Fisheries New Zealand
Tini a Tangaroa

Review of North Island eel sustainability measures for 2018/19

Consultation Document

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1 Submission Information

1. Fisheries New Zealand welcomes written submissions on any or all of the proposals contained in this Discussion Document. All written submissions must be received by Fisheries New Zealand no later than 27 July 2018.

   Submission can be emailed to: FMsubmissions@mpi.govt.nz

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1.1 OFFICIAL INFORMATION ACT 1982

2. All submissions are subject to the Official Information Act and can be released (along with personal details of the submitter) under the Act. If you have specific reasons for wanting to have your submission or personal details withheld, please set out your reasons in the submission. Fisheries New Zealand will consider those reasons when making any assessment for the release of submissions if requested under the Official Information Act.

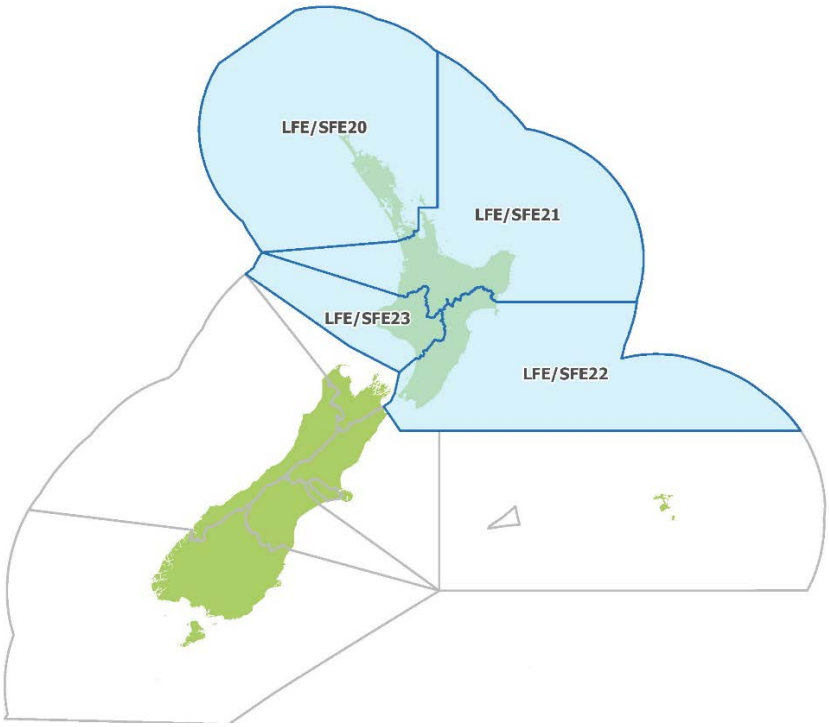

Figure 1: Quota Management Areas for shortfin eels (SFE) and longfin eels (LFE), with the North Island eel fishery (SFE 20 – 23 and LFE 20 – 23) highlighted in blue.

2 Executive Summary

3. Fisheries New Zealand is seeking information and views from tangata whenua and stakeholders on a review of sustainability settings for North Island freshwater eels (the shortfin eel *Anguilla australis* and the longfin eel *A. dieffenbachia* in Quota Management Areas (QMAs) 20-23 (SFE 20-23 and LFE 20-23; Figure 1).

4. Both species spend the majority of their life cycle in fresh water, with some overlap between the habitats of each species. However, shortfins prefer lowland lakes and slow moving soft bottom rivers and streams, and are predominant in coastal areas. Longfins prefer fast flowing stony rivers and are dominant in high country lakes. Once eels find a suitable habitat, movement may be limited, with an average home range of 30 metres and 10metres for shortfin and longfin eel respectively.

5. When managing freshwater eels, Fisheries New Zealand utilises the following suite of management tools to ensure their sustainability: Total Allowable Catch (TAC) and Total Allowable Commercial Catch (TACC); non-commercial allowances for customary and recreational fishing; minimum and maximum size restrictions; escapement tubes on commercial fyke nets; recreational daily catch limits; and closing areas to commercial fishing, e.g. the Whanganui, Motu and Mohaka Rivers (for more information on these management tools refer to section 4.2 of this document).

6. Given the small home range of shortfin and longfin eels, the large area of suitable habitat that is closed or inaccessible to commercial fishing also plays a significant role in the management of New Zealand's eel stocks, as they act as refuges from fishing pressure.

7. North Island eel stocks were last reviewed in 2008, with significant reductions to the TACs and TACCs of between 10% - 38% for shortfin eels and 35% - 78% for longfin eels. The Government is now developing a further package of management measures designed to at least maintain the current level of abundance (which is thought to be at, or above, the target sustainability level), and thereby enhance the long-term sustainability of eels.

8. South Island eel stocks were reviewed in 2016. The review of South Island eel stocks led to the separation of the previously combined eel stocks into individual shortfin and longfin stocks, and the subsequent setting of precautionary catch limits and allowances for the separated stocks.

9. The key differences between the 2016 South Island eel review and the current North Island review include:
   - Unlike South Island eels, North Island eels have always been managed as separate stocks since inclusion in the Quota Management System (QMS) allowing for species specific TACs, TACCs, and allowances to be set;
   - TACs and TACCs for South Island eels had not been reviewed since QMS entry, whereas substantial cuts were made to all North Island longfin and shortfin stocks TACs and TACCs in 2008; and
   - For three of the six longfin stocks and four of the six shortfin stocks in the South Island there was insufficient data to undertake a catch per unit effort (CPUE) analysis. However, there is sufficient data to undertake a CPUE analysis for all longfin and shortfin stocks in the North Island.

10. The current North Island eel review is informed by a new scientific stock assessment, which was completed in 2017 and reviewed through Fisheries New Zealand's science working group process[1]. The assessment is based on estimates of the relative abundance of longfin and shortfin eels within the fished areas of each QMA, annual recruitment of elvers (the number of juvenile eels returning each year) and an assessment of the amount of available eel habitat that is commercially fished (longfin eels only).

11. When reviewing the stock assessments for shortfin and longfin eels, Fisheries New Zealand's Fisheries Assessment Plenary (the Plenary), which is comprised of a range of experts, agreed for both species that the appropriate interim sustainability target[2], soft[3], and hard[4] limits are 40%, 20% and 10% of B_0 (unfished biomass) respectively, as recommended in the Fisheries New Zealand Harvest Strategy Standard[5]. These default targets may be reviewed in the future, given the pre-consultation feedback that showed there is clear interest in managing for higher levels of abundance, particularly in the case of longfin eels.

12. It is important to note that when discussing other fish species, B_0 usually refers to the biomass that existed prior to human impacts on the environment (i.e. fishing). But in the case of eels, a large proportion of their habitat has undergone largely irreversible modification, such as drainage of marshland to make way for farmland, and so it is more appropriate to think of it as the biomass that would exist with no fishing given the current amount of suitable habitat still available.

[1] Fisheries New Zealand Science working groups comprise Fisheries New Zealand and other independent scientists contracted to support the groups, as well as scientists from iwi, industry, environmental NGOs and agencies such as DOC and regional councils.
[2] Target: a biomass level that management actions are designed to achieve with at least 50% probability.
[3] Soft Limit: a biomass limit below which the requirement for a formal time-constrained rebuilding plan is triggered.
[4] Hard Limit: a biomass limit below which fisheries should be considered for closure.
[5] Harvest Strategy Standard for New Zealand Fisheries, October 2008, Ministry of Fisheries.

13. For longfin eels the Plenary agreed that all stocks were 'likely' (> 60% probability) at or above the sustainability target which, in this case, means a long-term sustainable harvest level. The Plenary also agreed that all longfin stocks were 'very unlikely' (< 10% probability) to be below the soft limit and the hard limit. This assessment was based on there being no negative trends in recruitment of elvers, positive or stable commercial CPUE trends across all QMAs, and the observation that 78% of available longfin habitat in the North Island is not currently subject to commercial fishing[6].

14. The Plenary was not able to make similar statements about the status of North Island shortfin eel stocks, largely because the percentage of unfished habitat is not known for shortfin eels. However, for all shortfin QMAs there are positive trends in CPUE, which indicates increasing abundance since entry into the QMS. This implies that the current TACs allow for sustainable utilisation while also allowing the abundance of shortfin eels to increase.

15. The two species differ in abundance when measured by CPUE, their distribution and biology, and in terms of the amount of information to inform the review. Fisheries New Zealand has proposed two different TAC options depending on the species and the QMA. Options are intended to increase the likelihood that overall eel abundance will increase (especially for longfin), albeit at different rates (one at the current pace, the second at a faster pace).

16. For longfin eels two options are proposed for each stock:
    - Option 1: *Status quo* (no change to the TAC); or
    - Option 2: Reduce the TAC (by an average of 15% across all QMAs) and the TACC (by an average of 32% across all QMAs).

17. Option 1 is intended to maintain current longfin abundance trends. It takes into account that all longfin stocks are likely at or above the sustainability target, and very unlikely to be below the soft limit and the hard limit. It also recognises that significant cuts to the TAC occurred in 2008 and that 78% of available longfin habitat in the North Island is not commercially fished.

18. Under Option 2 there is more likelihood that abundance will increase because the TACs would reduce by 15% and the TACCs would reduce by 32% on average across all North Island stocks. This represents a 72% TACC reduction from the original 2004 QMS settings. As occurred when the fishery was reviewed in 2008, the TACC for each longfin stock would be reduced to the average annual commercial catch (in this case since 2008).

19. Option 2 takes into account that some QMAs are not showing a clear increasing trend in CPUE and acknowledges concerns raised during pre-engagement by some tangata whenua about a perceived decline in abundance compared to historic experience. It also takes into account that there is some level of uncertainty with the science relating to longfin eels, and the difficulty of determining the unfished biomass for eels and the potential carrying capacity of the remaining eel habitat.

20. Many iwi are also concerned that fishing is only one of many factors influencing eel abundance and that habitat destruction, drain clearing, flood and hydro turbines are having a significant negative impact. Under these circumstances, managing the longfin

[6] Depending on the QMA between 50 and 98% of suitable eel habitat in each QMA is unaffected by commercial fishing because it is within Conservation land or is otherwise inaccessible.

eel fishery to a higher abundance target than 40% B_0 – which would be closer to historic unfished levels - may be appropriate. Option 2 takes this into account by setting a TAC that moves such stocks above the default sustainability target of 40% recommended in the Fisheries New Zealand Harvest Strategy Standard.

21. For all shortfin stocks the only proposed option is the *status quo* (no change to the current catch limits and allowances). Based on the best available information, the current TACs allow for sustainable utilisation and are allowing the abundance of shortfin eels to increase.

22. Under both options it is proposed that the allowances for customary and recreational fishing and for other sources of fishing-related mortality would remain unchanged, as was the approach in the 2008 review of the North Island fishery. Information on customary and recreational catch is uncertain. Under these circumstances, caution is required to ensure that recreational and customary allowances are adequate to provide for the likely range of customary and recreational catch and other fishing-related mortality levels.

23. Fisheries New Zealand considers this to be appropriate because the best available information suggests current allowances provide for recreational and customary catch and other fishing-related mortality.

24. Any changes to TACs, TACCs and allowances would be implemented for the 1 October 2018 fishing year.

25. Fisheries New Zealand seeks information and views from tangata whenua and stakeholders on these proposals.

3 What is proposed?

26. Fisheries New Zealand is reviewing the catch limits and allowances for shortfin eels *Anguilla australis* and longfin eels *A. dieffenbachia* in Quota Management Areas (QMAs) 20 - 23 (see Figure 1).

27. Given the two species differ in abundance when measured by catch per unit effort (CPUE), and in terms of the amount of information to inform the review, Fisheries New Zealand has proposed different options depending on the species of eel and the QMA.

Longfin

28. In terms of Total Allowable Catch (TAC) and Total Allowable Commercial Catch (TACC) the following two options are proposed for longfin stocks (see Table 1):
    - Option 1: *Status quo* (no change); or
    - Option 2: Reduce the TAC (by an average of 15% across all QMAs) and the TACC (by an average of 32% across all QMAs).

29. Under both options it is proposed that the allowances for customary, recreational fishing, and other non-commercial fishing sources of mortality would remain unchanged.

Table 1: Proposed management settings in tonnes for LFE 20-23 from 1 October 2018.

QMA	Option	Total Allowable Catch (TAC)	Total Allowable Commercial Catch (TACC)	Allowances		
				Customary **Māori**	Recreational	All other sources of mortality caused by fishing
20	Option 1 -*Status quo*	39	19	10	8	2
	Option 2 – Reduction	34 ↓	14 ↓	10	8	2
21	Option 1 - *Status quo*	60	32	16	10	2
	Option 2 – Reduction	51 ↓	23 ↓	16	10	2
22	Option 1 - *Status quo*	34	21	6	5	2
	Option 2 – Reduction	26 ↓	13 ↓	6	5	2
23	Option 1 - *Status quo*	34	9	14	9	2
	Option 2 – Reduction	30 ↓	5 ↓	14	9	2

Shortfin

30. For all shortfin stocks the *status quo* is the only option proposed. This is because abundance, as measured by CPUE, is increasing across all stocks. The positive trends in CPUE indicate that the current management regime allows for sustainable utilisation while also allowing the abundance of shortfin eels to increase.

31. For shortfin eel, it is proposed to retain the *status quo* for all management settings, as set out in Table 2 below.

Table 2: Management settings in tonnes (t) for shortfin eels in SFE 20 – 23 (no change proposed)

QMA	Option	TAC	TACC	Allowances		
				Customary **Māori**	Recreational	All other sources of mortality caused by fishing
20	*Status quo*	148	86	30	28	4
21	*Status quo*	181	134	24	19	4
22	*Status quo*	121	94	14	11	2
23	*Status quo*	36	23	6	5	2

4 Why the need for review?

32. Eels are becoming increasingly important to all New Zealanders. Māori consider eels (tuna) to be taonga and New Zealanders in general are connected to them due to their native/ endemic nature, their long and interesting life history, and people's interactions with tame eel populations.

33. In particular, public concern has been expressed in recent years about the sustainability of commercial fishing for longfin eels. As a result of these concerns, the Parliamentary Commissioner for the Environment produced a report in 2013, in which she recommended that an independent expert panel be convened to assess the status of longfin eels, and that commercial fishing be prohibited to allow eel stocks to recover.

34. Following a subsequent independent scientific review by a panel of international experts, the Government decided to progress a package of management measures to further improve the abundance and long-term sustainability of longfin eels (refer Appendix 1). These management measures included a review of sustainability settings for North and South Island longfin eels. Fisheries New Zealand reviewed South Island eel stocks in 2016, with the then Minister for Primary Industries setting significantly reduced TACs and TACCs for many South Island QMAs.

35. The current TAC, TACC, allowances and other management settings for the North Island eel stocks were developed in 2004 upon entry into the Quota Management System (QMS), and last reviewed in the 2007/08 fishing year. During the 2007/08 review, substantial cuts to the TACs and TACCs of between 10% - 38% for shortfin eel stocks and 35% - 78% for longfin eel stocks were made to improve eel sustainability and availability to non-commercial fishers.

36. This new review of North Island eel stocks based on a new stock assessment will ensure that the TACs, TACCs, allowances, and other management settings are set appropriately.

4.1 CONTEXT

Biological characteristics of freshwater eels

37. New Zealand has two main species of eel[7], the native shortfin eel *A. australis* (also found in South Australia, Tasmania and New Caledonia) and the endemic (found only in New Zealand) longfin eel *A. dieffenbachii*.

38. New Zealand freshwater eels are a temperate species and have a unique life history. They live predominantly in freshwater and undertake a spawning migration to an oceanic spawning ground. They spawn once and then die. The majority of the life cycle is spent in freshwater or estuarine/coastal habitat. Spawning of New Zealand species is presumed to take place in the Southwest Pacific. Offspring undertake a long oceanic migration back to freshwater where they grow to maturity before migrating back to the oceanic spawning grounds.

39. Whilst the habitat of both species overlap, shortfins prefer lowland lakes and slow moving soft bottom rivers and streams and are predominant in coastal areas. Longfins prefer fast flowing stony rivers and are dominant in high country lakes. Once eels find a suitable habitat, movement may be limited, with an average home range of 30m and 10m for shortfin and longfin eel respectively[8].

40. Growth of eels is highly variable and dependent on food availability, water temperature and eel density. Eels, particularly longfins, are generally long-lived. The maximum recorded age is 106 years for longfins and 60 years for shortfins. Longfin eels take longer to reach the minimum legal size (which is 220 grams for both longfin and shortfin eels). North Island shortfin eels take, on average, 5.8 years (13 years in South Island) to reach the minimum legal size, compared with 8.7 years (18 years for South Island) for longfins.

41. Migration appears to be dependent on attaining a certain length/weight combination and other environmental triggers. The range in recorded age at migration for shortfin males is 5–22 years and 9–41 years for females. For longfin eels the range in recorded age at migration is 11–34 years for males, and 27–61 years for females.

42. These different biological characteristics mean longfin eels are potentially more vulnerable to fishing pressure than shortfin eels.

Management tools

43. The QMS is designed to manage fish stocks at the QMA level. In doing so, the proposals in this paper seek to maintain or rebuild the relevant eel stocks to achieve a sustainable harvest level that also allows for utilisation of each stock across the entire QMA.

44. Fisheries New Zealand's Fisheries Assessment Plenary (the Plenary) agreed from a sustainability perspective that the interim default reference points of 40% B_0 (target), 20% B_0 (soft limit) and 10% B_0 (hard limit) were appropriate for both shortfin and longfin eels.

[7] A third species of freshwater eel, the Australasian longfin (*Anguilla. reinhardtii*) was identified in the North Island in 1996. When caught it is included as part of the shortfin catch as this species has productivity characteristics closer to shortfins than longfins, and because the catch is not sufficient to justify its own separate stock.

[8] Jellyman, D.J., Sykes, J.R.E. (2003). Diel and seasonal movements of radio-tagged freshwater eels, *Anguilla* spp., in two New Zealand streams. *Environmental Biology of Fishes 66:* 143-154. http://www.springerlink.com/content/w841242u21703727/

45. Fisheries New Zealand acknowledges that while these targets will ensure sustainability, they may not adequately meet the needs of tangata whenua and that managing above these targets may be appropriate for some longfin QMAs. Therefore, Fisheries New Zealand has developed a further proposal (Option 2) for all longfin stocks that reduces the commercial catch limit and places a greater emphasis on increasing the abundance of longfin eels.

46. To ensure the sustainability of New Zealand's longfin and shortfin eels, Fisheries New Zealand utilises the following suite of management tools:

- *Fishing Year:*
  The fishing year for all North Island eel stocks is from 1 October to 30 September.

- *Catch limits and allowances:*
  The total take of eels is managed under a TAC framework. The TAC is the total amount of eels that can be sustainably harvested within any given QMA. Once the TAC has been set, allowances are made for customary and recreational take and the remainder is allocated to the commercial fishery as the TACC. Once set, catch limits and allowances for all fish stocks are reviewed when needed to ensure they remain sustainable.

- *Minimum/maximum size restrictions*:
  Under commercial fishing regulations the size limits for harvesting eels are set at a minimum 220 g and maximum 4 kg weight. These restrictions allow juvenile eels to become established and those above 4 kg to safely migrate without being subject to the commercial harvest. In addition to this, quota owners from the North and South Islands formally agreed in 1995/96 not to land migratory female longfin eels regardless of their size, which protects the female eels that migrate prior to reaching the 4kg maximum size limit.

- *Escapement tubes:*
  All commercial fyke nets must have at least two escapement tubes, with an internal diameter of at least 31mm in the section of net capable of holding eels while in the water. These tubes allow smaller eels with a diameter less than 31mm to escape unharmed.

- *Recreational bag limits*:
  The recreational take of eels is restricted by a personal daily limit of 6 eels per person per day.

- *Catchments closed to commercial fishing*:
  In the North Island, the following areas have been set aside as non-commercial areas: Whakaki Lagoon; Lake Poukawa; Penarrow Lakes (and associated catchments); Whanganui River; Motu River and Mohaka River. These catchments not only act as a refuge from commercial fishing, but assist in the repopulation of eel stocks throughout New Zealand. This is because offspring from any eels that successfully migrated to breed offshore have the potential to repopulate any catchment throughout New Zealand.

Customary Management Tools

47. The proposals presented in this paper recognise that iwi have a range of legislative tools to undertake management at a finer scale than those set at the QMA level. These tools currently include the:
    - Fisheries (Kaimoana Customary Fishing) Regulations 1998;
    - Waikato-Tainui (Waikato River Fisheries) Regulations 2011; and
    - Fisheries (Ngtai Tuwharetoa, Raukawa and Te Arawa River Iwi) Regulations 2017.

48. These regulations enable tangata whenua to either apply to establish mātaitai reserves, which prohibit commercial fishing, or to propose bylaws which constrain fishing activity to provide for the utilisation of the eel fishery while ensuring sustainability.

49. In addition, under sections 186A and 186B of the Fisheries Act 1996, any person can seek to have the Minister of Fisheries prohibit or restrict fishing for up to two years to improve the size or availability of a species in an area or to recognise a customary fishing practice.

50. Together these regulations enable restrictions to be placed on the harvesting of eels at a rohe/local level to assist in addressing the concerns of tangata whenua and communities over localised utilisation of a fishery.

51. Given freshwater eels have a small home range once established and the large proportion of available habitat that is not commercially fished, the localised management tools available to iwi such as mātaitai are likely sufficient to protect longfin eels within their rohe.

North Island eel fishery

Commercial fishery

52. Virtually all commercially-caught eels (98%) are taken with fyke nets (see Figure 2). Eel catches are greatly influenced by water temperature (catches decline in winter months), flood events (increased catches) and drought conditions (reduced catches).

Figure 2: fyke net with escape tubes.

53. North Island eel fisheries were introduced into the QMS on 1 October 2004 using separate quota management areas for shortfin and longfin eels. The TACs, TACCs, and allowances set at this time were reviewed in 2007/08, with subsequent cuts made to all North Island stocks (see Tables 3 and 4).

Table 3: Initial TACs, TACCs and allowances (in tonnes) for North Island shortfin stocks (SFE 20, 21, 22 & 23) upon entering the QMS in 2004, and current settings following the review in 2007/08.

QMA	Settings	TAC (t)	Change in TAC from initial settings	TACC (t)	Allowances		
					Customary **Māori** (t)	Recreational (t)	Other sources of fishing-related mortality (t)
20	Initial	211		149	30	28	4
	Current	148	63 t ↓ (30%)	86	30	28	4
21	Initial	210		163	24	19	4
	Current	181	29 t ↓ (14%)	134	24	19	4
22	Initial	135		108	14	11	2
	Current	121	14 t ↓ (10%)	94	14	11	2
23	Initial	50		37	6	5	2
	Current	36	14 t ↓ (28%)	23	6	5	2

Table 4: Initial TACs, TACCs and allowances (in tonnes) for North Island longfin stocks (LFE 20-23) upon entering the QMS in 2004, and current settings following the review in 2007/08.

QMA	Settings	TAC	Change in TAC from initial settings	TACC	Allowances		
					Customary **Māori**	Recreational	Other sources of fishing-related mortality
20	Initial	67		47	10	8	2
	Current	39	28 t ↓ (42%)	19	10	8	2
21	Initial	92		64	16	10	2
	Current	60	32 t ↓ (35%)	32	16	10	2
22	Initial	54		41	6	5	2
	Current	34	20 t ↓ (37%)	21	6	5	2
23	Initial	66		41	14	9	2
	Current	34	32 t ↓ (48%)	9	14	9	2

54. Commercial catch data is available from 1965 and comes from different sources. Catch data prior to 1988 is for calendar years, whereas those since 1988 is for fishing years (1 October – 30 September). Commercial eel landings for the whole of New Zealand since 1966 are shown in Figure 3. Total commercial catch landings for North Island stocks have been reported separately for longfin and shortfin eels since QMS entry and are shown in Figure 4.

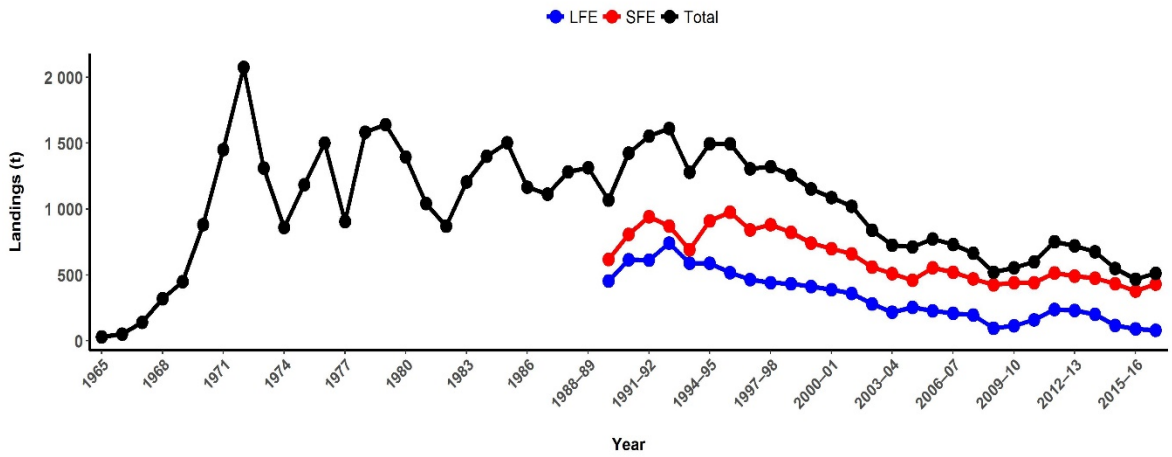

Figure 3: Total eel landings from 1965 to 2016–17, as well as separate shortfin and longfin landings from 1989–90 to 2016–17. Prior to 1988–89, the data points represent estimates for the period prior to the introduction of Eel Catch Landing Return (ECLR) forms, and were generated by pro-rating the unidentified eel catch by the longfin to shortin ratio.

55. Based on the average port price of $4.48 per kilogram for longfin and $5.50 per kilogram for shortfin, the 2015/16 catch data indicates an approximate landed annual value of $1,287,000 for shortfin and $133,056 for longfin[9]. Most of this catch was exported frozen to Asia and Europe.

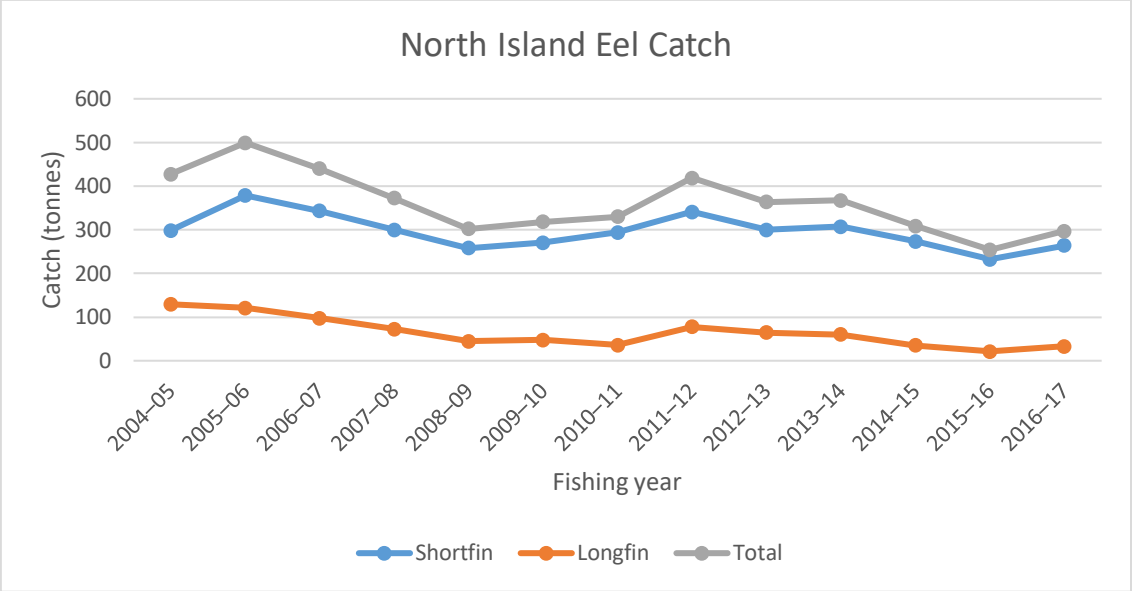

Figure 4: Total commercial landings for North Island eel stocks.

56. The relative proportion of each species landed varies by QMA. From analyses of landings to eel processing factories and estimated catch from Electronic Catch Landing returns (ECLRs), shortfin are the dominant species in all areas of the North Island and comprised 87% of total commercial landings in the North Island in 2016-17 fishing year.

57. Since entry into the QMS in 2004, the TACC has rarely been fully caught for either eel species. This is mainly because of market demand and also because iwi own large

[9] Caution is needed when interpreting the above values because not all Licenced Fish Receivers provide information for the port price survey (Fisheries New Zealand has not received sufficient results during the last three years to allow an update of the port pricing for eels). Note also the port price value is what the fisher receives, not what the eels are worth on the open market.

amounts of quota and choose to shelve (not fish) the annual catch entitlement (ACE) associated with that quota. This is particularly true for longfin eels. For example in the 2015/16 fishing year, only 70% and 36% of the TACC was landed in the North Island for shortfin and longfin eels respectively. The majority of iwi are shelving their quota to help increase abundance at the rohe, and in turn national, level.

Recreational fishery

58. The recreational fishery for eels includes any eels taken by people fishing under amateur fishing regulations (including any harvest by Māori not taken under customary provisions). In October 1994, a recreational individual daily bag limit of six eels was introduced throughout New Zealand. When the North Island eel fishery was introduced into the QMS, an allowance was made for recreational harvest for each QMA based on population, currently equating to 63 tonnes for shortfin and 32 tonnes for longfin for the entire North Island. There is no quantitative information on the recreational harvest of freshwater eels, however, based on expert opinion it is considered to be less than the existing recreational allowance (as contained in Tables 3 and 4).

Māori customary fishery

59. Tuna (eels) have long been considered taonga by Māori and are traditionally an important food source. Māori developed effective methods of harvesting tuna, and hold a good understanding of their habits and life cycle. Māori retain their traditional ties to tuna and continue to harvest them for customary purposes.

60. In the North Island, a number of areas have been set aside under fisheries regulations as non-commercial areas to allow only customary and recreational fishing of tuna, including: Whakaki Lagoon; Lake Poukawa; Penarrow Lakes (and associated catchments): Whanganui River; Motu River and Mohaka River.

61. Customary fishers prefer tuna of a large size, i.e. over 750 mm diameter and 1 kg in weight. There is no complete assessment of the current or past customary take for the North Island. Fisheries New Zealand records show only 410 kg of shortfin and no longfin tuna taken under customary allowances since 2013, however, this figure is under-representative of the actual customary catch for the following reasons:

    - Many Māori exercise their customary right to fish for tuna under the recreational bag limit of six eels per person per day; and
    - Large parts of the North Island are not yet gazetted under the Fisheries (Kaimoana Customary Fishing) Regulations 1998, therefore customary fishing authorisations are issued under Fisheries (Amateur Fishing) Regulations 2013 without a requirement to report catch to Fisheries New Zealand.

62. When the North Island tuna fishery was introduced into the QMS, an allowance was made for customary non-commercial harvest based on population and the number of marae within a given QMA, equating to 74 tonnes for shortfin and 46 tonnes for longfin across the entire North Island. Based on available information, current customary harvest is within this allowance.

All other sources of eel mortality caused by fishing

63. Although there is no quantitative information on the level of fishing-related mortality associated with the eel fishery (i.e. how many eels die while in the fyke nets), it is not

considered to be significant given that the fishing methods used are passive and catch eels in a live state.

64. Depending on the catchment and the associated land-based activities within those catchments, eel populations can be subject to significant sources of mortality from non-fishing activities (which are not included in TAC setting). Non-fishing mortality occurs through the mechanical clearance of drainage channels, and damage by hydro-electric turbines and flood control pumping. Although this is not factored into the TAC, Fisheries New Zealand considers these activities may be having a significant impact on eel abundance.

65. In addition to the current pressures, eel populations have been significantly reduced since European settlement from the 1840s by wetland drainage to make way for farmland, and on-going habitat modification brought about by dams, irrigation, redirection of rivers and streams, and the reduction in littoral (stream edge) habitat.

66. New mapping techniques estimate that only 22% of suitable longfin eel habitat is commercially fished in the North Island[10]. Therefore, fishing is unlikely to be the only influence on eel abundance in some parts of the North Island. This means that limiting catch of eels, on its own, may not result in a significant increase in eel abundance. To assist wider eel management, Fisheries New Zealand works with other agencies such as the Department of Conservation and relevant Regional Councils to input as appropriate into eel forums and working groups.

Monitoring of the North Island eel fishery

67. Fisheries New Zealand monitors the North Island eel fishery by reviewing:
    - yearly recruitment of elvers to specific dams throughout the North Island; and
    - CPUE of the commercially fished area within each QMA.

68. Elver recruitment is monitored by counting the number of elvers arriving at four dams (two on the East Coast[11] and two on the West Coast[12]) deemed to be representative of rivers throughout the North Island. Elver recruitment is monitored to ensure sufficient numbers of elvers return each year to maintain eel abundance.

69. Patterns in elver recruitment fluctuate strongly from year to year. This is because elvers migrate back to New Zealand, from their breeding ground in the Pacific Ocean, through a combination of active swimming and passively floating on ocean currents. Therefore, the number of eels returning in any given year can be affected by ocean currents and climatic conditions. While recruitment to these four dams fluctuate yearly, there is no negative trend (declining) over time.

70. The CPUE analysis is a measure of abundance within the commercially fished areas of each eel statistical area (ESA) based on the ease with which a commercial fisher can catch their ACE. If CPUE increases, it is assumed eel abundance is increasing; conversely if CPUE reduces it is assumed that eel abundance is decreasing. Despite commercial catch data being recorded since 1965, the CPUE analysis only dates back to 1989. This is

[10] Beentjes, M.P.; Sykes, J.; Crow, S. (2016). *GIS mapping of the longfin eel commercial fishery throughout New Zealand, and estimates of longfin habitat and proportion fished.* Draft New Zealand Fisheries Assessment Report held by Ministry for Primary Industries, Wellington.
[11] Wairua Falls and Matahina Dam.
[12] Karapiro Dam and Patea Dam.

because prior to 1989 catch data was recorded using a combined code for both species collectively, and not separated into longfin and shortfin catches.

71. When reviewing the CPUE data the Plenary noted that the CPUE trend is biased (the trend shown is not as positive as it should be) for the following reasons:
    - in 2012-13 the escape tube diameter on all commercial fishing nets was increased from 25 mm to 31 mm, allowing some legal sized eels to escape without being recorded;
    - failure of some fishers to record on catch return forms all legal sized eels caught, not just those retained; and
    - unrecorded release of eels over 4 kg in weight (or over 2 kg in Waikato due to local by-laws that apply in that area).

Percentage of available eel habitat commercially fished

72. In addition to recruitment monitoring and CPUE analysis, Fisheries New Zealand commissioned a research project in 2014 to determine the current proportion of longfin habitat within each ESA that was fished commercially and also impacted by anthropogenic impacts such as hydro dams.

73. The data used in this study was based on commercial fishing data from 2009/10 to 2013/14, obtained from face to face interviews with 53 individual commercial eel fishers from throughout New Zealand, and presence-absence data from the New Zealand Freshwater Fish Database (NZFFD). The data was then mapped and referenced to individual segments of the River Environment Classification (REC2). Fishing was shown to occur throughout New Zealand predominantly in rivers, with smaller contributions from both natural and hydro lakes, and to lesser extent in harbours and estuaries.

74. The total available longfin habitat was then determined by comparing locations of known habitat of longfin eels based on commercial catch data, interviews with fishers and presence-absence data from the NZFFD with locations of similar habitat and water conditions based on information from the REC2. The habitat of lakes behind dams was excluded from calculations of the current habitat available to longfins because of impeded access.

75. The results showed that currently between 2% and 50% of any ESA is commercially fished. Conversely, this means that between 50% and 98% of the available longfin eel habitat within any ESA is not commercially fished. Across the entire North Island only 22% of the available longfin eel habitat is commercially fished, leaving 78% of available habitat unaffected by commercial fishing.

76. Fisheries New Zealand acknowledges that this figure may positively or negatively change in the future. However, given the relatively small home range of longfin eels (approximately 10 m), and the larger percentage of the available longfin habitat that is not commercially fished, these unfished areas are a refuge from commercial fishing and play a significant role in ensuring protection and long-term sustainable management of the species[13].

[13] These areas may still be subject to customary and recreational fishing pressures where access to the river allows.

Stock assessment

77. As part of the review of North Island eels, the Plenary undertook a stock assessment of the North Island shortfin and longfin eel fisheries. A stock assessment is an evaluation of relevant data (in this case CPUE, elver recruitment, and the percentage of eel habitat commercially fished) in order to obtain an understanding of the status of the stock relative to defined reference points.

78. Stock status refers to a determination made, on the basis of the stock assessment results, about the current condition of a stock in relation to the defined reference points: e.g. is the biomass of the stock above or below a management target or biomass limit? Targets and limits are usually defined as percentages of B_0, the average biomass that could exist in the absence of fishing and other anthropogenic factors. It is often equated with the biomass that existed prior to the advent of fishing, but in the case of eels, which have been affected by irreversible habitat modifications, it is more appropriate to think of it as the biomass that would exist with no fishing given the current amount of suitable habitat available.

79. For most temperate water finfish stocks, a management target[14] of 40% B_0 has become the globally-accepted sustainability target. New Zealand also defines a soft limit[15] of 20% B_0 and a hard limit[16] of 10% B_0. These targets and limits are Fisheries New Zealand's default management settings for the New Zealand's finfish stocks where an alternative cannot be justified[17].

80. The Plenary agreed that the default management targets and sustainability limits of 40% B_0 (target), 20% B_0 (soft limit) and 10% B_0 (hard limit) are appropriate as interim reference points for both shortfin and longfin eels. As the management targets for eels are an interim measure only, these targets and limits may be reviewed in the future as more information becomes available.

81. For longfin eels, the Plenary was able to reach conclusions on stock status in relation to the targets and limits within each ESA, based partly on the proportion of habitat fished or impacted by hydro dams.

82. For longfin eels, the Plenary agreed that all stocks were 'likely' (> 60% probability) to be at or above the target. Furthermore, the Plenary agreed that all longfin stocks were 'very unlikely' (< 10% probability) to be below either the soft limit or the hard limit. This assessment was based on there being no negative trends in recruitment of elvers, positive or stable CPUE trends across all QMAs (coupled with the fact that these trends are biased downwards due to management regulations), and between 50% - 98% of available longfin habitat is unaffected by commercial fishing.

83. As the percentage of available shortfin habitat that is fished is not known, the Plenary was not able to make the same statements about shortfin eels, which are all of unknown status relative to the target and limits.

[14] Target: The level we want a fish stock to fluctuate around for the best balance between use and sustainability, while allowing for environmental variation.
[15] Soft limit: below this level, a fish stock is considered to be overfished or depleted and needs to be actively rebuilt, for example by reducing the total allowable catch.
[16] Hard limit: Below this level, a fish stock is considered to have collapsed and fisheries may need to be closed to rebuild at the fastest possible rate.
[17] Harvest Strategy Standard for New Zealand Fisheries, Ministry of Fisheries, October 2008

Preliminary consultation

84. Prior to the release of this consultation paper, Fisheries New Zealand undertook preliminary consultation with Te Ohu Kaimoana and the Eel Enhancement Company (EEC), and provided for input and participation from tangata whenua through face-to-face meetings with the following Fisheries Forums:
    - Te Hiku o Te Ika Fisheries Forum;
    - Mai i Nga Kuri a Wharei ki Tihirau Fisheries Forum;
    - Te Tai Hauauru Iwi Forum; and
    - Nga Hapu o Te Uru o Tainui Forum.

85. Officials also met with iwi that had a protocol with Fisheries New Zealand relating to eels. Where a functioning forum did not exist, Fisheries New Zealand emailed out a written summary of the review requesting input.

86. Te Ohu Kaimoana and the EEC support maintaining the *status quo* for all stocks for both shortfin and longfin eels. They note that four of the seven directors on the board of EEC represent iwi, and that the EEC have been working closely with Te Ohu Kaimoana and local iwi to better manage commercial fishing activities, establish areas of cultural significance, and establish 'no commercial take zones within individual rohe'.

87. The views of tangata whenua in relation to North Island eels were mixed, ranging from supporting the *status quo* through to a complete ban on commercial take of eels, longfin in particular. However, in relation to the management targets there was a consistent theme that abundance is low - "there is not enough tuna on the table" - and a management target of 40% doesn't meet the needs of concerned iwi. In particular the following themes where consistently raised:

Concern about human impacts on the environment

- Commercial fishing is not the biggest impact on tuna populations - they are severely impacted by loss of habitat, barriers to migration and high levels of mortality caused by flood control pumps and drain clearing, etc.

- The CPUE for some stocks (especially longfin) are flat, and iwi are concerned that small changes to current environmental conditions could lead to a drop in abundance.

Cultural and historic value of tuna

- There is 'less tuna on the table when compared to the past'. Iwi directly relate the abundance of tuna within their rohe to the frequency of which they see it on the table.

- Some iwi believe that tuna are more than taonga (treasured) - some iwi believe they are connected through Whakapapa (genealogy/ancestry), i.e. without tuna some iwi wouldn't be here today.

- Iwi own large amounts of quota (up to 60% on some QMAs). They are aware if the commercial harvest of tuna is banned it may not be reinstated, and this has the potential to remove future income from their mokopuna (descendants).

- The fact that iwi are shelving ACE and forgoing income from the quota they own, highlights the fact that iwi/hapu/tangata whenua place a higher value on eels than the commercial fishery. Therefore, when making decisions regarding eels, a standard cost benefit analysis that uses port-price should not be used when comparing the impact of the decision on tangata whenua. Tangata whenua use a different currency (customary/cultural – which is not equal to monetary value) to measure the value of their tuna fishery.

Concern about weighting of CPUE analysis in decision making

- Matauranga Māori (Māori knowledge/worldview) hasn't been included in the CPUE assessment.

- Many iwi shelve their ACE to improve eel abundance - CPUE increases are probably due to shelved ACE, and if the TACC were raised, this would defeat the purpose of Māori shelving their ACE in the first place.

- Hapu put a lot of time and money into local waterway clean-up and restoration and this should be recognised in Fisheries New Zealand decision-making.

Enhanced research

- Research needs to be targeted at the rohe (local area) level.

- Iwi/hapu require assistance and resourcing to undertake iwi/hapu-led research, surveys and independent assessment of their tuna stocks.

- Percentage of habitat fished should be calculated for shortfin.

- More frequent monitoring of elver recruitment could influence results.

Call for more stringent measures

- The TACC needs to be reduced if the goal is to increase tuna abundance.

- A rahui (moratorium) on the commercial harvest of eels (in particular longfin) should be considered for at least five years, until all iwi have had their rohe gazetted.

- The generic target set under the Fisheries New Zealand Harvest Strategy of 40% is too low - it needs to be higher to allow more breeding stock to migrate.

- Fisheries New Zealand should track tuna harvest throughout the year and ban it during the downstream migration.

88. Iwi also acknowledged that there are tools in place under the Fisheries (Kaimoana Customary Fishing) Regulations 1998 to assist with management of fish stocks within their rohe. However, some iwi outlined that they are not able to progress the gazetting of their rohe as part of the Fisheries (Kaimoana Customary Fishing) Regulations 1998, due to financial and resource limitations.

Comparison to South Island review

89. In 2016, MPI undertook a review of South Island eels stocks. The review resulted in separation of the previously combined South Island eel stocks into individual stocks. This change was to allow for species-specific management and greater protection of longfin eels.

90. New TACs, TACCs and allowances were set for the newly created stocks. For four of the six longfin stocks a precautionary TAC was set that effectively eliminates the commercial targeting of longfin eels (a TAC close to zero).

91. For the remaining two longfin eel stocks the abundance was considered high enough to support some level of continued utilisation while still allowing for increased abundance. For these two stocks there were reliable trends in relative abundance, as measured by the CPUE, showing them to be well above sustainability limits, noting also that a large percentage of tangible longfin eel habitat is not commercially fished in these areas (63% and 70%).

92. It was considered that this approach would result in an increase in longfin eel abundance over time[18], and takes into account that longfin eels are more vulnerable to fishing pressure than shortfin eels, as well as the need to be cautious where information is uncertain and set catch limits that will support an increase in abundance.

93. For five of the six shortfin stocks, TACs were set at a level that most closely approximated the *status quo*. There were reliable trends in relative abundance showing these stocks are stable or increasing. For the remaining stock (SFE 13) the TAC allowed for a 10% increase of shortfin take. This recognised the sizeable increase in abundance of shortfin eels in this QMA.

94. Key differences between the South Island eel review and the current North Island review include:

- Unlike South Island eels, North Island eels have always been managed as separate stocks since inclusion in the QMS allowing for species specific TACs, TACCs and allowances to be set;

- Until the 2016 review, TACs and TACCs for South Island eels had not been reviewed since QMS entry, whereas substantial cuts were made to all North Island longfin and shortfin stocks TACs and TACCs in 2008; and

- For three of the six longfin stocks and four of the six shortfin stocks in the South Island there was insufficient data to undertake a CPUE analysis, however for North Island eels there was sufficient data to undertake a CPUE analysis for all longfin and shortfin stocks.

[18] Subject to environmental influences and mortality from non-fishing related activities (e.g. mechanical clearance of drainage channels, hydro-electric turbines and flood control pumping).

5 Statutory Considerations

95. This section provides an overview of the Minister's legal obligations under the Fisheries Act 1996 (the Act) when setting or varying TACs, and TACCs for New Zealand fish stocks (refer Appendix 3 for more information).

5.1 SECTION 20 - SETTING AND VARIATION OF TOTAL ALLOWABLE COMMERCIAL CATCH

96. Under section 20 of the Act, the Minister sets a TACC in respect of the QMA relating to a stock. That TACC applies in each fishing year unless varied under section 20 or until an alteration of the QMA for that stock takes effect in accordance with sections 25 and 26.

5.2 SECTION 21 - SETTING OF NON-COMMERCIAL ALLOWANCES AND THE TACC

97. When setting a TACC for a stock under section 20 of the Act, section 21 requires the Minister to have regard to the TAC for that stock and allow for Māori customary non-commercial fishing interests, recreational interests, and all other sources of fishing-related mortality to that stock.

98. The Act does not provide an explicit statutory mechanism to apportion available catch between sector groups either in terms of a quantitative measure or prioritisation of allocation. Accordingly, the Minister has discretion to make allowances for various sectors based on best available information.

5.3 FURTHER CONSIDERATIONS

99. Section 12(1)(b) of the Act requires that the Minister provide for the input and participation of tangata whenua and have particular regard to kaitiakitanga before setting or varying a TAC. Fisheries New Zealand has provided an opportunity for tangata whenua to provide input into this process through the Te Hiku o Te Ika Fisheries Forum, Mai i Nga Kuri a Wharei ki Tihirau Fisheries Forum, Te Tai Hauauru Iwi Forum, Nga Hapu o Te Uru o Tainui Forum, and Te Ohu Kaimoana.

100. Sections 9(a) and (b) also require the Minister to take into account that associated or dependent species be maintained at or above a level that ensures their long-term viability, and that the biological diversity of the aquatic environment should be maintained. Fisheries New Zealand notes there are few associated or dependent species relating to the take of eels and that they are a targeted species using passive (live capture) fishing techniques.

101. The options in this paper (*status quo* or a TAC reduction), aim to maintain or increase eel abundance, and no negative impacts on the biological diversity of the aquatic environment are expected.

6 Why are these options proposed?

6.1 EVALUATION OF OPTIONS

Shortfin stocks (SFE 20 – 23)

102. For all shortfin stocks no change is proposed, with the *status quo* being the only option. Fisheries New Zealand considers this to be appropriate because abundance, as measured by CPUE, is increasing across all stocks. During the 2007/08 fishing year, substantial cuts (between 18% and 42%) were made to the TACC of all North Island shortfin stocks to improve eel sustainability and significantly reduce commercial fishing pressure on North Island shortfin eels. As a result the CPUE trends indicate the current TACs allow for sustainable utilisation while also allowing the abundance of shortfin eels to increase[19].

103. Fisheries New Zealand notes commercial and recreational fishing only occurs in a limited proportion of the available shortfin eel habitat, with the remaining habitat acting as a refuge from commercial activities. Unlike longfin eels, however, this proportion of commercially fished habitat has not been estimated for shortfin eels in the North Island.

104. Iwi also have a range of legislative tools to undertake eel management at a finer scale within their rohe (e.g. mātaitai reserves). Given freshwater eels have a small home range once established, this is a key way that iwi can protect eels within their rohe. In tandem with increasing abundance trends for shortfin, and the existing customary (and recreational) allowances set for shortfin, these tools can address many of the concerns raised during preliminary engagement with tangata whenua.

105. Overall, Fisheries New Zealand considers this approach is consistent with the Minister's statutory obligations under the Act to provide for utilisation of the shortfin eel resource, while ensuring sustainability.

Longfin stocks (LFE 20 – 23)

106. For longfin stocks, Fisheries New Zealand proposes the following two options for each stock:
    - Option 1: *Status quo* (no change); or
    - Option 2: Reduce the TAC (by an average of 15% across all QMAs) and the TACC (by an average of 32% across all QMAs).

107. Option 1 retains the current TAC. It takes into account the Plenary consensus that all longfin stocks were 'likely (> 60% probability) at or above the target', and 'very unlikely (< 10% probability) to be below the soft limit and the hard limit'. It also recognises the significant cuts to the North Island longfin TACs and TACCs of between 35% and 78% that occurred in 2008. Catch reductions in 2008 for longfin were larger than shortfin, reflecting the greater sustainability concerns associated with that species.

108. Option 2 sets a lower TAC that is more likely to support/promote an increase in longfin eel abundance. It takes into account that there is some level of uncertainty with the science

[19] CPUE trends are considered to be biased down (trend shown is not as positive as it should be). This is because in 2012-13 the escape tube diameter on all commercial fishing nets was increased from 25 mm to 31 mm, allowing some legal sized eels to escape without being recorded.

relating to the long-term management targets for eels. It also places additional weight on the concerns raised in pre-consultation by some iwi that the current management regime does not allow for adequate utilisation by iwi.

109. Since longfin eels entered the QMS in 2004, the CPUE data for all longfin ESAs is either stable or increasing. Given that some longfin stocks are not showing a clear upward (increasing) trend in CPUE, reducing catch for some or all longfin eel stocks, as proposed under Option 2, could be considered.

110. Under Option 2, Fisheries New Zealand proposes the same approach to that taken in 2008, whereby the TAC is based on a TACC reduced to the average annual commercial catch[20]. This would reduce the total longfin eel catch available to be taken commercially by 32%. It follows that catch would be significantly constrained in all years when it would otherwise have been above the long term average.

111. The economic impact of a reduced commercial catch of longfin will vary with eel prices. In the North Island, port prices are reported separately for longfin eels and shortfin eels and show a difference in value. Between 2010/11 and 2017/18 the average port price for longfin eels ranged between $4.31 and $4.83, while shortfin ranged between $5.28 and $5.62. Based on an average port price of $4.48 for longfin eels, under option two, the total port price value of the North Island longfin eel commercial fishery would be reduced from $362,880 (current North Island TACC) to $246,400 (North Island TACC as proposed under option 2).

112. Fisheries New Zealand recognises that intermediate options between Option 1 (*status quo*) and Option 2 could be considered, and welcomes feedback on such options.

113. Under both options it is proposed that the allowances for customary and recreational fishing, and other sources of fishing-related mortality, would remain unchanged as was the case in the 2008 review. Fisheries New Zealand considers this to be an appropriate approach because there is considerable uncertainty regarding recreational and customary catch levels. Under these circumstances, caution is required to ensure that recreational and customary allowances are adequate to provide for the likely range of customary and recreational catch levels and other fishing-related mortality levels. It is also consistent with the approach taken in the 2008 review.

6.2 PROPOSED OPTIONS FOR EACH STOCK

SFE 20 (ESAs AA and AB)

114. No change is proposed to the SFE 20 TAC, TACC, and allowances as outlined in Table 5.

Table 5: Proposed TAC, TACC and allowances for SFE 11 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – *Status quo*	148	86	30	28	4

[20] The average annual commercial catch for longfin eels reported since the last TACC reduction in 2008 and rounded to the nearest whole tonne.

115. The TAC and TACC for SFE 20 were reduced from 211 tonnes and 149 tonnes (30% and 42% respectively) in 2008.

116. Fisheries New Zealand proposes maintaining the *status quo* for SFE 20 because both of the Eel Statistical Areas (ESAs - refer map in Appendix 2) that make up QMA 20 (AA and AB[21]) are showing an upward trend in CPUE (Figure 5). AA has been steadily increasing since 1994 and AB has been steadily increasing since 2003.

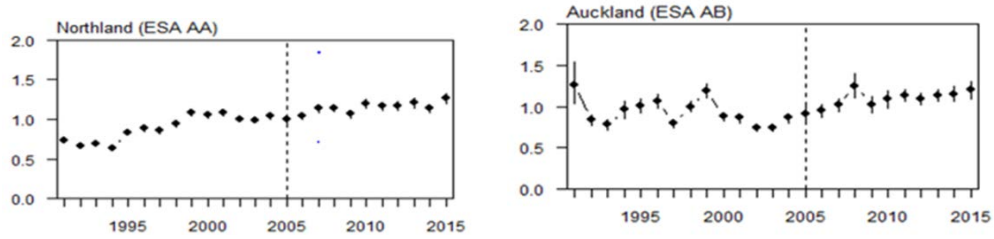

Figure 5: Shortfin CPUE graphs

117. For ESAs AA and AB the Plenary agreed that:
    - AA: increasing trend in CPUE since the early 1990s, but has stabilised over the most recent 6 years (Figure 5); and
    - AB: no clear trend in CPUE until 2003, after which it increases consistently.

118. This assessment is based on limited information and further stakeholder feedback on this option is requested.

LFE 20 (ESAs AA and AB)

119. Proposed options for LFE 20 TAC, TACC, and allowances are given in Table 6.

Table 6: Proposed TACs, TACCs and allowances for LFE 20 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – *Status quo*	39	19	10	8	2
Option 2 – Highest catch	34	14	10	8	2

120. The TAC and TACC for LFE 20 were reduced from 67 tonnes and 47 tonnes (a reduction of 42% and 60% respectively) in 2008.

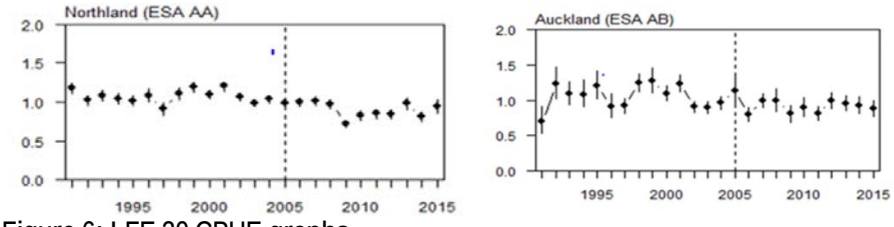

Figure 6: LFE 20 CPUE graphs

121. For ESAs AA and AB the Plenary agreed that:
    - AA: Very slight downward trend in CPUE over the time series (Figure 6); and
    - AB: A slight decline in CPUE to 2005, but stable thereafter.

[21] Refer Map of Eel Statistical Areas in Appendix

122. Option 1 proposes the TAC and TACC remain at the *status quo*. This recognises CPUE has been largely stable since the early 1990s and that, of the two ESAs (AA and AB) that make up this QMA, only 36% and 35% (respectively) of the available eel habitat is commercially fished. Furthermore, when assessing the status of the LFE 20 fish stock, the Plenary concluded LFE 20 is 'likely' (> 60% likelihood) at or above the 'target' and 'very unlikely' (< 10% likelihood) to be below the soft limit or the hard limit. Therefore, without significant changes, longfin eel abundance is expected to continue around existing levels. If in the future longfin abundance is seen to decline, Fisheries New Zealand will look to review the stocks.

123. Option 2 proposes a TAC based on the average annual commercial catch for longfin eels reported since the last TAC reduction in 2008. Basing the TAC and TACC on the average annual commercial catch would significantly reduce the total longfin eel catch available to be taken commercially (the ACE), and the long term catch of longfins eels. This is because catch would be significantly constrained in all years when it would have otherwise been above the long term average. This approach is more likely to support an increase in longfin eel abundance, and takes into account that longfin eels are more biologically vulnerable than shortfin eels, as well as the concerns raised in pre-consultation by some iwi.

124. Fisheries New Zealand proposes to retain current allowances for customary, recreational and other sources of fishing-related mortality under both Option 1 and 2. This is consistent with the approach taken in the 2008 review and the Minister's statutory obligations under the Act, whilst also allowing for the customary take through both customary and recreational allowances[22].

125. This assessment is based on limited information, meaning that further tangata whenua and stakeholder feedback on these options is requested. Fisheries New Zealand also recognises that intermediate options between Option 1 (*status quo*) and Option 2 could be considered, and welcomes feedback on such options.

SFE 21 (ESAs AC, AD, AE and AF)

126. No change is proposed to the SFE 21 TAC, TACC and allowances outlined in Table 7.

Table 7: Proposed TAC, TACC and allowances for SFE 21 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – Average catch	181	134	24	19	4

127. The TAC and TACC for SFE 21 were reduced from 210 tonnes and 163 tonnes (14% and 18% respectively) in 2008 (see Table 3).

128. Fisheries New Zealand proposes maintaining the *status quo* for SFE 21 because three of the four ESAs that make up QMA 21 (AC, AD and AE) are showing an upward trend in CPUE (Figure 7). There is no CPUE graph of AF because there is insufficient commercial fishing activity in this ESA to undertake a CPUE analysis.

[22] Anecdotal evidence suggest that a large proportion of Iwi exercise their customary right to fish by recreationally fishing for eels.

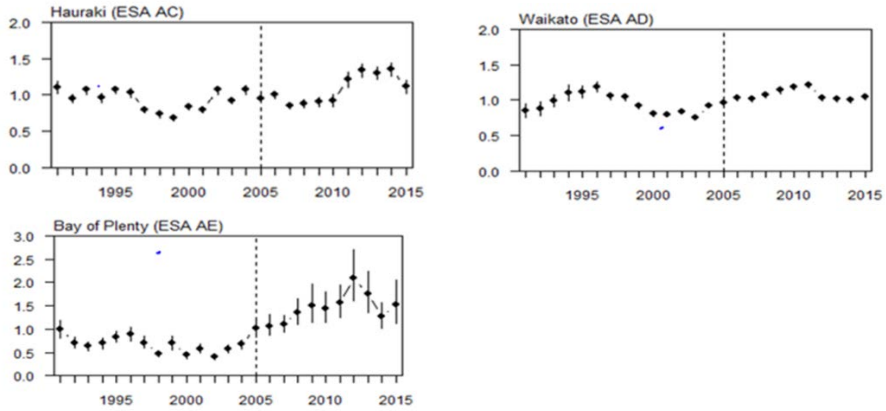

Figure 7: Shortfin CPUE graphs

129. For ESAs AC, AD and AE the Plenary agreed that:
    - AC: No trend in CPUE until 2010, after which it has increased;
    - AD: No long-term trend in CPUE until 2003, after which it increased; and
    - AE: No trend in CPUE until 2002, after which it increases steeply to a peak in 2012.

130. This assessment is based on limited information, and further stakeholder feedback on this option is requested.

LFE 21 (ESAs AC, AD, AE and AF)

131. Proposed options for LFE 21 TAC, TACC, and allowances are given in Table 8.

Table 8: Proposed TACs, TACCs and allowances for LFE 21 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – *Status quo*	60	32	16	10	2
Option 2 – Highest catch	51	23	16	10	2

132. The TAC and TACC for LFE 21 were reduced from 92 tonnes and 64 tonnes (35% and 50% respectively) in 2008 (see Table 4).

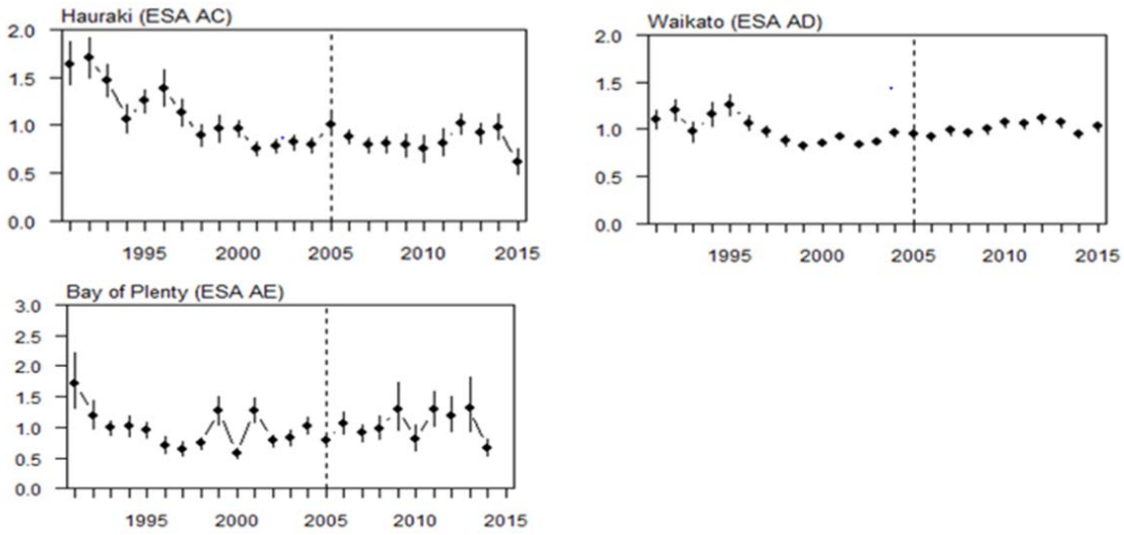

Figure 8: LFE 21 CPUE graphs

133. For ESAs AC, AD and AE the Plenary agreed that:
    - AC: Steep decline in CPUE to 2000/01, and then stable until 2014/15 (Figure 8);
    - AD: A moderate decline in CPUE to 1998, and then a gradual increase to around the level of the former peak by 2014/15; and
    - AE: A steep decline in CPUE to 2000, and then a gradual increase to a peak in 2012/13.

134. There is no CPUE graph of AF because there is insufficient commercial fishing to generate the required amount of data.

135. Option 1 proposes the TAC and TACC remain at the *status quo*. Basing the TAC and TACC on the *status quo* recognises that the CPUE has been stable since 2000 for AC and increasing since 2003 for AD and AE. There is a slight downward turn in CPUE between 2014 and 2015 for AC and AE. Fisheries New Zealand consider this to be natural fluctuation possibly caused by environmental factors, rather than the emergence of a long term trend. AC, AD and AE have 50%, 43.2% and 17.4% (respectively) of their available eel habitat commercially fished.

136. Furthermore, when assessing the status of the LFE 21 fish stock, the Plenary concluded that LFE 21 is 'likely' (> 60% likelihood) at or above the 'target', which in this case means a sustainable harvest level, and that LFE 20 was 'very unlikely' (< 10% likelihood) to be below the soft limit or the hard limit. Therefore, with all other things being equal, and given the positive trend in CPUE across two of the three ESAs that make up this QMA, longfin eel abundance is likely to continue to increase over time. However, if at any point in the future longfin abundance is seen to decline, Fisheries New Zealand will look to review the stocks.

137. Option 2 proposes a TAC and TACC be set based on the average annual commercial catch for longfin eels reported since the last TACC reduction in 2008. Basing the TAC and TACC on the average annual commercial catch would significantly reduce the total longfin eel catch available to be taken commercially, and will reduce the long term catch of longfin eels. This is because the catch would be significantly constrained in all years when it would have otherwise have been above the long term average. This approach takes into account that a lower TAC may support/promote an increase in longfin eel abundance, that longfin eels are more biologically vulnerable than shortfin eels, and the concerns raised in pre-consultation by some iwi.

138. Under both options Fisheries New Zealand proposes to retain current allowances for customary, recreational and other sources of fishing-related mortality. This is consistent with the approach taken in the 2008 review and is also in line with the Minister's statutory obligations under the Act which allows for customary take through both customary and recreational allowances.

139. This assessment is based on limited information, and further stakeholder feedback on these options is requested. Fisheries New Zealand also recognises that intermediate options between Option 1 (*status quo*) and Option 2 could be considered, and welcomes feedback on such options.

SFE 22 (ESAs AG, AK, AL and AM)

140. No change is proposed to the SFE 22 TAC, TACC, and allowances outlined in Table 9.

Table 9: Proposed TAC, TACC and allowances for SFE 22 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – Average catch	121	94	14	11	2

141. The TAC and TACC for SFE 22 was reduced from 135 tonnes and 108 tonnes (a reduction of 10% and 13% respectively) in 2008 (see Table 3).

142. Fisheries New Zealand proposes maintaining the *status quo* for SFE 22 because both of the ESAs it contains (AA and AB) are showing upward trends in CPUE (figure 5). There is no CPUE graph of AM because there is insufficient commercial fishing to generate the required amount of data. AA has been steadily increasing since 1994 and AB has been steadily increasing since 2003.

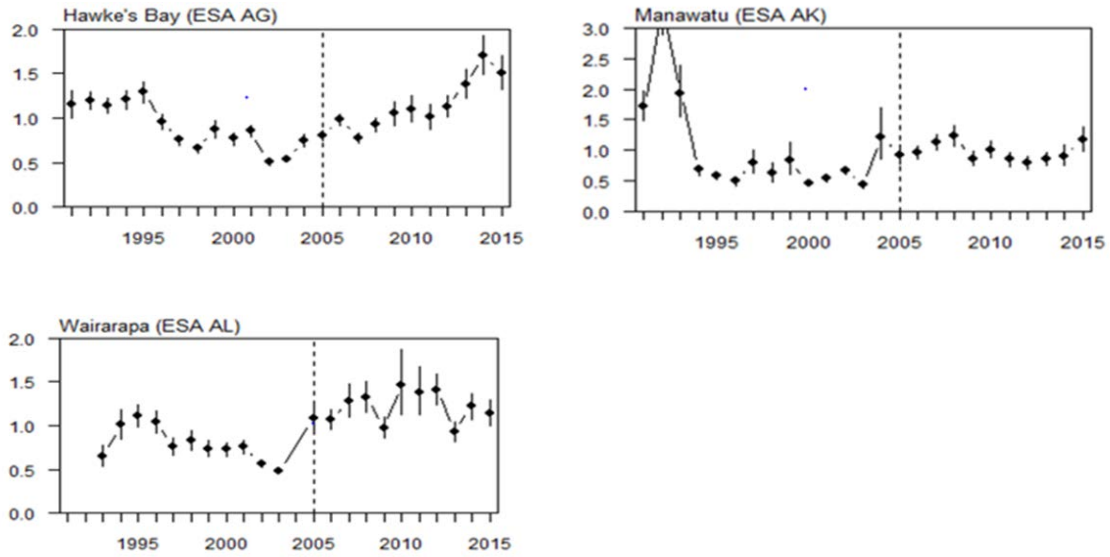

Figure 9: Shortfin CPUE graphs

143. For ESAs AG, AK and AL the Plenary agreed that:
    - AG: CPUE declined until 2002, followed by a steep increase (Figure 9);
    - AK: CPUE dropped markedly from 1992 to 1994, was stable until an increase in 2004, and has fluctuated without trend since then; and
    - AL: CPUE declined from 1995 to 2003, increased in 2005 and has fluctuated without trend since then.

144. This assessment is based on limited information and further stakeholder feedback on this option is requested.

LFE 22 (ESAs AG, AK, AL and AM)

145. Proposed options for LFE 22 TACs, TACCs and allowances are given in Table 10.

Table 10: Proposed TACs, TACCs and allowances for LFE 22 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – *Status quo*	34	21	6	5	2
Option 2 – Average catch	26	13	6	5	2

146. The TAC and TACC for LFE 22 were reduced from 54 tonnes and 41 tonnes (a reduction of 37% and 49% respectively) in 2008 (see Table 4).

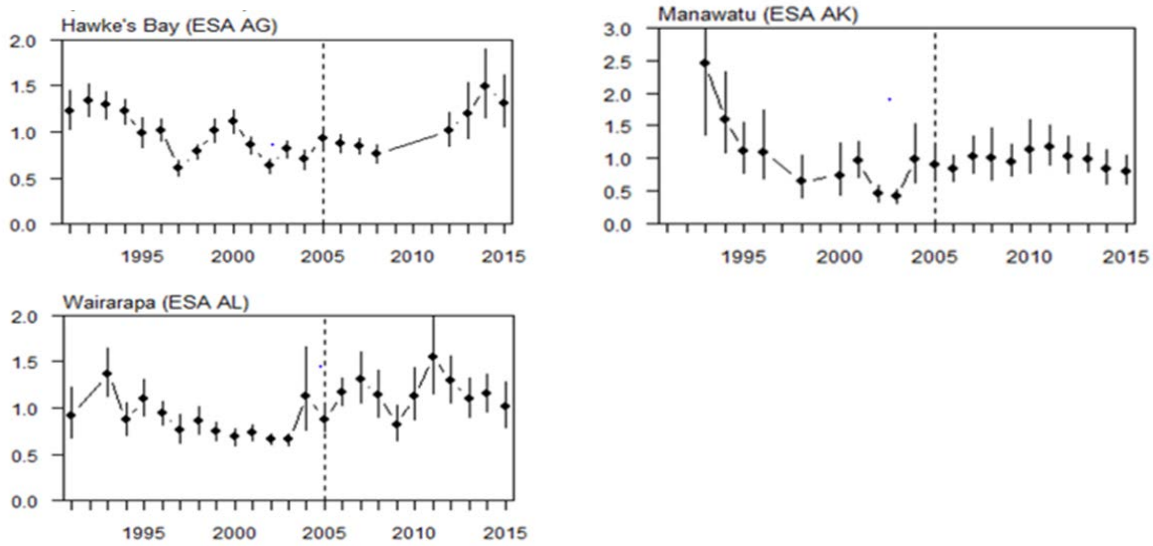

Figure 10: LFE 22 CPUE graphs

147. For ESAs AG, AK and AL the Plenary agreed that:
- AG: CPUE declined until 1997, was stable until 2008 and then increased (Figure 10);
- AK: CPUE declined steeply until 2003, increased in 2004 and has fluctuated without trend since then ; and
- AL: CPUE declined steeply until 2003, increased in 2004 and has fluctuated without trend since then.

148. There is no CPUE graph of AM (Wellington) because there is insufficient commercial fishing to generate the required amount of data.

149. Option 1 proposes the TAC and TACC remain at the *status quo*. Basing the TAC and TACC on the *status quo* recognises that the CPUE has been increasing since entry into the QMS (2004) for ESAs AG and AL and stable for AK. Of the four ESAs that make up this QMA - AG, AK, AL and AM - only 17.3%, 36%, 4.4% and 2.4% respectively of the available eel habitat is commercially fished. Furthermore, when assessing the status of the LFE 22 fish stock, the Plenary concluded LFE 22 is 'likely' (> 60% likelihood) at or above the 'target' and 'very unlikely' (< 10% likelihood) to be below the soft limit or the hard limit. Therefore, with all other things being equal, and given the positive trend in CPUE across two of three ESA that make up this QMA, longfin eel abundance is likely to continue to increase over time. However, if at any point in the future longfin abundance is seen to decline, Fisheries New Zealand will look to review the stocks.

150. Option 2 proposes a TAC based on the average annual commercial catch for longfin eels reported since the last TACC reduction in 2008. Basing the TAC and TACC on the

average annual commercial catch would significantly reduce the total longfin eel catch available to be taken commercially and will reduce the long term catch of longfin eels. This is because the catch would be significantly constrained in all years when it would have otherwise have been above the long term average. This approach takes into account that a lower TAC may support an increase in longfin eel abundance, that longfin eels are more biologically vulnerable than shortfin eels, as well as concerns raised in pre-consultation by some iwi.

151. Under both options Fisheries New Zealand proposes to retain current allowances for customary, recreational and other sources of fishing-related mortality. This is consistent with the approach taken in the 2008 review and the Minister's statutory obligations under the Act and allows for the customary take, through both customary and recreational allowances.

152. This assessment is based on limited information, and further stakeholder feedback on these options is requested. Fisheries New Zealand also recognises that intermediate options between Option 1 (*status quo*) and Option 2 could be considered, and welcomes feedback on such options.

SFE 23 (ESA AH and AJ)

153. No change is proposed to the SFE 20 TAC, TACC, and allowances as outlined in Table 11.

Table 11: Proposed TAC, TACC and allowances for SFE 23 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – *Status quo*	36	23	6	5	2

154. The TAC and TACC for SFE 23 were reduced from 50 tonnes and 37 tonnes (28% and 38% respectively) in 2008 (see Table 3).

155. Fisheries New Zealand proposes maintaining the *status quo* for SFE 23 because of the two ESAs that make up QMA 20, AH is showing an upward trend in CPUE and AJ has a stable trend (refer Figure 11). Fisheries New Zealand notes the CPUE for both these ESAs have declined in recent years but consider that to be natural variation, and that they have both increased overall since entry into the QMA.

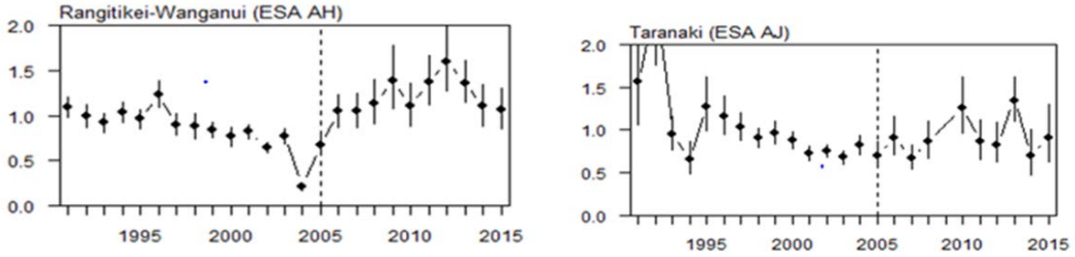

Figure 11: Shortfin CPUE graphs

156. For ESAs AH and AJ the Plenary agreed that:
    - AH: CPUE declined until 2004, then increased steeply until 2012, and then declined through to 2015 (refer Figure 11); and

- AJ: CPUE declined until 2003, followed by a gradual increase.

157. This assessment is based on limited information and further stakeholder feedback on this option is requested.

LFE 23 (ESAs AH and AJ)

158. Proposed options for LFE 23 TACs, TACCs, and allowances are given in Table 12.

Table 12: Proposed TACs, TACCs and allowances for LFE 23 (all values in tonnes)

	TAC	TACC	Customary	Recreational	Other fishing related mortality
Option 1 – *Status quo*	34	9	14	9	2
Option 2 – Average catch	30	5	14	9	2

159. The TAC and TACC for LFE 23 were reduced from 66 tonnes and 41 tonnes (reductions of 48% and 78% respectively) in 2008 (see Table 4).

160. For ESAs AH and AJ the Plenary agreed that:
- AH: No comment due to lack of data (Figure 12); and
- AJ: Moderate decline in CPUE until 2003, increasing to 2012, and then declining to 2015.

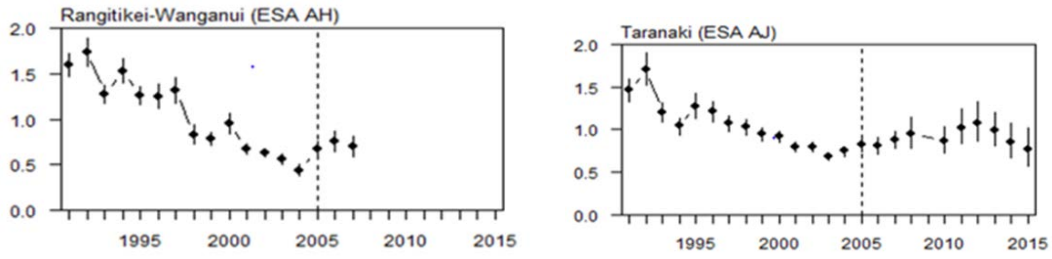

Figure 12: Longfin CPUE graphs

161. Option 1 proposes the TAC and TACC remain at the *status quo*. Basing the TAC and TACC on the *status quo* recognises that the CPUE has a stable trend since entry into the QMS in 2004. Commercial fishing activity in AH and AJ was so low that a CPUE analysis was not possible. It also takes into account that for AH and AJ only 24.8% and 17% (respectively) of the available eel habitat is commercially fished. Furthermore, when assessing the status of the LFE 23 fish stock, the Plenary concluded LFE 23 is 'likely' (> 60% likelihood) at or above the 'target' and 'very unlikely' (< 10% likelihood) to be below the soft limit or the hard limit. Therefore, with all other things being equal and given the upward trend in CPUE for AJ and the very low percentages of available eel habitat that is commercially fished across both AH and AJ, longfin eel abundance is likely to continue to increase over time. However, if at any point in the future longfin abundance is seen to decline, Fisheries New Zealand will look to review the stocks.

162. Option 2 proposes a TAC based on the average annual commercial catch for longfin eels reported since the last TACC reduction in 2008. Basing the TAC and TACC on the average annual commercial catch would significantly reduce the total longfin eel catch available to be taken commercially and will reduce the long term catch of longfin eels. This is because the catch would be significantly constrained in all years when it would

have otherwise have been above the long term average. This approach takes into account that a lower TAC may support an increase in longfin eel abundance, that longfin eels are more biologically vulnerable than shortfin eels, as well as concerns raised in pre-consultation by some iwi.

163. Under both options Fisheries New Zealand proposes to retain current allowances for customary, recreational and other sources of non-commercial fishing-related mortality. This is consistent with the approach taken in the 2008 review, the Minister's statutory obligations under the Act, and allows for the customary take through a combination of customary and recreational allowances.

164. Information on non-commercial catch of eels in the North Island remains highly uncertain. Caution is required to ensure that recreational and customary allowances are adequate to provide for the likely range of customary and recreational catch and other fishing-related mortality levels. Available information suggests current allowances are adequately providing for customary catch (through a combination of customary and recreational allowances) and for recreational catch (which is constrained by a six eel per day bag limit).

165. This assessment is based on limited information and further stakeholder feedback on these options is requested. Fisheries New Zealand also recognises that intermediate options between Option 1 (*status quo*) and Option 2 could be considered, and welcomes feedback on such options.

7 Other Relevant Matters

7.1 MONITORING AND FUTURE REVIEWS

166. North Island eel stocks will continue to be monitored through Fisheries New Zealand's annual review and planning process. Updates to the scientific assessments will occur, with a further stock assessment for North Island eels in three years Depending on the results of this monitoring and the TACs for the longfin and shortfin stocks may be reviewed again at that time to ensure they continue to support the objectives for the fishery.

7.2 TIMING

167. The proposed amendments to TACs and TACCs would be effective on, and from, the first day of the next fishing year – this being 1 October 2018 for all stocks.

8 Further Information

168. Should you require further information, please see:

Fisheries Act (1996)
http://www.legislation.govt.nz/act/public/1996/0088/latest/DLM394192.html

Fisheries New Zealand Plenary document

Freshwater eel Chapter - Ministry for Primary Industries (2017). Fisheries Assessment Plenary, May 2017: stock assessments and stock status. Compiled by the Fisheries Science Group, Ministry for Primary Industries, Wellington, New Zealand, 321 p. (https://fs.fish.govt.nz/Doc/24437/21_EEL_2017.pdf.ashx)

Harvest Strategy Standard

Harvest Strategy Standard for New Zealand Fisheries, October 2008, Ministry of Fisheries. (http://fs.fish.govt.nz/Page.aspx?pk=113&dk=16543)

GIS mapping of the longfin eel commercial fishery throughout New Zealand, and estimates of longfin habitat and proportion fished, New Zealand Fisheries Assessment Report 2016/32, M.P. Beentjes, J. Sykes and S. Crow (http://fs.fish.govt.nz/Page.aspx?pk=113&dk=24053)

Appendix 1 - Parliamentary Commissioner report on longfin eels

169. In 2013, the Parliamentary Commissioner for the Environment released a report outlining the status of longfin eel populations in New Zealand.[23] In this report, the Commissioner made the following recommendations aimed at improving the abundance of longfin eels in New Zealand:
    - That the Minister suspends the commercial catch of longfin eels until longfin eel stocks are shown to have recovered; and
    - That the Minister directs his officials to establish a fully-independent expert peer review panel to assess the full range of information available on the status of the longfin eel population.

170. Subsequently, an independent scientific review of the information available on the status of eels was carried out by a panel of international experts in November 2013.[24] The independent panel concluded that while there was a trend of decline from the early 1990s to the late 2000s, there has been a relatively stable, and in some cases increasing, abundance in recent years.

171. Based on the panel's report, and after consideration of the relevant scientific evidence, the previous Minister for Primary Industries decided that the information available was not sufficient to support a complete closure of the longfin eel fishery.

172. As an alternative, the Minister decided to progress a package of management measures to ensure an increase in the number of longfin eels and their long-term sustainability. These management measures include:
    - A review of catch limits for North and South Island longfin eels to ensure that they will support/promote an increase in longfin eel abundance;
    - A review to consider the separation of South Island longfin and shortfin stocks to support improved management of each species;
    - The introduction of abundance target levels to support assessment of the status of the longfin eel population and rate of rebuild[25]; and
    - Improved information from the commercial longfin eel fishery to better inform stock assessment.[26]

[23] On a pathway to extinction? An investigation into the status and management of the longfin eel, April 2013
[24] www.mpi.govt.nz/Portals/0/Documents/fish/Eel-Review-Report-25-11-2013.pdf
[25] Completed in 2016.
[26] Fisheries New Zealand conducted a review using a more comprehensive and integrated information base to inform the stock assessment process for longfin eels. This included improved commercial catch reporting and additional data provided by universities, the Department of Conservation, and local councils to assist in monitoring eel abundance. Not all of this information was able to be utilised as part of the current stock assessment, but is still being collected and may be used in the future. Fisheries New Zealand is also undertaking research to understand the percentage of available habitat that is commercially fished. The results of this work have been considered in the development of the options presented in this paper.

Appendix 2 - Monitoring of the North Island eel fishery

173. Fisheries New Zealand monitors the North Island eel fishery by reviewing:
    - yearly recruitment of elvers (juvenile eels) to specific dams throughout the North Island; and
    - the catch per unit effort (CPUE) of the commercially fished area within each quota management area (QMA).

174. Elver recruitment is monitored by counting the number of elvers arriving at four dams (two on the East Coast[27] and two on the West Coast[28]) deemed to be representative of rivers throughout the North Island.

175. Patterns in elver recruitment fluctuate strongly year to year. This is because elvers migrate back to New Zealand, from their breeding ground in the Pacific Ocean, through a combination of active swimming and passively floating on ocean currents. Therefore the amount of eels successfully returning in any given year can be severely affected by ocean currents and climatic conditions. While recruitment to these four dams fluctuate yearly, there is no negative trend (declining) over time.

176. CPUE analysis is a measure of abundance within the commercially fished areas of each eel statistical area (ESA) based on the ease of which a commercial fisher can catch their allocated Annual Catch Entitlement (ACE). With all other things being equal, if over time it gets easier for a commercial fisher to catch their ACE, it can be assumed the abundance of eels is increasing (i.e. it is easier to catch the eels because there are more eels there to be caught). However, if over time it gets harder for commercial fishers to catch their ACE it can be assumed that eel abundance is decreasing over time (i.e. it is getting harder because there are less eels there to be caught).

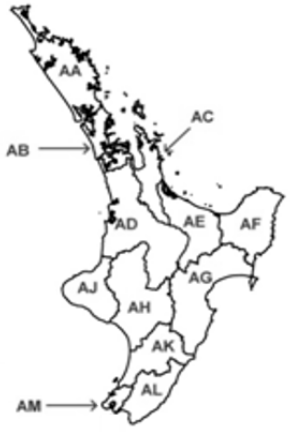

Figure 13: Eel Statistical Area codes

177. When undertaking a CPUE analysis, each QMA is broken into the smaller Eel Statistical Areas (ESAs) which is the scale at which commercial fishers report their catch. For all ESAs across the North Island the CPUE is increasing for shortfin and stable or increasing for longfin since at least the early 2000s, with the exception of ESAs AF, AM and AH where there is insufficient commercial fishing activity to generate a CPUE analysis.

[27] Wairua Falls and Matahina Dam.
[28] Karapiro Dam and Patea Dam.

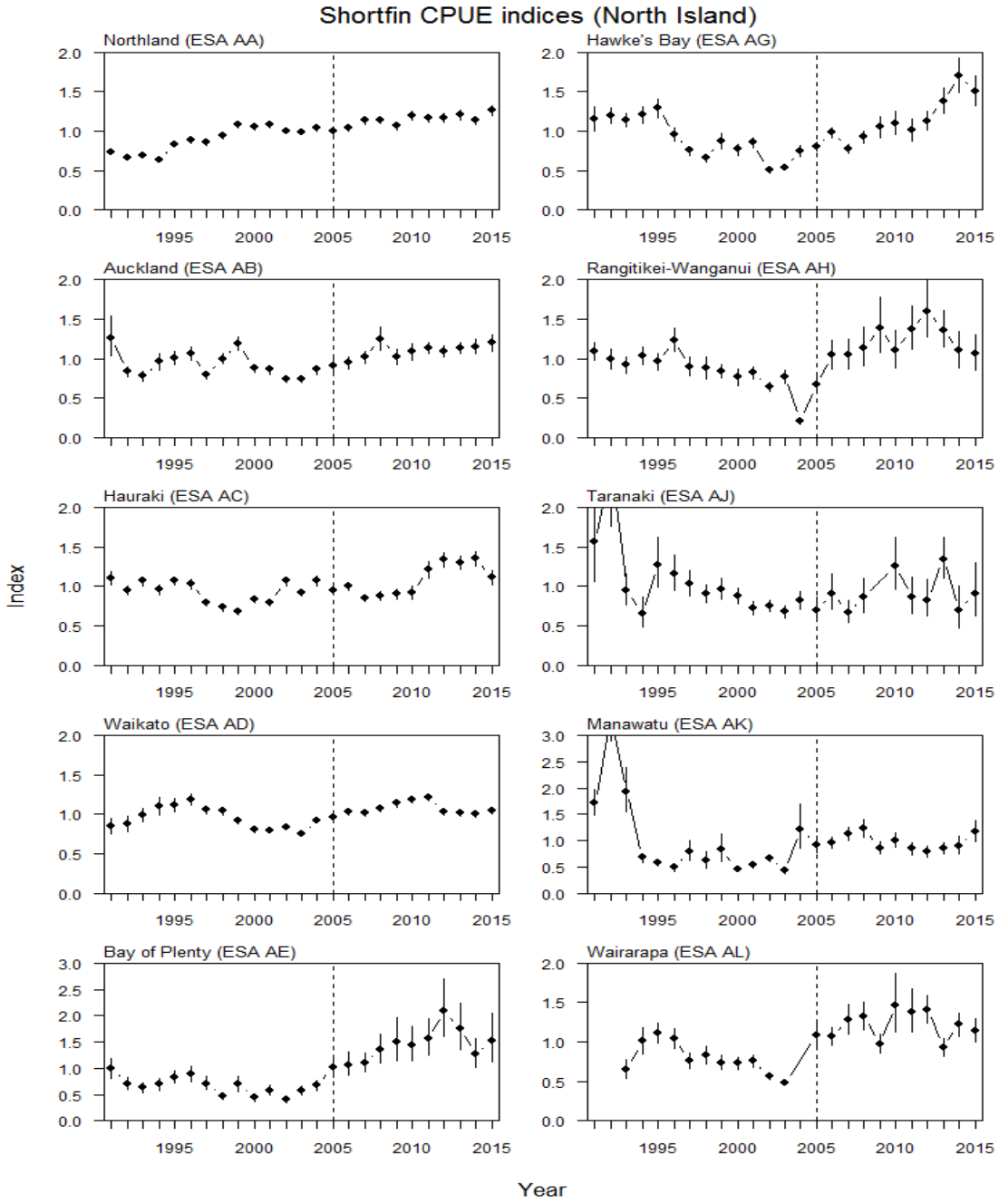

Figure 14: Shortfin CPUE analysis per Eel Statistical Area (ESA).
Note: the dotted line indicates entry into the QMS.
QMA 20 = AA and AB
QMA 21 = AC, AD, AE, and AF
QMA 22 = AG, AK, AL and AM

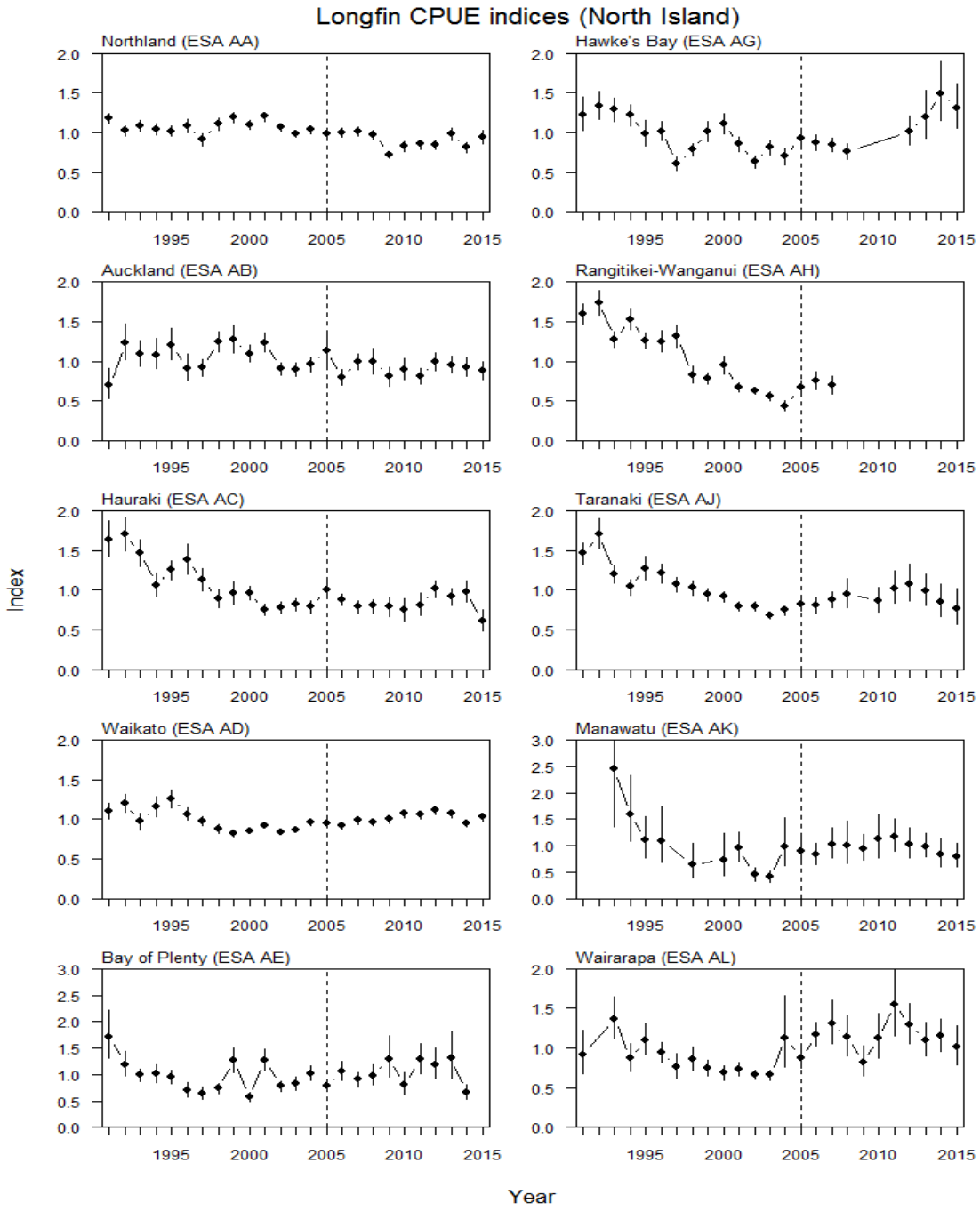

Figure 15: Longfin CPUE analysis per Eel Statistical Area (ESA).
Note: the dotted line indicates entry into the QMS.
QMA 20 = AA and AB
QMA 21 = AC, AD, AE, and AF
QMA 22 = AG, AK, AL and AM

178. When reviewing the CPUE data it is important to note that the CPUE trend is biased low (the trend shown is not as positive as it should be) for the following reasons:

    - In 2012-13 the escape tube diameter on all commercial fishing nets was increased from 25 mm to 31 mm. This allows eels up to 300 grams, which are above the 220 grams minimum legal size [29] to escape, unharmed. As eels less that 300 grams, but

[29] The minimum legal size for commercially caught eels is 220 grams. The increase in escape tube meant legal eels between 220 grams and 300 grams were escaping and not being record.

above 220 grams are commercially legal, they should be recorded prior to release and included in abundance estimates, which doesn't happen as they are able to escape through the escapement tubes.

- Failure of some fishers to record on catch return forms all legal sized eels caught, not just those retained. Due to limitations in ACE for longfins, a substantial portion of the catch is often returned to the water. Not recording this results in underestimated CPUE/abundance. ACE became limited after longfin TACCs were severely cut in 2007, and even more so during recent years when many iwi, concerned with longfin sustainability, shelved their quota.

- Unrecorded release of eels over 4 kg (over 2 kg in Waikato co-management area). The 4 kg maximum legal size was introduced in 2007/08, with no statutory requirement to record the weight of returned eels. CPUE before 2007/08 includes eels over 4 kg, but after this date it does not. A voluntary logbook programme on the South Island involving commercial fishers showed that large numbers of large eels are returned, however this data is not available for the North Island.

179. It is also important to note that the CPUE analysis only applies to the areas of each ESA that are commercially fished. Therefore, it can be assumed that the actual eel abundance is higher than what is reflected in the CPUE analysis. This is because eel habitat outside the commercially fished area acts as a refuge from commercial fishing.

180. In addition to this work, Fisheries New Zealand commissioned a research project in 2014 to determine the proportion of longfin habitat within each ESA that was fished commercially and also impacted by anthropogenic activity (e.g. hydro dams). The amount of available eel habitat within each ESA that is commercially fished was determined from face-to-face interviews with fishers. The area of each ESA not fished included:
    - Department of Conservation estate;
    - Areas closed by Fisheries New Zealand to commercial fishing (e.g. Whanganui, Motu, and Mohaka Rivers); and
    - Inaccessible areas and streams too small to be commercially viable.

181. The total proportion of longfin habitat was determined using computer models based on presence absence data (where eels have been observed versus where they have not been observed) from the New Zealand Fresh Water Fish Data Base (NZFWFDB) and environmental predictors on the REC2 database.

182. From this information, it was possible to determine the percentage of available eel habitat within each ESA that is commercially fished. The results showed that between 2% (ESA AM) and 50% (ESA AC) of any ESA is commercially fished. Conversely, this means that between 98% and 50% of the available eel habitat within any ESA is not commercially fished (refer Table 13).

183. Across the entire North Island only 22% of the available longfin eel habitat is commercially fished, leaving 78% of available eel habitat unaffected by commercial fishing.

Table 13 Percentage of available eel habitat within each eel statistical area (ESA) that is commercially fished and impacted.

QMA	Eel Statistical Area	Current habitat fished	Max. impacted area Percent (%)
LFE 20	AA	36.1	40.2
LFE 20	AB	34.9	38.2
LFE 21	AC	50.0	55.0
LFE 21	AD	43.2	55.7
LFE 21	AE	17.4	23.9
LFE 21	AF	8.6	13.6
LFE 22	AG	17.3	24.7
LFE 22	AK	36.0	40.6
LFE 22	AL	4.2	5.0
LFE 22	AM	2.4	7.4
LFE 23	AH	24.8	29.9
LFE 23	AJ	17.0	23.6
All NI	All NI	22.5	29.0

Appendix 3 - Statutory Considerations

184. This section provides an overview of the Minister's legal obligations under the Fisheries Act 1996 (the Act or the Fisheries Act) when setting or varying TACs, and TACCs for New Zealand fish stocks.

A3.1 SECTION 5(B) – TREATY OF WAITANGI (FISHERIES CLAIMS) SETTLEMENT ACT 1992

185. Section 5(b) says the Act is to be interpreted, and all persons exercising or performing functions, duties, or powers under it are required to act, in a manner consistent with the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (the Settlement Act). This obligation furthers the agreements expressed in the Deed of Settlement referred to in the Preamble to the Settlement Act.

186. The development of customary regulations, Iwi Fisheries Forums, and providing for the input and participation of iwi in fisheries decisions, discussed elsewhere in this paper, are some of the ways in which the obligations in the Settlement Act are given effect to.

A3.2 SECTION 8 – PURPOSE OF THE FISHERIES ACT 1996

187. Section 8 says the purpose of the Act is to provide for the utilisation of fisheries resources while ensuring sustainability.

188. "Ensuring sustainability" is defined as: "maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment". "Utilisation" of fisheries resources is defined as "conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural wellbeing."

189. The Supreme Court has stated that the purpose statement incorporates "the two competing social policies reflected in the Act" and that "both policies are to be accommodated as far as is practicable in the administration of fisheries under the quota management system....[I]n the attribution of due weight to each policy that given to utilisation must not be such as to jeopardise sustainability".[30]

A3.3 SECTION 9 – ENVIRONMENTAL PRINCIPLES

190. Section 9 prescribes three environmental principles that the Minister must take into account when exercising powers in relation to the utilising of fisheries resources or ensuring sustainability.

[30] Recreational Fishing Council Inc v Sanford Limited and Ors [2009] NZSC 54 at [39].

Principle 1: Associated or dependent species should be maintained above a level that ensures their long-term viability.

191. The Act defines "associated and dependent species" as any non-harvested species taken or otherwise affected by the taking of a harvested species. "Harvested species" is defined to mean any fish, aquatic life or seaweed that may for the time being be taken with lawful authority. So this principle is focussed on species (such as protected species) for which a permission to target commercially cannot be given.

192. The term "long-term viability" (in relation to a biomass level of a stock or species) is defined in the Act as a low risk of collapse of the stock or species, and the stock or species has the potential to recover to a higher biomass level. This principle therefore requires the continuing existence of species by maintaining populations in a condition that ensures a particular level of reproductive success.

193. Where fishing is affecting the viability of associated and dependent species, appropriate measures such as method restrictions, area closures, and potentially adjustments to the TAC of the target stock should be considered.

Principle 2: Biological diversity of the aquatic environment should be maintained.

194. "Biological diversity" is defined in the Act as 'the variability among living organisms, including diversity within species, between species, and of ecosystems'. Determining the level of fishing or the impacts of fishing that can occur requires an assessment of the risk that fishing might cause catastrophic decline in species abundance or cause biodiversity to be reduced to an unacceptable level.

Principle 3: Habitat of particular significance for fisheries management should be protected.

195. Habitat is defined in the Oxford Dictionary of English to mean the natural home or environment of an animal, plant or species. In Fisheries New Zealand's view, in the fisheries context, this means those waters and substrates necessary for fish to spawn, breed, feed or grow to maturity. These should be protected and adverse effects on them avoided, remedied, or mitigated.

A3.4 SECTION 10 – INFORMATION PRINCIPLES

196. Section 10 prescribes four information principles that the Minister must take into account when exercising powers in relation to the utilising of fisheries resources or ensuring sustainability:
    a) Decisions should be based on the best available information;
    b) Decision makers should take into account any uncertainty in the available information;
    c) Decision makers should be cautious when information is uncertain, unreliable, or inadequate; and
    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 the Act.

197. Less than full information suggests caution in decision-making, not deferral of a decision completely. "The fact that a dispute exists as to the basic material upon which the decision must rest, does not mean that necessarily the most conservative approach must be adopted. The obligation is to consider the material and decide upon the weight which can be given it with such care as the situation requires."[31]

[31] *Greenpeace NZ Inc v Minister of Fisheries* (HC, Wellington CP 492/93, 27/11/95, Gallen J) p 32.

198. Both scientific and anecdotal information need to be considered and weighed accordingly when making management decisions. The weighting assigned to particular information is subject to the certainty, reliability, and adequacy of that information.

199. As a general principle, information outlined in the Fisheries New Zealand Fishery Assessment Plenary Report is considered the best available information on stock status and should be given significant weighting. The information presented in the Plenary Report is subject to a robust process of scientific peer review and is assessed against the Research and Science Information Standard for New Zealand Fisheries.[32] Corroborated anecdotal information also has a useful role to play in the stock assessment process and in the management process.

A3.5 SECTION 11 – SUSTAINABILITY MEASURES

200. Section 11(1) allows sustainability measures (such as a TAC) to be set or varied after the following factors are taken into account:
    (a) Any effects of fishing on the stock and the aquatic environment
    (b) Any existing controls that apply to the stock or area concerned
    (c) The natural variability of the stock concerned.

    These factors are discussed in the section of the decision document relating to each stock.

201. Section 11(2) says that before any sustainability measure is set or varied the Minister must have regard to any provision of:
    (a) Any regional policy statement, regional plan, or proposed regional plan under the Resource Management Act 1991;
    (b) Any management strategy or management plan under the Conservation Act 1987 that apply to the coastal marine area and which the Minister considers to be relevant;
    (c) Sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000;
    (ca) regulations made under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012; and
    (d) a planning document lodged with the Minister of Fisheries by a customary marine title group under section 91 of the Marine and Coastal Area (Takutai Moana) Act 2011

    that apply to the coastal marine area and are considered to be relevant.

202. Section 11 (2A) requires the Minister take into account:
    (a) Any conservation services or fisheries services;
    (b) Any relevant fisheries plan approved under this Part-see discussion of section 11A below; any
    (c) Any decisions not to require conservation services or fisheries services.

[32] A non-binding Fisheries New Zealand Policy Document.

203. Services of particular relevance to the decisions in this paper relate to programmed research used to monitor stock abundance. To date national fisheries plans have been approved only for deepwater and highly migratory species.

A3.6 SECTION 12 – CONSULTATION AND INPUT AND PARTICIPATION OF TANGATA WHENUA

204. Section 12(1) says that before setting or varying any sustainability measure under the Act the Minister is required to:
    - consult with those classes of persons having an interest in the stock or the effects of fishing on the aquatic environment in the area concerned, including, but not limited to, Māori, environmental, commercial and recreational interests; and
    - provide for the input and participation of tangata whenua having a non-commercial interest in the stock concerned or an interest in the effects of fishing on the aquatic environment in the area concerned; and have particular regard to kaitiakitanga.

205. The Act defines Kaitiakitanga to mean "the exercise of guardianship; and, in relation to any fisheries resources, includes the ethic of stewardship based on the nature of the resources, as exercised by the appropriate tangata whenua in accordance with tikanga Māori", where tikanga Māori refers to Māori customary values and practices.

206. Iwi Fisheries Forums and Forum Fisheries Plans are the main ways in which input and participation of tangata whenua is provided for. Information provided by Forums and iwi views on the management of fisheries resources and fish stocks set out in iwi Fisheries Plans express how tangata whenua exercise kaitiakitanga in respect of the stocks and areas in this sustainability round.

207. Section 12 (2) says that as soon as practicable after setting or varying any sustainability measure, the Minister shall give the persons consulted under 12(1), the reasons in writing for his or her decisions.

A3.7 SECTIONS 13 &14 - SETTING AND VARIATION OF THE TOTAL ALLOWABLE CATCH (TAC)

Section 13 – Total Allowable Catch

208. The TAC for most stocks in the Quota Management System (QMS) is set under section 13 of the Act.

209. Under s 13 the general premise is to set a TAC that maintains the biomass of a fishstock at or above a level that can produce the maximum sustainable yield (MSY). That biomass level is abbreviated as B_{MSY}.

210. MSY is defined, in relation to any fish stock, as being the greatest yield that can be achieved over time while maintaining the stock's productive capacity, having regard to the population dynamics of the stock and any environmental factors that influence the stock.

211. Section 13(2) of the Act requires a TAC to be set that maintains a stock at or above MSY or that moves or restores it to or above that level, having regard to the interdependence of stocks.

212. Section 13(2A) says that if the Minister considers that the current level of a stock or the level of a stock that can produce the MSY is not able to be estimated reliably using the best available information, he or she must:
    - not use this lack of information as a reason for postponing, or failing to set a TAC for the stock, and
    - have regard to the interdependence of stocks, the biological characteristics of the stock and any environmental conditions affecting the stock, and
    - set a TAC using the best available information that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, a level which can produce the MSY.

213. The Minister may set the TAC to achieve the objective in a way and rate which has regard to the interdependence of stocks and within a period appropriate to the stock.

214. 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 (s13(3)) the Minister may have regard to such social, cultural, and economic factors as he or she considers relevant. This provision applies to TACs set under s13(2) or s13(2A) (if applicable).

215. The obligation to have regard to the interdependence of stocks when setting a TAC requires consideration of the effects of fishing on associated stocks harvested with the target stock. Examples include other non-target fish species (bycatch) or benthic species that are incidentally impacted by trawl gear. The role of the target stock in the food chain should also be considered. In particular, interdependence involves a direct trophic (i.e. one stock is likely to be directly affected through a predator or prey relationship by the abundance of another stock) relationship between stocks.

Section 14 – Alternative total allowable catch for stock specified in Schedule 3

216. Section 14 says that notwithstanding anything in section 13, if satisfied, in the case of any quota management stock listed in Schedule 3, that the purpose of this Act would be better achieved by setting or varying a TAC otherwise than in accordance with section 13(2) the Minister may at any time, set or vary a TAC for that stock that he or she considers appropriate to achieve the purpose of this Act. In other words section 14 allows a TAC to be set or varied for the limited number of stocks listed on Schedule 3 otherwise than by reference to B_{MSY}.

217. Schedule 3 stocks are ones where:
    - it is not possible because of the biological characteristics of the stock to estimate B_{MSY};
    - a national allocation for New Zealand has been determined as part of an international agreement;
    - the stock is managed on a rotational or enhanced basis; or
    - the stock comprises one or more highly migratory species.

218. Section 14(8) of the Act allows for stocks to be added to or deleted from Schedule 3.

A3.8 SECTIONS 20 & 21 - SETTING AND VARIATION OF THE TOTAL ALLOWABLE COMMERCIAL CATCH (TACC)

219. After setting or varying the TAC, a separate decision arises in respect of allocating the TAC, i.e., deciding what portion of the TAC is to be available for commercial and other purposes.

220. Section 20 requires a TACC to be set for each QMS stock and allows it to be varied from time to time. A TACC can be set at zero. This would occur in situations where the TAC was set at zero for sustainability reasons (i.e. the fishery was closed).

221. Section 21 of the Act says that in setting or varying the TACC the Minister must have regard to the TAC and allow for:
    a) M□ori customary non-commercial fishing interests;
    b) Recreational interests; and
    c) All other mortality to that stock caused by fishing.

222. The Courts have in a number of cases considered what is involved in allowing for non-commercial interests. In Snapper 1[33] the Court of Appeal said that the recreational allowance is simply the best estimate of what recreational fishers will catch while being subject to the controls which the Minister decides to impose upon them e.g. bag limits and minimum lawful sizes. Having set the TAC the Minister in effect apportions it between the relevant interests.[34]

223. The Supreme Court in Kahawai[35] endorsed this approach and said that the words "allow for" require the Minister both to take into account the interests and make provision for them in the calculation of the TACC.[36] The Supreme Court went on to say that ss 20 and 21 prescribe a framework within which the Minister must operate when setting the TACC. The frame work requires apportionment of the TAC by the Minister among the various interests and other mortality. The sequential nature of the method of allocation provided for in s 21 does not indicate that non-commercial fishing interests are to be given any substantive priority over commercial interests. In particular the allowance for recreational interests is to be made keeping commercial interests in mind.[37]

224. The Supreme Court further said that in the end, within the limits provided for by the Act, the Minister makes a policy decision as to what allocations are appropriate for non-commercial interests and other mortality and what is to be the TACC. These decisions are interdependent. The Act does not confer priority for any interests over the other. It leaves that to the judgment of the Minister.[38]

225. Under the customary fishing regulations [Fisheries (Kaimoana Customary Fishing) Regulations 1998], customary take is regulated through the authorisation system which requires that all customary fishing is to be undertaken in accordance with tikanga and the overall sustainability of the fishery. This framework was put in place to give effect to legal obligations in the Settlement Act. [39]

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[33] New Zealand Fishing Industry Association (Inc) v Minister of Fisheries CA 82/97, 22 July 1997 ("Snapper 1").
[34] Snapper 1, p 17.
[35] New Zealand Recreational Fishing Council Inc v Sanford Limited [2009] NZSC 54 ("Kahawai")
[36] Kahawai [55]
[37] Kahawai [61]
[38] Kahawai [65]
[39] Where the customary regulations don't apply customary fishing is regulated under regulations 50-52 of the Fisheries (Amateur Fishing) Regulations 2013 and a similar authorisation system applies.

226. When allowing for Māori customary non-commercial interests, the Minister must take into account:
   a) Any m□taitai reserve in the relevant quota management area; and
   b) Any temporary area closure or temporary fishing method restriction or prohibition imposed in the area for the purposes of improving the availability or size of a species for customary fishing purposes or recognising a customary fishing practice in the area.

227. The intent is that the purposes of measures enacted to provide for customary fishing are not adversely affected or reasons for limited customary take are ignored when setting the customary allowance.

228. An allowance is to be made for all other mortality to a stock that results from fishing. This includes illegal catch, discards, and incidental mortality from fishing gear.

A3.9 HAURAKI GULF MARINE PARK ACT 2000

229. Section 11(2) of the Fisheries Act requires the Minister to have regard to sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000 (HGMPA) when setting or varying a sustainability measure (such as a TAC).

230. Section 13 of the HGMPA says all persons exercising powers or carrying out functions for the Hauraki Gulf under various specified Acts, including the Fisheries Act, must, in addition to any other requirement specified in those Acts, have particular regard to sections 7 and 8 of the HGMPA. This would apply to the setting or varying of TACCs.

231. Section 7(1) of the HGMPA says the interrelationship between the Hauraki Gulf, its islands, and catchments and the ability of that interrelationship to sustain the life-supporting capacity of the environment of the Hauraki Gulf and its islands are matters of national significance.

232. Section 7(2) says the life-supporting capacity of the environment of the Gulf and its islands includes the capacity—
   (a) to provide for—
      (i) the historic, traditional, cultural, and spiritual relationship of the tangata whenua of the Gulf with the Gulf and its islands; and
      (ii) the social, economic, recreational, and cultural well-being of people and communities:
   (b) to use the resources of the Gulf by the people and communities of the Gulf and New Zealand for economic activities and recreation:
   (c) to maintain the soil, air, water, and ecosystems of the Gulf.

233. Section 8 says that to recognise the national significance of the Hauraki Gulf, its islands, and catchments, the objectives of management are:
   (a) the protection and, where appropriate, the enhancement of the life-supporting capacity of the environment of the Hauraki Gulf, its islands, and catchments:
   (b) the protection and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments:
   (c) the protection and, where appropriate, the enhancement of those natural, historic, and physical resources (including kaimoana) of the Hauraki Gulf, its

islands, and catchments with which tangata whenua have an historic, traditional, cultural, and spiritual relationship:

(d) the protection of the cultural and historic associations of people and communities in and around the Hauraki Gulf with its natural, historic, and physical resources:

(e) the maintenance and, where appropriate, the enhancement of the contribution of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments to the social and economic well-being of the people and communities of the Hauraki Gulf and New Zealand:

(f) the maintenance and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments, which contribute to the recreation and enjoyment of the Hauraki Gulf for the people and communities of the Hauraki Gulf and New Zealand.