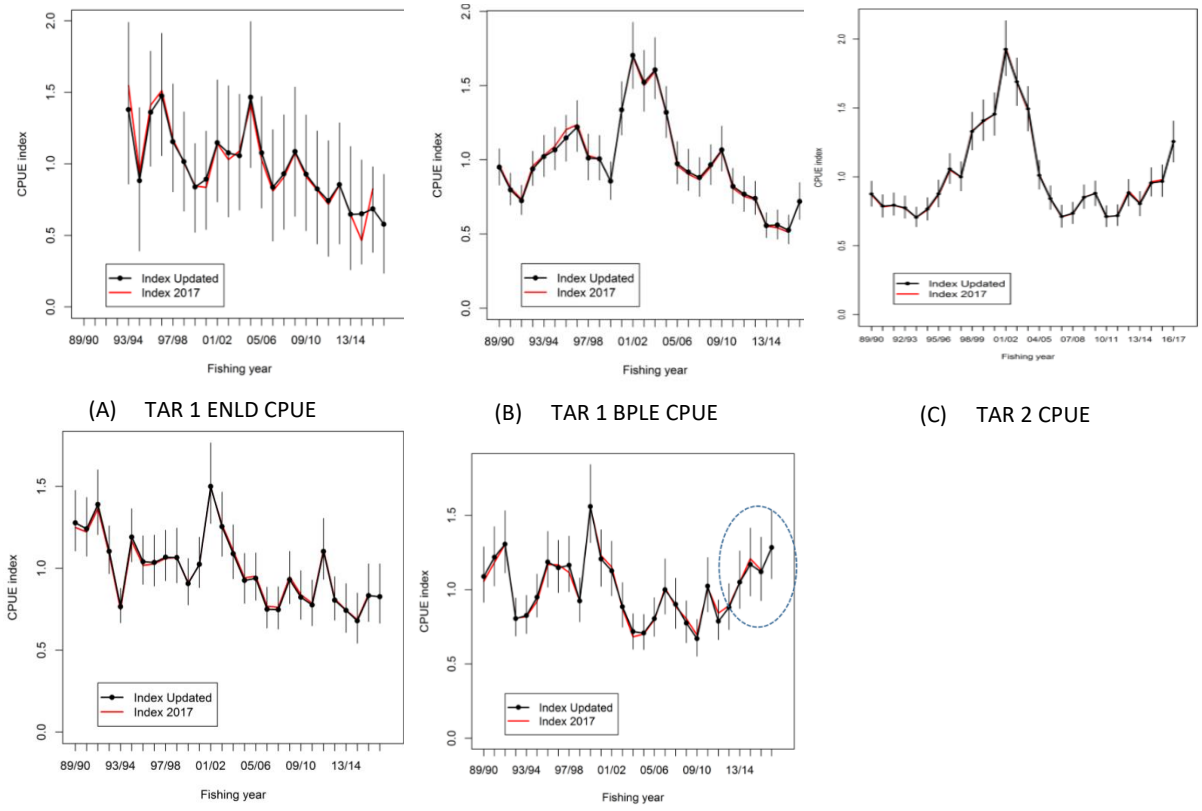


Figure 4. Tarakihi fish-stock areas and Statistical Areas that constitute the domain of the east coast TAR assessment.

CPUE indices demonstrating different regional trends

52. There is no uniform state for the fishery across the QMAs. Each management area displays a different CPUE trend that demonstrates the importance of spatial management to address the disconnect between scientific and management boundaries (Figure 5).



(A) TAR 1 ENLD CPUE (B) TAR 1 BPLE CPUE (C) TAR 2 CPUE

(D) TAR 3 SN CPUE (E) TAR 3 BT CPUE

Figure 5. CPUE trends observed in the TAR stock assessment model.

28N rights

53. When the QMS was first established, quota holders had rights to fish set tonnages of quota rather than a proportion of the TACC. If a sustainability assessment indicated more catch was available, the Government sold more quota on the open market. If a decrease was required, the Government bought quota back from quota holders. However, in the early days of the QMS, it was recognised that several fish stocks required substantial catch reductions. Quota owners were offered compensation for these reductions through tendered buyback – not market rates. Those quota owners who did not accept this option obtained rights under 28N of the Fisheries Act 1983 to fish at the lower level demanded but with the ability of returning their quota to its original limit when/if the fishery recovered. Under that regime, 28N rights holders had preferential access to quota when TACCs were increased.

54. The '28N' rights continue to exist under the QMS today, but the regime has been modified. Quota is now based on proportionality. To allow 28N rights holders to gain additional catch when the TACC is increased (over and above the rights for their exercised quota), quota shares in the fishery are taken from all other quota owners (including iwi) and reallocated to 28N rights holders.

55. The Deed of Settlement was signed in 1992 and was put into effect through the *Treaty of Waitangi (Fisheries Claims) Settlement Act 1992*. However, the *Fisheries Act 1983* was not amended to reflect the settlement obligations, and 28N rights were subsequently carried through into the *Fisheries Act 1996*.

56. Ultimately, this situation means that where a fishery, that has 28N rights within it, has its TACC reduced, then in the absence of any other change, when the fishery recovers and the TACC is subsequently increased, then the 28N rights are invoked and the proportionate share of quota that iwi hold will be reduced. This is a permanent reduction in the proportional share that iwi have in the TACC of that fishery. That is directly contrary to:

    a) the agreement in the Fisheries Settlement, and

    b) furthering the agreements expressed in the Deed of Settlement (see section 3 and 4 of Treaty of Waitangi Claims Settlement Act 1992).

57. This undermines the agreement between the Crown and Māori, that Māori would receive 10% of all stocks in the QMS at the time of the interim fisheries settlement in 1989.

58. In light of the Minister's obligations under section 5(b) of the *Fisheries Act 1996,* and the relationship through other legislation to the Deed of Settlement, the Minister must be advised that, before he makes any decision under the Fisheries Act that will as a consequence trigger 28N rights, all other options to achieve the same effect but not trigger 28N rights should be examined and, wherever possible, used. If the Ministry fails to examine and recommend options that are not contrary to the Settlement, that will obviously have the effect of permanently undermining the Fisheries Settlement. This must be avoided. This issue is relevant for a number of fisheries that are being reviewed as part of the 2018 sustainability round, including TAR2.

59. Where the potential for a breach of the Settlement exists because of 28N rights exists, Te Ohu Kaimoana's position is that the Ministry has the responsibility to examine and wherever possible pursue strategies to ensure there is no breach or erosion of the Settlement.

60. Taking all these complexities together a disciplined and well-implemented voluntary strategy provides the optimal set of mechanisms for the east coast tarakihi fishery.

Socio-economic factors

61. East coast tarakihi is a very important component of inshore fisheries and is predominantly caught as part of a mixed species fishery. Management measures affecting TAR need to reflect the interdependent effects that any cut in catch will have on the ability of fishers to then catch other species.

62. 90% of TAR is domestically sold, forming an important part of the domestic market. This domestic market identifies that socio-economic factors need to reflect not just the direct impacts on the fishing industry but also the flow on effects to the wider seafood sector within New Zealand.

63. Commercial catch varies but all stocks are well utilised with no significant or consistent under-catch.

5 MANAGEMENT STRATEGY

Overview

64. The management strategy:

- aligns with the requirements of the Act and is not inconsistent with the HSS guideline
- acknowledges that industry needs to take action to address the outcomes of the 2017/18 Stock Assessment
- recognises that any action should reflect the complexity of the model and the associated scientific uncertainties
- will, given the associated complexities, require a combination or regulatory and non-regulatory measures that are implemented in an innovative, collaborative manner to achieve an optimal response
- must be cognisant of the history of the fishery and reflect the socio-economic importance of the east coast TAR fishery
- will provide for an iterative process of collecting more information to better inform the next TAR stock assessment. This is consistent with the HSS which states that "Targets will be set by fisheries managers based on estimates of MSY-compatible reference points, but modified by relevant factors"

Aim

65. To improve the stock status and move it towards real world B_{MSY} before the next TAR stock assessment, while iteratively collecting more information to better inform the next TAR stock assessment.

66. This management strategy is a commitment to enabling the best-informed fisheries management decisions whilst moving the stock towards B_{MSY} in line with the requirements of the Fisheries Act.

Objectives

67. The management strategy objectives are to:

a. Increase the east coast TAR biomass by at least 12% by the next stock assessment (and in doing so increase the stock status to circa 20 % B0 within three years); and

b. Improve the knowledge about the stock to reduce uncertainties, fine tune management measures to ensure their effectiveness and allow more informed management decisions in future.

68. The management strategy objectives would be achieved through implementation of an innovative suite of management and research measures to inform subsequent fishery management decisions.

69. We emphasise that the trajectory of the proposed rebuild is subject to the MSE results; this will be completed next year, and shelving increases our flexibility to react to these results.

Management Strategy Target 1 and 2

70. The management strategy timeline of three years is considered an appropriate management period in order to align with the next scheduled east coast TAR stock assessment in 2020/21. Three years allows for additional science to be collected to inform the next stock assessment and address the uncertainties outlined in Section 3.

71. Table 1 demonstrates how the management strategy target reverses the current stock trajectory and turns this into a positive trajectory that is moving towards B_{MSY} compared to the status quo (Table 2). The projections have been provided in the context of both percentage biomass increases compared to the 2016/2017 level and the projected stock status in 2020/21.

Table 1. Model outputs based on a 20% catch reduction from the projected 2018/19 catch levels.

Project Year	1	2	3
Model Year	Year 1	Year 2	Year 3
Fishing year	2018/19	2019/20	2020/21
Probability of being above 10% SB_0 ($SB>10\%SB_0$)	0.986	0.978	0.978
Probability of being above 20% SB_0 ($SB>20\%SB_0$)	0.202	0.291	0.406
SB_ratio Median SB/SB_0	0.171	0.177	0.187
Delta SB_ratio (Yr[x]/Yr[2018])	1.024	1.060	1.120

Table 2. Status quo without any catch reductions – continuation of 100%**.**

Project Year	1	2	3
Model Year	Year 1	Year 2	Year 3
Fishing year	2018/19	2019/20	2020/21
Probability of being above 10% SB_0 ($SB>10\%SB_0$)	0.971	0.928	0.882
Probability of being above 20% SB_0 ($SB>20\%SB_0$)	0.141	0.174	0.217
SB_ratio Median SB/SB_0	0.162	0.157	0.155
Delta SB_ratio (Yr[x]/Yr[2018])	0.970	0.940	0.928

6 PROPOSED MANAGEMENT MEASURES

72. Confirmation of agreed management measures is required as part of the management strategy development and agreement between industry and government.

Voluntary reductions in catch

73. Voluntary reductions in catch are proposed as part of the management strategy reflecting the results of the recent stock assessment and associated projections, whilst recognising the scientific uncertainty associated with the assessment and the socio-economic considerations required by the Act.

74. The mechanism proposed to implement the voluntary catch reductions from 1 October 2018 is through formal voluntary shelving to achieve an overall *c*. 20% B_0 of overall East Tarakihi in order to increase the east coast TAR biomass by 12% biomass by the next stock assessment.

75. Fisheries Inshore New Zealand, Southern Inshore and Te Ohu Kaimoana consider that shelving of ACE is a viable way of reducing the commercial catch and that the Minister of Fisheries is obliged to take this into account in accordance with the provisions of s 11(1)(a). If the Minister is satisfied that the approach will adequately mitigate a risk to sustainability, there is no legislative obligation to choose from the list of statutory sustainability measures set out is s 11(3) and apply any additional measures. This would also mean that the Minister would not be directed to either s 13 or 14 in order to vary a TAC for one or more stocks.

76. Shelving ACE provides potential to respond to fisheries management challenges in real time, improve buy-in to management measures from quota owners and address short term changes in abundance, without placing Settlement and quota assets at risk. In many instances it is a superior tool to the blunt approach of reducing TACs and TACCs, because its effectiveness is enhanced through being part of a fine-scale management package.

77. Acknowledging the complexity of different management areas and the differing CPUE trends and observations of these fisheries, a differential voluntary catch reduction is proposed (that would be equivalent to an overall 25% TACC reduction) to achieve the management target. The differential cuts agreed by industry are:

	Current TACC	Current 'TACC' in EASTERN *	Current catch in east	Reduction from 2018/19 projected catch levels**	% Eastern ACE to be shelved to achieve catch reduction in East	New catch limit in EASTERN	Catch Limit in WESTERN	New Total ACE available to industry	ACE to be shelved
TAR1	1,447	868	740	30%	40%	518	579	1,097	350
TAR2	1,796	1,796	1,796[6]	16%	16%	1,500	0	1,500	296
TAR3	1,403	1,403	1,287	19%	26%	1,040	0	1,040	363
TAR7	1,088	225	225	20%	20%	179	863	1,042	46
TOTAL	5,734	4,292	4,047	20%	25%	3,237	1,442	4,679	1,055

* For TAR1 and TAR7, the last three years of catch data indicate that 60% (TAR1) and 20% (TAR7) of catch respectively was taken on the east coast and have been used to denote the TACC for these areas.

** Based on 2016/17 catch levels.

78. Based on the above differential figures the following percentages of ACE holdings (based on the quota held at 30 September 2018) will be transferred to FishServe's Client Number (9790642):

- TAR1: 24.2% of ACE holdings
- TAR2: 16% of ACE holdings
- TAR3: 26% of ACE holdings
- TAR7: 4.1% of ACE holding.

Catch spreading

79. To address management complexities around TAR1E and TAR1W, and TAR7 eastern Cook Strait, industry is proposing to advance voluntary catch spreading measures. This will allow catches to be reduced in the areas covered by the assessment whilst not adversely affecting those areas not incorporated into the stock assessment. Precedent exists for industry to conduct catch spreading agreements.

80. The details of the catch spreading arrangements are:

	Total ACE 2017/18[7]	Total ACE available after shelving	Total Eastern ACE available	Total Western ACE available
TAR1	1,447	1,097	518	579
TAR7	1,088	1,043	179	864

81. Industry will operate a mechanism whereby every TAR1 quota owner would shelve 24.2% of their ACE into FishServe, and FishServe will then apportion the remainder so that 52.78% is TAR1W ACE and 47.22% is TAR1E ACE. For TAR7, every quota owner would shelve 4.1% of their ACE into FishServe, and FishServe will then apportion the remainder so that 82.84% is TAR7W ACE and 17.16% is TAR7E ACE. Industry will then either use or sell their ACE in each eastern or western side of the QMA as suits their operation.

82. The boundaries for the east West Splits are:

    TAR1: The TAR1 Eastern Area is the eastern area of the TAR1 QMA that overlaps with FMA1. The TAR1 Western Area is the western area of the TAR1 QMA that overlaps with FMA9.

    TAR7: The TAR7 Eastern Area is that part of TAR7 that is east of a line from Kapiti Island to the the northern point of the Brothers Islands enclosing the remaining eastern portion of the TAR7 QMA bordering TAR3 and TAR2 QMAs. The TAR7 Western Area is the remaining part of TAR7.

83. For the 2018/19 Fishing Year, FINZ will contract FishServe to monitor TAR1E / TAR1W and TAR7E / TAR7W catches against the East / West catch limits. This includes recording and balancing catch with ACE and reporting to FINZ who in turn will report performance to the Fisheries New Zealand. The mechanism will develop over time and become increasingly efficient and automated following the introduction and utilisation of ER data.

Deemed Value Review

84. Reflecting the fact that catch will have been voluntary reduced, it will be necessary to conduct a deemed value review. The aim of this review will be to provide a deemed value system that appropriately reflects the changes in the available catch after shelving and take into account:

    - the need to incentivise accurate recording of catches and disposals so as to better inform the model
    - the increased difficulty for fishers to avoid TAR, especially in areas where the CPUE is increasing
    - the potential constraints on ACE availability
    - the need to act as a deterrent to over-catch of the new voluntary catch limits

85. Industry propose retaining the current interim and annual deemed values, but to commence increasing the ramping earlier so that it applies at 110% of ACE holding for all stocks, to the current maximum deemed value of $5.75.

		Deemed value rates		
		Interim	100-110%	>110
TAR1	Current	1.50	3.00	4.00
	Proposed	1.50	3.00	5.75
TAR2	Current	2.48	2.75	4.25
	Proposed	2.48	2.75	5.75
TAR7	Current	1.25	2.50	4.00
	Proposed	1.25	2.50	5.75
TAR 3	Current	0.55	1.09	5.75
	Proposed	0.55	1.09	5.75

Improved selectivity measures including voluntary closed areas

86. To address the uncertainty around recruitment, industry is committed to improving selectivity measures including using temporary voluntary closures to reduce the levels of juvenile TAR caught. The appropriate areas for temporary voluntary closures to protect juvenile TAR will be determined through information provided by the proposed research project below.

87. Work has already begun discussing the initiatives required to minimise impact on juvenile TAR and the most appropriate approach to achieve this in each of the QMAs. These measures will be developed and ready for implementation from 1 October 2018.

Recording of undersize TAR

88. Industry is proposing to collect additional data on catches of sub-legal TAR to "*enable an evaluation of the sensitivity of the model results to this source of mortality."* This is an important data source to address the key uncertainty about recruitment in the next stock assessment. The FAR acknowledges that *"There is anecdotal evidence that the trawl fisheries off the east coast of the South Island may catch substantial quantities of tarakihi below the Minimum Legal Size (MLS) of 25 cm (F.L.). These catches are discarded* [as legally required] *and their magnitude has not been quantified. Thus, no information was available to explicitly account for this additional source of mortality in the assessment models."*

89. Voluntary reporting of sub-legal fish will provide data on a portion of the fishery that the model currently does not account for and has had to assume is constant over time. The preliminary analysis conducted at industry's request demonstrates this has not been constant.

90. If large catches of small TAR are recorded, it will identify the need for improved management to reduce the levels of this undersize catch. The location of small juveniles would be an additional data source to address uncertainty around connectivity.

91. Industry is committed is to a desk-based study to analyse this data further building on the preliminary work contracted by industry.

Review of the MLS for TAR

92. A review of the MLS is proposed to determine why it is not currently in line with the size at first maturity. There appears to be a disconnect between the two and the historical rationale for this is not clear. This would need to be assessed and the impacts of such a change would need to be analysed and discussed as part of this review.

93. Industry proposes that a Discard Working Group be convened to review the impacts of any MLS change to TAR.

7 PROPOSED RESEARCH PROJECTS

94. These research projects will collect further data to address the scientific uncertainties identified in Section 3. They align with the scheduled 2020/21 stock assessment and will be completed in time to inform that assessment.

95. The ***primary research projects*** are those industry has identified as key components of this management strategy. The ***supplementary research projects*** are projects that can provide useful information on the east coast TAR but are not necessary within the next three-year period before the next stock assessment.

Primary research projects

Management Strategy Evaluation (MSE)

96. The MSE is a simulation analysis using outputs from the stock assessment to determine the real world B_{MSY}. It is anticipated that the preliminary development of an MSE for TAR can be done in a relatively short timeframe and is a priority research action for the management strategy.

97. The results of this work will then be used as the B_{MSY} target for the next stock assessment to determine where the stock is in relation to the management target. Industry has identified this as a priority piece of research—this research aims to address uncertainty about B_{MSY} for east coast TAR.

TAR genetic research (information provided by Victoria University)

98. The overall objective of the work is to use genetic markers to determine New Zealand tarakihi stock structure. Specific details of this project are provided in Section 9. This research will provide information to prove or disprove the current stock assessment hypothesis regarding the connectivity of east coast TAR (see Section 9).

99. The project is in two phases in line with the specific objectives:

    1. determine the mitochondrial DNA (mtDNA) sequence using DNA from a broad range of tarakihi samples and conduct a “first look” test of stock structure; and subsequently
    2. determine the whole genome sequences of a range of tarakihi samples and based on the results of the mtDNA study, conduct a high-resolution test of the stock structure.

100. Additional funding for this work will increase the sample size that can be used and increase the statistical rigour of results. Industry have identified this as a priority piece of research and would, as part of the management strategy, identify funding options to assist scientists in achieving a higher level of statistical rigour i.e. provide funding for more samples.

ECSI trawl survey

101. Industry is committed to the ongoing ECSI trawl survey. The ECSI survey provides a valuable time series of data that informs the stock assessment model.

Catch sampling

102. Industry is committed to a cost effective, representative catch sampling project. It is acknowledged that the catch sampling provides a valuable data source to the assessment model. Industry will be actively engaged to work collaboratively with research providers to ensure representative sampling is achieved. This will thereby deal with the areas of concerns raised around the previous catch sampling project.

103. It is important to recognise that with this second round of representative catch sampling for eastern tarakihi will be done at the same time as the first round of catch sampling for west coast tarakihi. This and the genetic work above could provide very valuable answers as to whether there are two separate tarakihi stocks (east and west), two tarakihi stocks (east and west) that are largely separate but have some mixing, two tarakihi stocks (east and west) that are somewhat interdependent with significant mixing or one national tarakihi stock. The answer to this will have significant management implications

for all tarakihi stocks. The uncertainty without this information is another reason to take cautionary action at this time.

Improve CPUE analysis

104. Engagement with industry highlighted to both scientists and managers that there is a disconnect between the CPUE analysis used in the stock assessment and the nature of the fishery. There have been some subtle changes in the fishery that need to be better understood. To achieve this, a research project is required for scientists to engage with fishers and identify the data fields that are currently not collected that would better inform CPUE analysis. For those fields already collected, it will provide assurances that the correct information is being collected and analysed. This work will ensure that the CPUE used in the upcoming TAR assessment (2020/21) has accounted for the uncertainties outlined Section 3 of this paper.

Analysis of undersize TAR catches

105. In conjunction with the recording of undersize catch, a research project is proposed that will assess the location and scale of undersize TAR catches as well as investigate temporal changes to provide data that is potentially beneficial in identifying recruitment pulses in the fishery. The proposed research will provide detailed analysis of the latest trawl survey data. This will include the ECSI trawl survey and potentially incorporate data from the INT2018-03 research proposal (if this project proceeds). The proposed WCNI survey may be used to provide supplementary data. This work has been identified to address the uncertainties raised in Section 3 of this paper.

Supplementary research projects

Otolith chemistry (information provided by NIWA)

106. This is supplementary project that would complement the genetics research previously outlined above. The work investigates a subset of the fish being using to assess the genetics of New Zealand tarakihi (collaboration with Peter Ritchie, Yvan Papa, Alex Halliwell; Victoria University of Wellington), supported by the current Bottlenecks programme. The intention being, where possible, to use the same individual fish for both the otolith and genetics research, as this will increase the collective power of the work.

107. The project is looking at the elemental chemistry of these fish otoliths and for TAR has two research objectives:

    1. To assess the otolith chemistry of the inner part of the adult fish otolith, which represents that part of the otolith laid down during their small juvenile life phase. If we can identify distinct separate groups of fish, this may in turn represent fish produced in different natal nursery areas. By looking at how these proportions vary around New Zealand, it may give us an idea of what putative nurseries are linked to what regions. It does not tell us what/where those nurseries are, but it does give us a better handle on likely stock structure; and this also helps us in later going out to physically find and map out those nurseries.

    2. To look at the environmental history of adult fish, by quantifying how the elemental chemistry varies from the centre out to the edge of otoliths, which is effectively a time series, 'time-stamped' using annual growth rings. Here we are looking for evidence of distinct separate groups of fish making large scale seasonal spawning (or other time scale) migrations each year, where these large spatial movements are likely to pass through areas with different background environmental chemistries and be 'captured' as such in the otolith elemental records.

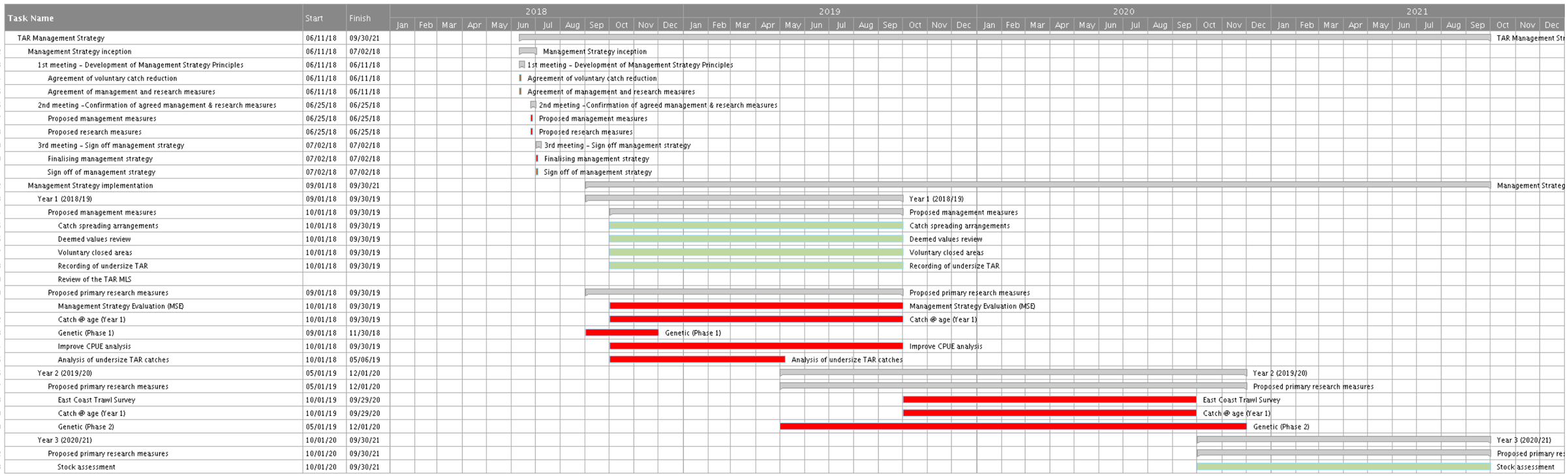
Trawl Gear Selectivity Modelling project (information provided by NIWA)

108. This is a supplementary project that would complement the genetics research previously outlined above. This would be a TAR-focussed project that is part of a wider collaboration between NIWA and SINTEF to use SINTEF software tools and expertise to develop predictive models of trawl cod-end selectivity for New Zealand species to help inform commercial fishing practices and management decisions. This work has been identified to address the uncertainties raised in Section 3 of this paper.

8 MANAGEMENT STRATEGY IMPLEMENTATION TIMEFRAME

The timeline outlines the process required to reach an agreement management strategy including determining that most effective management and research measures to achieve the management strategy target.

	Task Name	Start	Finish
1	TAR Management Strategy	06/11/18	09/30/21
2	Management Strategy inception	06/11/18	07/02/18
3	1st meeting – Development of Management Strategy Principles	06/11/18	06/11/18
4	Agreement of voluntary catch reduction	06/11/18	06/11/18
5	Agreement of management and research measures	06/11/18	06/11/18
6	2nd meeting –Confirmation of agreed management & research measures	06/25/18	06/25/18
7	Proposed management measures	06/25/18	06/25/18
8	Proposed research measures	06/25/18	06/25/18
9	3rd meeting – Sign off management strategy	07/02/18	07/02/18
10	Finalising management strategy	07/02/18	07/02/18
11	Sign off of management strategy	07/02/18	07/02/18
12	Management Strategy implementation	09/01/18	09/30/21
13	Year 1 (2018/19)	09/01/18	09/30/19
14	Proposed management measures	10/01/18	09/30/19
15	Catch spreading arrangements	10/01/18	09/30/19
16	Deemed values review	10/01/18	09/30/19
17	Voluntary closed areas	10/01/18	09/30/19
18	Recording of undersize TAR	10/01/18	09/30/19
19	Review of the TAR MLS		
20	Proposed primary research measures	09/01/18	09/30/19
21	Management Strategy Evaluation (MSE)	10/01/18	09/30/19
22	Catch @ age (Year 1)	10/01/18	09/30/19
23	Genetic (Phase 1)	09/01/18	11/30/18
24	Improve CPUE analysis	10/01/18	09/30/19
25	Analysis of undersize TAR catches	10/01/18	05/06/19
26	Year 2 (2019/20)	05/01/19	12/01/20
27	Proposed primary research measures	05/01/19	12/01/20
28	East Coast Trawl Survey	10/01/19	09/29/20
29	Catch @ age (Year 1)	10/01/19	09/29/20
30	Genetic (Phase 2)	05/01/19	12/01/20
31	Year 3 (2020/21)	10/01/20	09/30/21
32	Proposed primary research measures	10/01/20	09/30/21
33	Stock assessment	10/01/20	09/30/21



9 APPENDICES

Genetic analysis of New Zealand tarakihi: Testing the stock structure model ((Information provided by Victoria University)

Project supervisor: Associate Professor Dr. Peter Ritchie (E-mail: Peter.Ritchie@vuw.ac.nz)
PhD Student: Yvan Papa (E-mail: Yvan.Papa@vuw.ac.nz) MSc student: Alex Halliwell

Overall objective: Use genetic markers to determine New Zealand tarakihi stock structure

Specific objectives:

1) Determine the mitochondrial DNA (mtDNA) sequence using DNA from a broad range of tarakihi samples and conduct a "first look" test of stock structure
2) Determine the whole genome sequences of a range of tarakihi samples and based on the results of the mtDNA study, conduct a high-resolution test of the stock structure

Project 1 Mitochondrial DNA (low resolution) small genome analysis – MSc

Preliminary results: 1 September 2018 *Completion date: 1 November 2018*

This study will provide a low-resolution test of the tarakihi stock hypotheses and we expect a preliminary assessment of the genetic data by the end of 2018. Mitochondrial DNA is a genetic sample of the small genome in animal cells. This marker is used to conduct a 'first look" type study, which enables hypotheses about stock structure to be rapidly tested. A finding of genetic difference between two populations is usually strong evidence for a lack of successful migration and reproduction between two areas. If no genetic difference is detected it could mean that higher resolution markers are required to find the difference. An important component of testing for genetic differences is to have samples analysed from a broad range of locations, which enable us to define a reference point for the geographic scale that a genetic difference can be detected. We have 1300 samples of NZ tarakihi, but our current funding limits us to analyzing 400 specimens. This constraint reduces our ability to properly test all of the locations implicated in the stock model and obtain the requirement broad-scale reference points to "calibrate" the data analysis.

Constraint: Funding limited to analyzing 400 specimens which restricts the statistical power of the method. To satisfy the statistical requirements an additional $12,500 (approximately) would be needed to complete the DNA sequencing of the 1,300 samples.

Project 2 Full genome (high resolution) analysis – PhD

Preliminary results: mid-2019 *Completion date: 1 December 2020*

The second study will use the high-resolution approach of whole-genome sequencing (WGS) to target a massive number of genetic markers across the genome. This method allows the detection of stock structure that could be missed with the single-marker method of mtDNA.

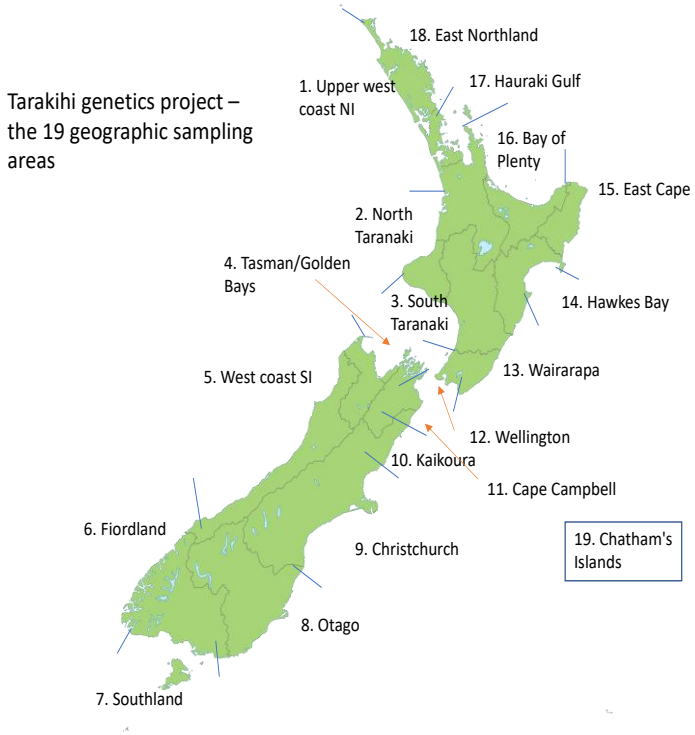
With a comprehensive sample size, the WGS has the potential to provide a definitive answer about the genetic stock structure of tarakihi. The key to the success is being able to collect data from a broad range of samples and wide geographical coverage. With our current funding we will only be able to analysis 230 of the 1300 samples that we have available. An additional $60,000 of funding would enable us to considerably increase the statistical power. This would reduce the risk of underestimating the levels of genetic variability and avoid sub-sampling bias and the potential for false positive findings. This increase in the statistical confidence would transform our study into a robust genetic-based test of the fish stock model.

Constraint: Current funding restricts us to analysing 230 samples and hence limits the statistical power and level of confidence in findings. Additional $60,000 of funding would double sample size and enable a proper test of the model.

The work currently underway is funded by a VUW Doctoral Scholarship to Yvan Papa; combined with a sub-contract from NIWA, as part of the MBIE Endeavour Fund Research Programme "Juvenile Fish Habitat Bottlenecks' (CO1X1618). This research is being conducted in collaboration with Dr. Mark Morrison (NIWA) and Dr. Maren Wellenreuther (Plant and Food Research).

Supplemental information: Sample Collections Available

Tissue samples from more than 1300 specimens from 19 areas, including spawning grounds, have already been collected (see sampling area map below).



19 areas where tarakihi have been sampled between November 2017 and March 2018 (60 fish/area).

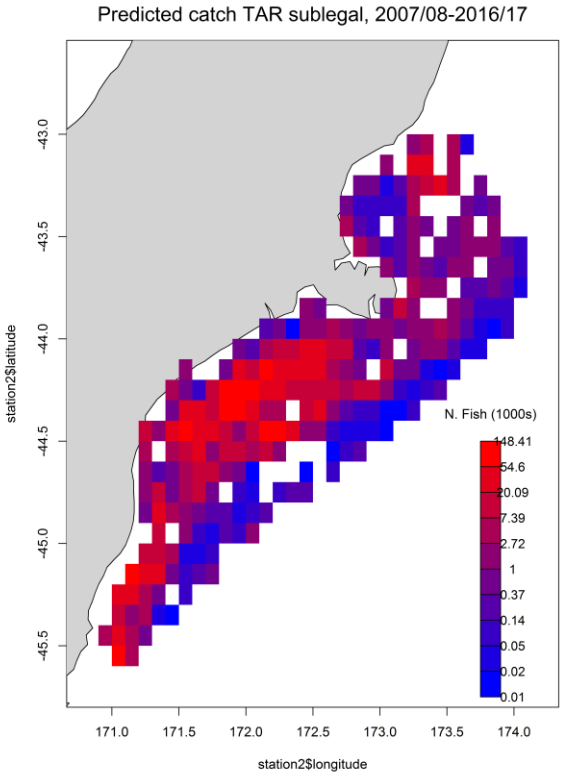
Three of these areas (East Cape, Cape Campbell and West Coast SI) have been sampled for 60 additional fish during the spawning season.

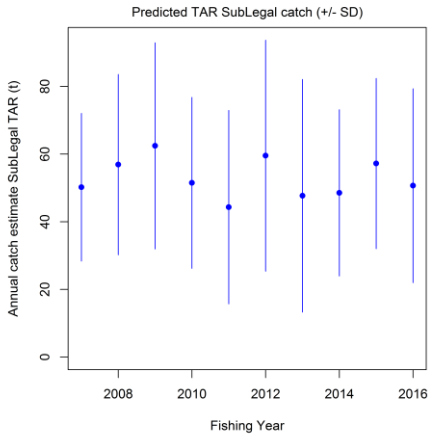
Additional samples include 40 King tarakihi from 3 Kings Islands and 60 tarakihi from Australian waters.

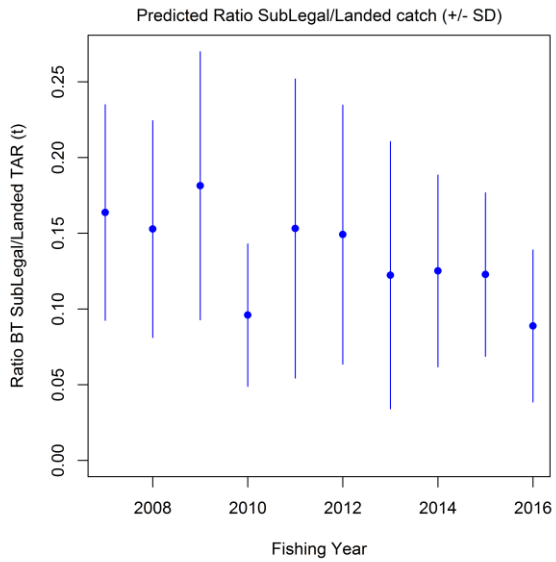
Preliminary analysis of sublegal TAR catches (Canterbury Bight – Pegasus Bay)

Summary

- ECSI Kaharoa trawl stations with (and without) associated TAR length frequency data. All surveys combined (to 2014) (N stations = 1547, Nfish = 158,385).
- For each trawl station derive TAR LF.
- Apply 100 mm trawl selectivity to LF (=vulnerable to commercial gear).
- Truncate length frequency at 25 cm (F.L.) = sublegal fish.
- Derive sublegal TAR density (number of fish) for each trawl (sum of fish divided by area swept).
- Determine average distribution of sublegal fish using (ordinary) Kriging approach (combined over surveys, years, seasons).







Acknowledgement of uncertainties in provisional work

- Range of assumptions required for analysis.
- Does not account for variation in distribution and relative abundance amongst years (variable recruitment).
- Assumption of trawl selectivity (100 mm mesh).
- Reliability of Kriging approach – further evaluation required.
- Trawl records are based on start location only.
- Uncertainty is under-estimated but is still high – catch estimates are poorly determined.
- Highlights main areas of highest sub-MLS catches. Fishing appears to be low in the areas of highest abundance.
- Suggests moderate catch of sub-MLS TAR, although indicates that catches are not excessively high.

Trawl Gear Selectivity Modelling project (information provided by NIWA)

Overall Project Aim
Collaborate with SINTEF to use their software tools and expertise to develop predictive models of trawl codend selectivity for New Zealand species to help inform commercial fishing practices and management decisions. We aim to be able to give predicted selectivity information over a range of codend mesh sizes and shapes: from 100 – 200mm (cover 4 – 6") for diamond, T90 and square orientated mesh.

Current funding sources: MBIE Catalyst Seeding Fund (until Feb 2019), and NIWA Core Fisheries programme (until June 2019).

Project leaders: Ian Tuck & Emma Jones, NIWA

Progress to date
In 2017 we sponsored a visit by overseas fisheries selectivity expert to come to NZ for the ICES meeting, and to help set up and run the first set of trials.

Co-funded with MPI a 9-day charter onboard 11.5m vessel in Hawkes Bay. Used vessel's standard net with a 5' diamond mesh codend with and without a small mesh liner. Completed up to 4 tows a day, aiming for 2 pairs, although not all tows were paired. Completed 24 tows, 9 sets of paired tows and 6 unpaired tows. Collected length frequency data for selectivity analysis and morphometric data for 3 species: snapper, red gurnard and English sole.

Proposed work for 2018/2019

Planned return visit to SINTEF to complete data analysis and develop the models in May 2018 and attend ICES FTFB meeting in early June

Propose a second round of data collection to add 2–3 species for which we can develop models sometime between July 2018 and Feb 2019.

Allowing a minimum of 3 days per species for morphometric data collection, so suggest would need 4–9 days of vessel time depending on resources available.

Funding provided
NIWA propose to cover the costs of providing science staff and specialized equipment to collect these data. In addition to this, NIWA have already and will continue to support the cost of data analysis, provision of reports and presentation of results to Industry forums, and if desired, development of an interactive tool that could be made available on a website to easily demonstrate the effect on selectivity of changing mesh sizes / shapes (as discussed).

Funding requested:
We request in-kind funding and support to enable the charter of a vessel for up to 9 days to collect morphometric and selectivity data for 2-3 species as per Option 1 (see below).

The size of vessel and scope of work can be determined in consultation with Talley's / Southern Inshore Fisheries Management / FINZ. Species already discussed include tarakihi, elephant fish and red cod. Ideally, we would need to use a vessel fishing in an area where all the target species occur across the relevant size range – this may be a challenge and we will need to be guided by your knowledge on this. We have operated successfully on an 11m **day** boat in Hawkes Bay, but this was absolute minimum size.

Commercial vessel chartered with in-kind Industry support

Data collection: Agree target species and a fishing ground where we can catch a suitable mix of the target species.

Carry out paired selectivity tows (i.e. 2 tows fished side-by-side) using a 5" diamond or other Industry-specified configuration codend with and without a small mesh liner. Tows likely to be shorter than standard commercial tows, e.g. 1.5 – 2 hrs. This enables more pairs to be achieved per day for the selectivity data.

After each haul, sort catch and collect length frequency data for target species. Sub-sample of fish held in an onboard tank to keep alive for morphometric data collection using the fall-though mesh templates for those target species. Samples need to include the entire relevant size range, ie including small fish that we know will pass through the smallest mesh size, and large fish that would have 100% retention even in the largest mesh size. Eg for snapper, we collected fish from 13/14/15cm up to 40+cm.

Processing and fate of catch: the vessel would need a special permit to use the small mesh liner. Sub-legal fish would be disposed of at sea asper the permit requirements. Legal fish would be landed against the vessel's quota and sold. Would need to agree whether profit from fish sales are subtracted from the agreed charter fee, or charter fee reflects that the catch is being sold in addition.

Staffing: we would need a minimum of 2, ideally 3 scientists onboard. 1 to collect length frequency data and 2 to collect morphometric data. On our previous charter we also had the help of a crew member to form a second team of 2 people to collect l-f and morphometric data.

Space: would require an area, preferably under some sort of cover to set up mesh templates and collect those data. Templates are approx. 50 x 60cm in size and we would need to install a table/frame into a space where they can be used. Ideally this would be close to a holding tank big enough to maintain 10 – 15 fish alive at a time. Also space for someone with a measuring board to collect LFs.

ANNEX 2 HAWKES BAY GEAR TRIALS HISTORICAL PAPERS


Nancy Glen April Trials Report.pdf


2013 Net Trials Report October 2013.

Objective

The objective of a Gear Innovation Pathway is to facilitate industry innovation that will add value and productivity to NZ fisheries. The Gear Innovation Pathway is a conduit to promote and support gear development that has benefits that may be seen at either a regional or national level.

An overarching Gear Innovation Pathway will provide a defined process and framework that enables fishers to initially develop innovative ideas and then provides the opportunity for fishers to benefit from industry support, technical and scientific expertise as these ideas are developed.

Research Themes

It is proposed that the scope of the gear innovation pathway will be restricted to 4 key research themes. The research themes include – vessel and gear efficiencies (i.e. reduced operating costs such as reduced fuel consumption), selectivity, benthic impacts and non-fish protected species interactions.

Research Process

The standard format for the innovation pathway is to utilise a framework that has three distinct phases. The staged approach is being proposed to ensure that the most up to date information is available at each stage of the research development. It also ensures that at each stage of the research that there is technical input to ensure scientific rigour through the process.

- Phase 1: Idea submission
  - Fishers / LFRs and industry groups identify a gear innovation idea that they would like to investigate and submits the idea for review by the technical expertise group.
  - The technical expertise group reviews the proof of concept idea and provides support and funding for the idea to be developed as a proof of concept. Appropriate guidelines for pursuing an idea and the reporting requirements for a proof of idea concept will be developed by the technical expertise group.

- Phase 2: Proof of concept/prototype testing
  - Successful ideas from Phase 1 will test the proof of concept, utilising information provided by the technical expertise group.
  - Results from Phase 2 will be presented to the technical expertise group. If successful following a review of results the idea will then get further funding to develop it further.
  - Following agreement to pursue an idea the project will be subject to a defined project plan and associated reporting requirements and deliverables.

- Phase 3: Development stage
  - Where successful the proof of concept from Phase 2 will be developed into a working prototype will be produced for further testing. This Phase will be subject to increased levels of scientific rigour.
  - Phase 3 will be subject to a defined project plan and associated reporting requirements and deliverables.

The staged approach encompasses key stop/go assessments review the outputs from the previous phase/phases and address the following before proceeding to the next phase of the work stream;

- Based on the outputs from the previous phases the feasibility of continuing onto the next phase?
- Based on the previous phases are there any modifications required to the upcoming phase? If so what are the cost/benefit of these to the proposed changes?
- Review of the upcoming budget and project implementation plan taking into account the findings from the previous phase/s.

The stop/go assessment approach ensures continuous review and monitoring of the project, whilst allowing for proactive engagement and adjustment of the budgets and implementation plans for the project work streams.

Governance and management framework

A governance and funding structure would clearly define the management structure to enable gear innovation at a local / regional level that can benefit from a national framework providing expertise, support and funding as appropriate.

A technical expertise group will be created that consists of industry representatives e.g. CSOs, industry gear experts, independent gear experts and government representatives. CSOs are intended to be a conduit for local fishers to engage with this project. The technical expertise group would be responsible for;

- Reviewing Phase 1 idea submissions and providing recommendations for those projects that pass the Stop/Go assessment to the Phase 2 work.
- Reviewing Phase 2 work and providing the requirements for Phase 2, this includes the data requirements and the level of reporting required to provide adequate scientific rigour to the project.
- Following a Stop/Go assessment of Phase 2 set the project requirements for innovation projects that receive funding for Phase 3.

An administrative group would be set up that would be responsible for supporting applicants through the process and for providing support to the technical expertise group. This group would also manage the budgets and monitor milestone reporting requirements.

Proposed funding model

The initial focus will be on developing industry funding that can be used alongside SIL funding. Additional funding streams will be investigated including Primary Growth Partnerships.

The proposed funding model to facilitate innovation is that there will be limits to the funding available at each Phase of the Innovation pathway and that specific guidelines will be developed to determine the requirements for innovators to get access to funding through this process. These requirements will be related to key performance indicators and reporting milestones.

Not all projects will receive proof of concept funding and successful projects will be dependent on the stop/go assessment process. Projects will be reviewed based on the guidelines and principles developed as part of the overarching governance and structure of the Gear Innovation Pathway.

Indicative funding requirements are envisaged to be;

- Phase 1 – no funding available. Ideas to be developed by innovators and presented to the technical expertise group using a template outlining the idea.
- Phase 2 – funding of a maximum of 5k per approved idea provided to innovators to develop the idea. Assistance will be provided at the end of the phase 2 to facilitate the submission of a brief proof of concept document. The funding model will facilitate 20 proof of concept ideas to be submitted within 1 year (maximum of 100k spent on proof of concept).
- Phase 3 – funding of a maximum of 20K per approved Phase 2 project. The funding model will facilitate 5 proof of concept ideas to be submitted within 1 year (maximum of 100k spent on Phase 3 projects).

It is anticipated that there will be a 25% migration rate from Phase 2 to Phase 3.

Anticipated timeframes

- The intention is to have the innovative pathway developed for the middle of 2018.
- At the start of the 2018/19 fishing year the pathway would be available for innovators to benefit from.

Next steps

Existing resources both in terms of known gear expertise and funding are available to progress the Gear Innovation Pathway and following confirmation from the SIL Board that the innovation pathway concept is agreeable as the proposed framework is outside of the normal approach for SIL proposals then these funding streams within industry will be pursued further.

Following an indication from the SIL Board that the conceptual idea of an enabling framework that holds seed funding to facilitate innovation within a structured process is something that can be progressed then a SIL proposal will be developed. This will include development of the governance and management framework and the identification of appropriate expertise to form the technical expertise group and cost-effective approaches to provide administrative support to the innovation pathway.