Fisheries New Zealand
Tini a Tangaroa

Review of Sustainability Measures for East Coast South Island Multi-species Trawl Fishery for 2020/21

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Contents

Page

1 Stocks being reviewed

Blue moki (MOK 3)
Latridopsis ciliaris, moki

Leatherjacket (LEA 3)
Parika scaber, kokiri

Red gurnard (GUR 3)
Chelidonichthys kumu, kumukumu, pūwhaiau

Rig (SPO 3)
Mustelus lenticulatus, mango, manga, kāpeta

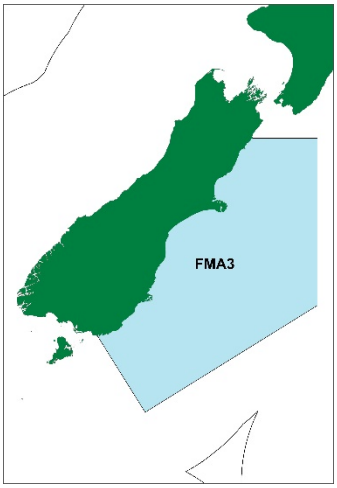

Figure 1: South-East Coast Fisheries Management Area 3

2 Summary

1. Fisheries New Zealand is proposing to review the sustainability measures for blue moki, leatherjacket, red gurnard, and rig, which are part of the East Coast South Island multi-species trawl fishery (FMA 3), for the 1 October 2020 fishing year.

2. The best available information suggests that increases to the total allowable catch (TAC) for blue moki, leatherjacket, red gurnard, and rig could be considered. Fisheries New Zealand proposes the following options for these stocks:

3. **MOK 3:** Available scientific information, last updated in 2017, suggests MOK 3 is being fished below its target mortality rate, and very unlikely (<10%) to be overfished. Catch per unit effort (CPUE) indicates a potential increase in abundance since 2005-06. Fisheries New Zealand proposes three options for consultation.

   Option 1 is the status quo. This is the most cautious option that places most weight on the uncertainty associated with this assessment. It retains the TAC at 197 tonnes, the total allowable commercial catch (TACC) at 160 tonnes and all allowances as currently set.

   Option 2 sets the TAC at 216.6 tonnes, within this TAC the TACC would be set at 176 tonnes and the recreational allowance increased by two tonnes. The allowance for other sources of mortality from fishing would increase by 1.6 tonnes. It allows for some increased utilisation, reflecting increased catch and abundance.

   Option 3 sets the TAC at 234.2 tonnes, within this TAC the TACC would be set at 192 tonnes and the recreational allowance would increase by two tonnes. The allowance for other sources of mortality from fishing allowance would increase by 3.2 tonnes. It provides the greatest economic benefits, but with potentially greater sustainability risk.

4. **LEA 3:** Scientific information on LEA 3 is limited. CPUE information and the East Coast South Island trawl survey suggests abundance may have increased in parts of LEA 3. Fisheries New Zealand proposes two options for consultation.

   Option 1 is the status quo. It retains the TAC at 140 tonnes and the TACC at 130 tonnes and all allowances as currently set. This option defers any change pending further research to assess the degree to which changes in fishing practices and economic drivers may have influenced CPUE trends.

   Option 2 sets the TAC at 160.3 tonnes, within this TAC the TACC would be set at 143 tonnes. The allowance for other mortality caused by fishing would be increased by 7.3 tonnes. This option reflects increases in the CPUE and biomass index since 2008 and allows for additional utilisation.

5. **GUR 3:** Scientific information from 2015 suggests GUR 3 is at or above the Harvest Strategy Standard target of 40% SB_0 and above the soft and hard limit. CPUE and the most recent East Coast South Island trawl survey suggest high relative abundance, and that a modest increase in the TAC could be considered to help address difficulties avoiding gurnard when targeting other species of the mixed fishery. Fisheries New Zealand proposes two options for consultation.

   Option 1 is the status quo. This option retains the TAC at 1,593 tonnes, the TACC at 1,320 tonnes and all allowances as currently set.

   Option 2 sets the TAC at 1,606.2 tonnes, within this TAC the TACC would be set at 1,452 tonnes. The allowance for other mortality caused by fishing would decrease by 118.8 tonnes given updated information and improved fishing practises.

6. **SPO 3:** Available scientific information from 2019 suggests SPO 3 is at or above the Harvest Strategy Standard target of 40% SB_0 and above the soft and hard limit. An increasing trend in the bottom trawl CPUE series and from the East Coast South Island trawl survey suggests high abundance and that a modest increase in the TAC could be considered. Fisheries New Zealand proposes two options for consultation.

   Option 1 is the status quo. This option retains the TAC at 710 tonnes and the TACC at 600 tonnes and all allowances as currently set.

   Option 2 sets the TAC at 806 tonnes, within this TAC the TACC would be set at 660 tonnes and the fishing mortality allowance increased by 36 tonnes. Other allowances would remain at the current settings.

7. Fisheries New Zealand seeks your input and views on the options proposed.

3 Quota Management System

8. Blue moki, leatherjacket, red gurnard, and rig within New Zealand are managed using the Quota Management System (QMS), with a 1 October to 30 September fishing year. For more information about the QMS go to https://www.mpi.govt.nz/law-and-policy/legal-overviews/fisheries/quota-management-system/.

4 Legal basis for managing fisheries in New Zealand

9. The Fisheries Act 1996 provides the legal basis for managing fisheries in New Zealand, including the Minister's responsibilities for setting and varying sustainability measures. See the separate document *Overview of legislative requirements and other considerations* at https://www.fisheries.govt.nz/dmsdocument/40502 for more information.

4.1 28N rights

10. There are 28N rights[1] associated with the SPO 3 fishery. Any change to the TACC as part of the October 2020 Sustainability Round will have an impact on those rights. When 28N rights are triggered in a fishery through an increase to the TACC, they are honoured by reallocating quota shares from other quota holders in the fishery to the rights holders – in this case the tonnage held may increase but the percentage share of other quota holders in the fishery decreases.

11. Reallocation of quota shares not only increases the catch entitlement of the 28N rights holder, but also alters the proportionate shares of all quota owners in the stock, including decreasing the settlement proportion.

[1] Some quota share owners have preferential allocation rights (also known as 28N rights). Preferential allocation rights are a weight of quota that an individual is entitled to receive when the TACC increases. If there is a TACC increase, the benefits of the increase will be applied to those with preferential allocation rights first. For more information see: https://www.fishserve.co.nz/information/quota-shares#Top

5 Treaty of Waitangi Obligations

5.1 Input and participation of tangata whenua

12. Iwi Fisheries Forums and Forum Fisheries Plans provide for input and participation of tangata whenua. Te Waka a Māui me Ōna Toka Iwi Forum (the forum) is the Te Wai Pounamu (South Island) iwi fisheries forum — it includes all nine tangata whenua Iwi of Te Wai Pounamu: Ngāti Apa ki Ratō, Ngāti Kōata, Ngāti Kuia, Ngāti Rarua, Ngāti Tama, Ngāti Tōarangatira, Rangitāne ō Wairau, Te Ati Awa and Ngai Tahu.

13. In March 2020, Fisheries New Zealand provided forum members with fisheries management material for discussion at a hui scheduled for 18 March 2020. This material included possible stocks for review in the 2020 sustainability round for forum members to input into the proposed management settings. Due to COVID-related travel restrictions the intended hui on 18 March 2020 was cancelled and input from the forum has been impacted.

14. Any further input from the nine tangata whenua Iwi of Te Wai Pounamu will be by electronic means and will be included in the final advice and recommendations provided to the Minister. Input provided may result in an alternative option being presented to the Minister for his decision on the management settings for blue moki in MOK 3, leatherjacket in LEA 3, red gurnard in GUR 3 and rig in SPO 3.

5.2 Kaitiakitanga

15. Blue moki, red gurnard, and rig are identified as taonga species in the Te Waipounamu Iwi Forum Fisheries Plan; in addition, the Te Waka a Maui me Ona Toka Iwi Forum considers all fish species taonga. The Forum Fisheries Plan contains objectives to support and provide for the interests of South Island iwi, including the following which are relevant to the options proposed in this paper:

    - **Management objective 1:** To create thriving customary non-commercial fisheries that support the cultural wellbeing of South Island iwi and whanau;

    - **Management objective 3:** To develop environmentally responsible, productive, sustainable and culturally appropriate commercial fisheries that create long-term commercial benefits and economic development opportunities for South Island iwi; and

    - **Management objective 5:** to restore, maintain and enhance the mauri and wairua of fisheries throughout the South Island.

16. The following customary management areas are located within FMA 3:

    - the taiāpure of Te Taumanu o Te Waka a Māui (Kaikōura), Oaro-Haumuri (Kaikōura), Akaroa Harbour (Canterbury), East Otago (Otago)

    - the mātaitai reserves of Te Waha o te Marangai (Kaikōura), Mangamaunu (Kaikōura), Kahutara (Kaikōura), Oaro (Kaikōura), Tūtaeputaputa (Kaikōura), Lyttelton Harbour/Whakaraupo (Banks Peninsula), Rapaki Bay (Banks Peninsula), Koukourārata (Banks Peninsula), Wairewa/Lake Forsyth (Banks Peninsula), Te Kaio (Banks Peninsula), Opihi (South Canterbury), Waitarakao (South Canterbury), Te Ahi Tarakihi (South Canterbury), Tuhawaiki (South Canterbury), Waihao (South Canterbury), Moeraki (North Otago), Waikouaiti (Otago), Otakou (Otago Harbour), Puna-wai.Toriki (Hays Gap) (South Otago), Waikawa Harbour/Tuma Toka (Catlins Coast)

    - temporary closures –under sections 186A or 186B of the Fisheries Act 1996 – Kaikōura-Wakatu Quay (Kaikōura)

6 Relevant acts, plans, strategies, statements and context

17. There are a number of acts, regional plans in place within FMA 3, including:

    - The Kaikōura Marine Strategy integrates a number of marine protection and fisheries mechanisms to manage coastal and marine resources. The Kaikōura (Te Tai ō Marokura) Marine Management Act 2014 establishes a number of marine protection and sustainable fisheries measures in the Kaikōura marine environment.
    - Regional coastal plans to address the cumulative effects of activities in the coastal marine area, and the adverse impacts from land-based activities on the marine environment.
    - The Regional Coastal Environment Plan for the Canterbury Region aims to promote the sustainable management of the natural and physical resources of the Canterbury coastal environment.
    - The Regional Plan: Coast for Otago (the Coast Plan) provides policies and methods (which include rules) for the integrated and sustainable management of Otago's coastal marine area.

18. Fishers are subject to the rules in the plans (for example, small scale restrictions on fishing methods), however, the large area of FMA 3 means these rules do not, in general, stop fishers taking their annual catch entitlement (ACE) from other areas within FMA 3.

19. The National Plan of Action for Sharks (NPOA Sharks 2013) is relevant to rig (rig is an elasmobranchs[2]). One of the goals of the NPOA Sharks 2013 is to maintain the biodiversity and long-term viability of New Zealand shark populations, based on a risk assessment framework; including maintaining those species in the QMS at or above target.

20. The Draft National Inshore Finfish Fisheries Plan (2019) provides guidance on management objectives and strategies for finfish fisheries. The new Draft National Inshore Finfish Fisheries Plan will guide the operational management of inshore finfish fisheries for the next five years. The Plan is aimed at progressing New Zealand towards ecosystem-based fisheries management. The five key focus areas of the Plan are: managing individual stocks, enhancing benefits for customary, commercial and recreational fisheries, enabling integrated multi-stock management, improving local fisheries, and improving environmental performance. The East Coast South Island multi-species trawl review has been a step towards these objectives. Public consultation on the draft plan closed 19 February 2020. Thirty-nine submissions, ranging across a number of themes were received, which Fisheries New Zealand is currently considering.

7 Current state of the stocks

7.1 MOK 3

21. MOK 3 is a low information fishery. The amount of catch and the value of that catch is low and the general approach to managing this type of stock is to use catch trends as the key monitoring tool. Declining catch trends or landings in excess of the TACC are used as a trigger for further investigation and consideration of review.

22. The most recent scientific assessment of blue moki was in 2017. Fisheries New Zealand considers MOK 3 to be very likely (>90% probability) to be at or below its fishing mortality target. MOK 3 is considered to be very unlikely (<10%) overfished, a threshold fishing pressure that shouldn't be exceeded as it will ultimately lead to stocks falling below other performance measures.

23. Catch analysis from catch sampling of the migratory adult population (2004-05 and 2005-06) indicated the total mortality was low, with fishing mortality well below natural mortality. An

[2] Elasmobranchii is a subclass of Chondrichthyes or cartilaginous fish, including the sharks and the rays, skates, and sawfish.

increase in CPUE from the MOK 3 fishery suggests that the biomass of migratory adults has increased since then. It indicates that there has been an increase in abundance since 2005-06 when the fishing mortality rate estimate indicated that fishing mortality on the adult population was below the natural mortality rate. While CPUE may not be reliable, the Fisheries Assessment Plenary report agreed that the CPUE analyses conducted in 2017 were adequate to state that the biomass of migratory adults increased from 2005-06 to 2016-17. This suggests that the stock is relatively lightly exploited, and that an opportunity may exist to increase harvest at this time.

24. The inshore bottom trawl fishery which operates within MOK 3 primarily targets species such as red cod and flatfish that live close to the seafloor. Being a mixed-species fishery there is inevitable bycatch of co-habiting species such as blue moki.

25. Trawl vessels are constrained by the following spatial closures within MOK 3:

- Pegasus Bay: Trawling is prohibited from all the inshore waters of Pegasus Bay between the Waimakariri River and Godley Head, and along the coast to East Head.
- Salmon Conservation Area: No trawl vessel over 23 m in length or with a power rating of 250 Kw or more may fish within 7 nautical miles of an area of Banks Peninsula commencing at Godley Head and proceeding around to Akaroa Head between 7 December and 14 February each year.
- Two nautical mile restriction: Trawling is restricted within two nautical miles of the South Island coast from Slope Point (southeast of Haldane Bay) to Clarence Point (north of Kaikōura).
- Trawl vessels over 46 m: All trawl vessels over 46 m are excluded from the Canterbury Bight to a point at sea southeast of Banks Peninsula. From that point on, the boundary of the closure proceeds 13 nautical miles seaward of the territorial sea to the northern boundary of FMA 3.

26. Blue moki stocks are managed under the Draft National Fisheries Plan for Inshore Finfish (the Finfish Plan). The Finfish Plan is a Fisheries New Zealand policy document that sets out management objectives for inshore finfish stocks, including MOK 3. Within the Finfish Plan, stocks are grouped, with management approaches and objectives tailored for each group.

27. MOK 3 is in Group 2 in the Finfish Plan. Management objectives for Group 2 stocks are to:

- Provide social, economic and cultural benefits;
- Manage stocks using a partial quantitative stock assessment, based on a relative index of abundance or estimate of fishing mortality, to provide an indication of stock status in relation to B_{MSY} proxies and associated target and limit reference points; and
- Maintain stock abundance at or above the management target.

28. As fishing pressure on Group 2 stocks is often relatively low, the general approach to managing these stocks is to minimise management costs by using catch trends as the key monitoring tool. Declining catch trends or landings in excess of the TACC are used as a trigger for further investigation and consideration of review. MOK 3 falls in the latter category with commercial catch exceeding the TACC for three of the past four fishing years.

29. CPUE indices for blue moki are not considered to be sufficiently reliable to represent abundance indices for the stock. Rather, the indices are considered to be indicative of general trends in abundance for the stock.

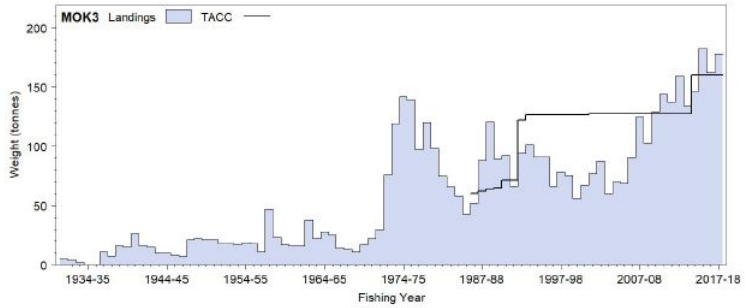

Figure 2: Reported commercial landings and TACC for MOK 3

7.2 LEA 3

30. LEA 3 is a low value and low information fishery. The most recent stock assessment for LEA 3 was 2013. A characterisation and CPUE analysis for the LEA 3 fishery was carried out, and there was an indication that CPUE from the Canterbury Bight fishery has increased since the early 2000s. The index showed that the CPUE remained low at the start of the series and then began to increase from 2007/08 to 2011/12. However, some concerns were raised by the Southern Inshore Fisheries Working Group about the low number of vessels in the analysis and the development of new markets for this species that may have increased targeting or retention of this species in recent years. This suggested that the index may not be reliable as an index of relative abundance and has limited value as an indicator of stock status.

31. The Working Group concluded that this analysis only pertains to the stock unit for the east coast of the South Island; and although unreliable is the best available information on the stock abundance at this stage, but trawl survey data may provide better information in the future.

32. The ECSI Trawl survey monitors both pre-recruited groups of fish and fish in the catchable size range. The total trawl survey biomass estimates for the entire survey area (10-400 m) have large confidence intervals (errors), and there is some indication that the biomass in the 30-400 m depth have shown an increase in recent years. Proposed enhanced design of the survey will result in better and more robust information on leatherjacket biomass in future.

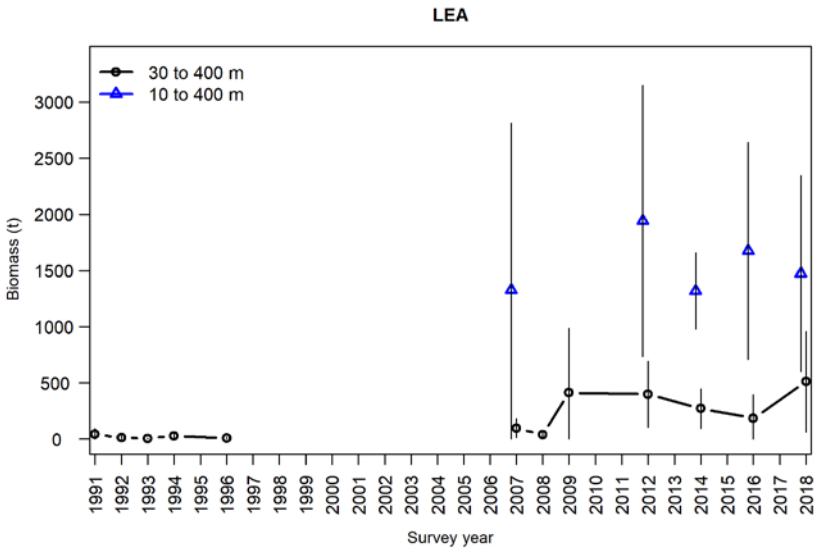

Figure 3: Leatherjacket total biomass for the ECSI winter surveys in core strata (30–400 m), and core plus shallow strata (10–400 m) in 2007, 2012, 2014, 2016 and 2018. Error bars are ± 2 standard deviations.

33. The large extent of the LEA 3 quota management area and the relatively low volume of catch in LEA 3 in the past, suggests that there be may an opportunity to provide for a modest increase in utilisation over the medium term and that this may have a limited impact on the stock.

34. Leatherjacket are landed in fisheries targeting red cod, barracouta, flatfish, elephant fish, tarakihi, blue warehou and gurnard, but are most commonly caught in flatfish, red gurnard and elephant fish target bottom trawl sets. There are two distinct areas of catch distribution within LEA 3 (Foveaux Strait and Canterbury Bight) and these may represent distinct biological stocks.

35. Most of the current leatherjacket catch is taken as a bycatch, and it is very likely that leatherjacket has always been primarily a bycatch species.

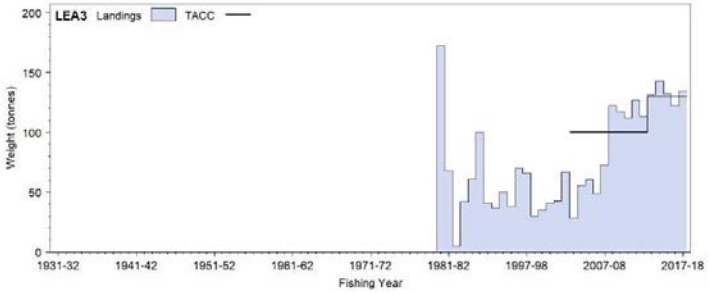

Figure 4: Reported commercial landings and TACC for LEA 3

36. Some concerns have been raised about catch being taken in “hay paddocks”; these are polychaete worm beds that are biologically sensitive, habitat forming areas, which appear to be diminishing in areal extent as a consequence of disturbance from bottom trawling.

7.3 GUR 3

37. GUR 3 is mostly taken as a bycatch in bottom trawl fisheries targeting red cod, barracouta and flatfish. Some gurnard are also taken in the target tarakihi and stargazer bottom trawl fisheries. The level of targeting on this species is low, averaging less than 10% of the total landed catch since 1989-90. The correspondence between relative abundance and catch suggest a constant exploitation rate. The current catch is therefore unlikely (<40%) to cause overfishing.

38. The most recent stock assessment for GUR 3 was 2015. Fisheries New Zealand considers GUR 3 likely (>60%) to be above target levels. GUR 3 is considered to be very unlikely (<10%) to be below the soft and hard limit.

39. GUR 3 currently falls within a group of stocks where a relative abundance monitoring approach is being used. Key indicators used to monitor and inform management of GUR 3 include CPUE from the commercial fishery, which has been updated to the end of the 2013/14 fishing year, and a fishery-independent estimate of relative biomass from the ECSI trawl survey from 2018. These abundance indicators are used to estimate relative changes in stock status in relation to the target level, which is a proxy for B_{MSY}.

40. Abundance indices (discussed below) suggest that relative abundance of GUR 3 may be at a high level. This suggests that there is potential to obtain higher benefits from the stock, at least in the short-term while maintaining sustainability.

41. Fisheries New Zealand monitors the stock status of GUR 3 using CPUE analysis and the biennial ECSI inshore trawl survey. The GUR 3 TAC was last reviewed in 2015. Two independent CPUE series and the winter trawl survey corroborate that stock size for GUR 3 has increased since the late 1990s.

42. These indicators have enabled a target level (a proxy for B_{MSY} measured using CPUE) to be set through the science working group process. The status of GUR 3 in relation to the reference point target was likely (>60%) to be above the target in 2015.

43. The CPUE trend shows a substantial increase in abundance after 2000 (Figure 5), and this level of abundance continues to be reflected in the results of the fishery independent ECSI trawl survey (Figure 6), as well as the recent reporting landings for the fishery (Figure 7).

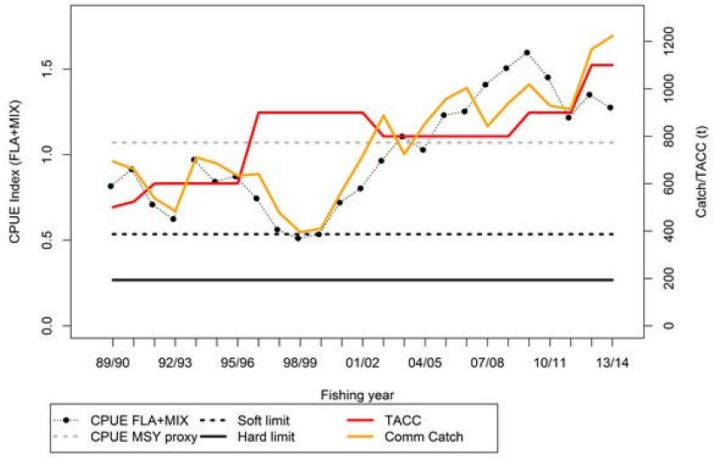

Figure 5: CPUE indices and TACCs for GUR 3 from 1989/90 to 2013/14. Dashed grey line: B_{MSY} proxy; dashed black line: soft limit; and solid black line: hard limit.

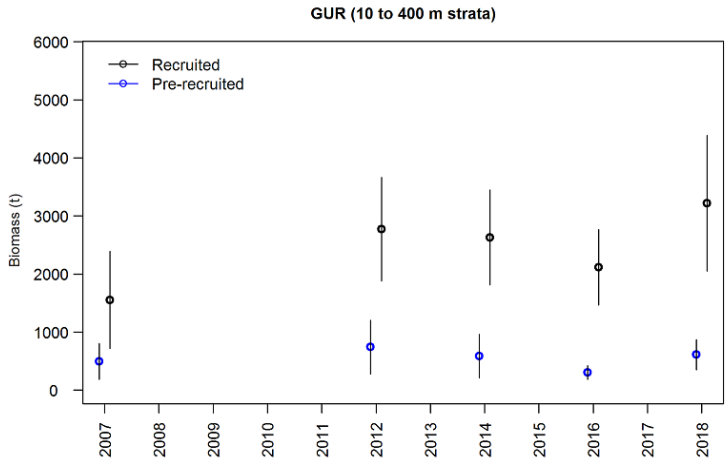

Figure 6: GUR 3 total biomass for all ECSI winter surveys (10–400 m) from 2007 to 2018. Error bars are ± two standard deviations.

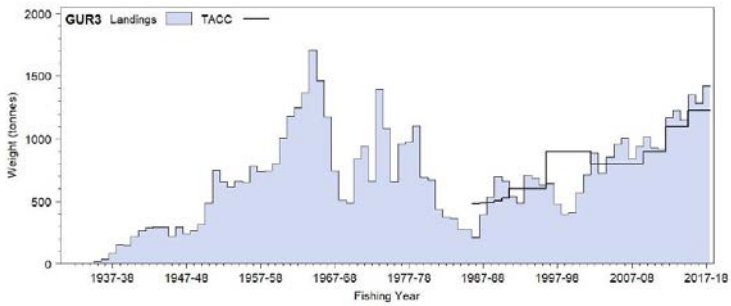

Figure 7: Reported commercial landings and TACC for GUR 3

7.4 SPO 3

44. The most recent assessment of SPO 3 was 2019, when SPO 3 was assessed to be about as likely as not (40-60%) to be at or above target levels. SPO 3 is considered very unlikely (<10%) to be below the soft limit, and also very unlikely (<10%) to be below the hard limit.

45. Rig biomass estimates in the ECSI winter trawl surveys are generally higher in recent years compared with the 1990s. However, the low 2018 core strata biomass estimate in SPO 3 contradicts this conclusion unless notice is taken of the considerable and variable biomass of rig in the shallow (10-30 m) strata. There has been a strong increasing trend in the bottom trawl CPUE series dating from the late 2000s.

46. Catches exceeded the TACC in 2017-18 and 2018-19 and it is unknown if catches at this level or the TACC will cause the stock to decline below the soft or hard limits. No change in the amount of fishing effort targeting SPO 3 occurred during this time (2017/18, 2018/19); suggesting the increase in landings was primarily due to an increase in the amount caught as bycatch by inshore trawl vessels, particularly those targeting flatfish (there was a decrease in trawl effort targeting flatfish during this time).

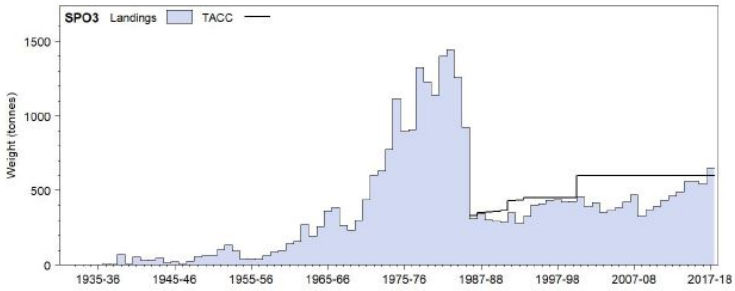

Figure 8: Historical landings and TACC for SPO 3

8 Recent catch levels and trends

47. Overall, the stocks of the ECSI trawl fishery appear to be performing well, based on ECSI trawl survey data and CPUE information (noting that leatherjacket is not optimised under the ECSI trawl survey, and is monitored primarily via catches).

48. Commercial landings of MOK 3 have exceeded the TACC three years out of the last four. Since an increase to the TACC in 2014, the commercial landings have exceeded the TACC by an average of 2% (102% of TACC caught).

49. The LEA 3 TACC has been consistently fully caught since a 2013 TACC increase. The TACC has been exceeded in five of the last six years.

50. The GUR 3 TACC has been consistently overcaught for the past 12 years. Commercial fishers state that because of the high abundance of gurnard in GUR 3, they find it difficult to stay within the TACC despite the low level of targeting of this species.

51. A majority of SPO 3 is taken in the shark set net and bottom trawl fisheries. The most recent update to the SPO CPUE and characterisation in 2016 showed an increasing trend in the bottom trawl series. The increase in the bottom trawl series are interpreted as indicating good recruitment. The TACC for SPO 3 has been overcaught by 5% over the last two years.

52. Catch composition by the eight target species from the 2018 ECSI trawl survey from both the core strata (30-400 m) and shallow strata (10-30 m) is presented in the following tables, including the top species caught in FMA 3 in 2018/19:

Table 1: 2018 ECSI trawl survey composition by eight target species core strata (30-400 m)

Species	Percentage of catch
Spiny dogfish	28%
Dark ghost shark	14%
Sea perch	4%
Red cod	3%
Red gurnard	2%
Tarakihi	2%
Elephant fish	1%
Giant stargazer	1%

Table 2: 2018 ECSI trawl survey catch composition by eight target species shallow strata (10-30 m)

Species	Percentage of catch
Red gurnard	21.2%
Spiny dogfish	17.9%
Elephant fish	4.7%
Red cod	1.3%
Tarakihi	0.2%
Dark ghost shark	0%
Sea perch	0%
Giant stargazer	0%

Table 3: Catch composition for FMA 3 - top 10 species caught 2018/19

Species	Percentage of 2018/19 FMA 3 catch
Elephant fish	25%
Red gurnard	22%
Rough skate	9%
Spiny dogfish	8%
Red cod	7%
Blue warehou	5%
Tarakihi	4%
Flatfish	4%
Leatherjacket	3%
Rig	2%

53. Other stocks in the ECSI trawl fishery are either not being fully utilised at the current TACC (eg FLA 3, STA 3, RCO 3, SPE 3 SPD 3[3]), or there is a lack of evidence to support changes to current settings (ELE 3). These stocks will continue to be monitored and reviewed where information suggests a change (reduction or increase to the TAC) is appropriate.

8.1 Customary

54. The reported current level of Māori customary catch for finfish in FMA 3 is low. Blue moki (moki) and red gurnard (kumukumu, pūwhaiau) have been reported under the South Island customary fishing regulations in past years. The low level of customary catch reporting may be indicative of tangata whenua using recreational fishing regulations for their harvest.

8.2 Recreational

55. Blue moki is popular with recreational fishers and taken by beach anglers, set netting and spearfishing. The most recent survey (National Panel Survey of Marine Recreational Fishers) indicates an increase of 41% in the recreational catch of blue moki in MOK 3 from the 2011/12 to the 2017/18 survey.

56. Leatherjacket are seldom caught by recreational fishers. Results from the panel surveys indicated a drop in the number of fish caught by recreational fishers over the past two surveys.

57. Red gurnard is an important recreational species. It is often taken by fishers targeting snapper and tarakihi. Recreational catch in GUR 3 increased by 24% over the past two surveys.

58. Rig are the most commonly recreationally caught shark in New Zealand. Recreational catch estimates from the last two surveys indicate a 24% increase in recreational catch of rig.

[3] Flatfish (FLA 3): The last 2 years an average of 61% of ACE caught. Giant stargazer (STA 3): 2014-2019 average of 56% of TACC caught. Red cod (RCO 3): 2017-2019 average of 44% of TACC caught. Sea perch (SPE 3): 2014-2019 average of 66% of TACC caught. Spiny Dogfish (SPD 3): 2014-2019 average of 37% of TACC caught.

59. The National Panel Survey of Marine Recreational Fishers is a snapshot of fishing activity over a fishing year, and it is not appropriate to draw robust conclusions around increases or reductions in recreational harvest solely from this information. Factors such as weather, wind, swell, water temperature and fuel prices all determine how much fishing occurs in any given year.

Table 4: Summary of the National Panel Survey of Marine Recreational Fishers results from FMA 3 for blue moki, leatherjacket, red gurnard and rig

Fish stock	2011/12 Estimated harvest (tonnes)	2017/18 Estimated harvest (tonnes)	(+/- tonnes, % change)
MOK 3	11.6	16.3	4.7, 41%
LEA 3	506 (number of fish)	133 (number of fish)	74% decrease
GUR 3	2.01	2.49	0.48, 24%
SPO 3	8.9	14.9	6, 67%

60. In addition to these estimates of recreational catch, landings under section 111[4] (recreational catch taken by commercial fishers) are presented in Table 5. Section 111 landings of these species are relatively low.

Table 5: Section 111 landings MOK 3, LEA 3, GUR 3 and SPO 3 from 2014/15-2018/19

Fish stock	2014/15 (kg)	2015/16 (kg)	2016/17 (kg)	2017/18 (kg)	2018/19 (kg)
MOK 3	11	78	40	113	92
LEA 3	24	2	146	88	258
GUR 3	474	571	360	803	341
SPO 3	290	236	203	214	84

8.3 Commercial

61. The inshore trawl fishery in FMA 3 primarily targets demersal species such as red cod and flatfish. Being a mixed fishery there is inevitable bycatch of cohabiting species such as blue moki and leatherjacket.

62. Most blue moki landings are taken by set net or trawl on the east coast between the Bay of Plenty and Kaikōura, although small quantities are taken in most New Zealand coastal waters. While the proportions of the total commercial landings taken by set net and trawl have varied over time, set-netting has been the predominant method (60%) since 1979.

63. Most of the current leatherjacket catch is taken as a bycatch, and it is very likely that leatherjacket has always been primarily a bycatch species.

64. GUR 3 landings regularly exceeded the TACC between 1988–89 and 1995–96. Ageing of fish collected during the ECSI trawl surveys suggests there were one or two relatively strong year classes moving through the fishery, which may help explain the over-catches. However, once the TACC in GUR 3 was increased to 900 tonnes in the 1996–97 fishing year, landings declined to well below this quantum. In 2002–03, the TACC for GUR 3 was reduced by 100 tonnes, to 800 tonnes. GUR 3 has been consistently overcaught since 2004.

65. Commercial fishing stakeholder groups (NZ Fishing Federation, Southern Inshore Fisheries, and Fisheries Inshore New Zealand) have requested that the TACC for GUR 3 be increased by

[4] Section 111 of the Fisheries Act 1996 enables commercial fishers to take a recreational catch for their own consumption.

180 tonnes in the October 2020 Sustainability Round. This would increase the TACC by 13.6%. The rationale for the increase from commercial representatives is the TACC is consistently overcaught and the ECSI survey results in 2021 can be used to assess the status of the fishery.

66. Catches for rig (SPO 3) exceeded the TACC in 2018 for the first time. It is unknown if catches at this level or the TACC will cause the stock to decline.

9 Current management controls

Table 6: Current controls on commercial and recreational fisheries by stock

Fish stock	Commercial controls other than TACC	Recreational controls
MOK 3	Management controls affecting commercial take of blue moki include a commercial minimum legal size of 40 cm, area restrictions for certain fishing methods and a minimum set net mesh size of 114 mm for target fishing.	Minimum fish length 40 cm, a daily bag limit of 15 as part of a wider combined finfish limit of 30, area restrictions for certain fishing methods and a minimum set net mesh size of 114 mm.
LEA 3	n/a	n/a
GUR 3	Standard regulatory 100 mm trawl mesh size applies. No specified minimum fish length.	Minimum fish length 25 cm, a daily bag limit of 20, area restrictions for certain fishing methods and a minimum set net mesh size of 100 mm.
SPO 3	Standard regulatory 100 mm trawl mesh size applies. No specified minimum fish length.	A combined daily bag limit of 5 in the South-East Fishery Management Area. Area restrictions for certain fishing methods and a minimum set net mesh size of 150 mm. Fishers can take up to 3 rig as part of their combined daily bag limit in the Kaikōura Fishery Management Area.
All	No fishing is allowed in the following marine reserves: Akaroa Marine Reserve, Flea Bay (Pōhatu Marine Reserve, Hikurangi Marine Reserve).	Unless otherwise stated, minimum net mesh size of 100 mm applies. A combined maximum daily bag limit of 20 finfish (of any combination) listed on Fisheries New Zealand's website (https://www.fisheries.govt.nz/travel-and-recreation/fishing/fishing-rules/challenger-region-fishery-management-area/#twistie) Numerous methods and area restrictions apply as set out in the Fisheries (Amateur Fishing) Regulations 2013. Set netting is prohibited offshore to 4 nm along the east coast of the South Island from Clarence to South Point. Otago Harbour – set netting restrictions. No fishing is allowed in the following marine reserves: Akaroa Marine Reserve, Flea Bay (Pōhatu Marine Reserve, Hikurangi Marine Reserve).

10 Options – Varying TACs, TACCs and allowances

Table 7: Current and proposed TACs, TACCs and allowances for blue moki, leatherjacket, red gurnard and rig

Stock	Option	Total Allowable Catch (tonnes)	Total Allowable Commercial Catch (tonnes)	Allowances		
				Customary **Māori** (tonnes)	Recreational (tonnes)	All other mortality caused by fishing (tonnes)
MOK 3	Option 1 *(Status quo)*	197	160	1	20	16
	Option 2	216.6 ↑	176 ↑ (10%)	1	22 ↑	17.6↑
	Option 3	234.2 ↑	192 ↑ (20%)	1	22 ↑	19.2↑
LEA 3	Option 1 *(Status quo)*	140	130	1	2	7
	Option 2	160.3 ↑	143 ↑ (10%)	1	2	14.3↑
GUR 3	Option 1 *(Status quo)*	1,593	1,320	3	6	264
	Option 2	1,606.2 ↑	1,452 ↑ (10%)	3	6	145.2↓
SPO 3	Option 1 *(Status quo)*	710	600	20	60	30
	Option 2	806↑	660 ↑ (10%)	20	60	66 ↑

10.1 Options for varying the TACs

67. The Fisheries Act 1996 provides for the Minister to use the best available information to set a TAC that is not inconsistent with the objective of maintaining the stock(s) at or above, or moving the stock towards or above, the B_{MSY}.

68. The best available scientific information suggests the abundance for blue moki and red gurnard has increased. Rig biomass estimates from ECSI trawl surveys from 2012 to 2016 also suggest the biomass has increased relative to the 1990s. However, a low 2018 core strata biomass estimate contradicts this conclusion about rig unless notice is taken of the considerable and variable biomass of rig in shallow (10-30 m) strata. Still, rig was expected to be about as likely as not to be at or above target in 2019.

69. Three options are proposed for blue moki; the status quo, and two options that would increase the TAC. The status quo and an option that would increase the TAC by just over 10% is proposed for leatherjacket, red gurnard and rig. These options take into account the uncertainty associated with the scientific and other available information on these stocks. Changes to the TAC for one stock in this multispecies fishery will also have effects on the other stocks that are caught with it, potentially influencing the choice of options. The TAC options are discussed in greater detail below.

70. **MOK 3:** Best available information suggests MOK 3 is below the target fishing mortality. The catch rate index indicates that there has been a general increase in abundance since 2005-06 until the most recent assessment in 2017 when the fishing mortality rate estimate indicated that fishing mortality on the adult population was below the natural mortality rate. This suggests that the stock is relatively lightly exploited, and that an opportunity exists to increase harvest. Fisheries New Zealand proposes three TAC options for consultation. The choice of TAC options differs in terms of the weight placed on the uncertainty in the estimate of the natural mortality rate, and also the reliability of CPUE[5] indices as indices of stock abundance.

[5] An indirect measure of the abundance of a target species. Changes in the catch per unit effort are inferred to signify changes to the target species' true abundance. A decreasing CPUE indicates overexploitation, while an unchanging CPUE indicates sustainable harvesting.

Option 1 is the status quo. This is the most cautious option that places most weight on the uncertainty associated with the scientific assessment. It retains the TAC at 197 tonnes. In particular, this option acknowledges that the CPUE indices from the fishery are not considered to be sufficiently reliable to represent abundance indices for the stock.

Option 2 sets the TAC at 216.6 tonnes. This would allow for the increased utilisation, reflecting increased catch and abundance in the Kaikōura set net fishery and as bottom trawl by-catch along the southern east coast South Island. This option takes into account the uncertainty associated with the scientific and other available information for MOK 3.

Option 3 increases the TAC by 37.2 tonnes. This is the least cautious option. It provides the greatest economic benefits, while also potentially presenting a greater sustainability risk.

71. **LEA 3:** The biomass index from the ECSI trawl survey 30-400 m strata has increased since 2008, until 2018 suggesting an increase in abundance. LEA 3 catch has been in excess of the TACC five out of the last six years. Fisheries New Zealand proposes two TAC options for consultation. The uncertainty regarding trends in CPUE as a result of changes in reporting and retention is reflected in the conservative TAC option.

    Option 1 is the status quo. This is the most cautious option that places most weight on the uncertainty associated with the lack of a scientific assessment of the maximum sustainable yield, reference or current biomass for leatherjacket stocks. It retains the TAC at 140 tonnes. In particular, this option acknowledges that further research is warranted to assess the degree to which changes in fishing practices and economic drivers may have influenced CPUE trends.

    Option 2 sets the TAC at 160.3 tonnes. The change reflects increases in the CPUE and biomass index since 2008.

72. **GUR 3:** Best available scientific information suggests GUR 3 is at or above the Harvest Strategy Standard default target biomass of 40% SB_0 and the soft and hard limits. Estimates of the total biomass from the ECSI trawl survey suggest that there is an opportunity to increase sustainable utilisation in this fishery. Based on this information, Fisheries New Zealand proposes two TAC options for consultation. The choice of TAC differs in terms of the weight placed on the uncertainty that, prior to the 2007, the ECSI trawl survey did not cover the entire depth range for red gurnard. A variable proportion of the population in the previously surveyed 10-30 m depth range suggest that survey catchability varies between years in the core survey area (30-400 m).

    Option 1 is the status quo. This is the most cautious option that places most weight on the uncertainty associated with the scientific assessment. It retains the TAC at 1,593 tonnes. In particular, this option recognises that the ongoing monitoring of the stock using trawl surveys (the next is in 2021) will enable responsive management and appropriate adjustments to address any future risk or possible opportunity.

    Option 2 sets the TAC at 1,606.2 tonnes. This option recognises the TACC has been consistently overcaught for the past 12 years, despite landings being largely as a bycatch of other target fisheries. The consistent levels of catch indicate that there is capacity and desire to fully catch the TACC to the levels proposed. An updated stock assessment of GUR 3 is scheduled for 2021 which will provide greater certainty about biomass trends and a further opportunity to review the fishery in 2022.

73. **SPO 3:** Best available scientific information suggests SPO 3 is at or above the Harvest Strategy Standard default target biomass of 40% SB_0 and the soft and hard limit. Estimates from the ECSI trawl survey years 2012 to 2016 suggest the biomass has increased since the 1990s. The 2018 ECSI estimate was greater than the equivalent 2016 estimate. There has been an increasing trend in the bottom trawl CPUE series suggesting good recruitment. Fisheries New Zealand proposes two TAC options for consultation. The choice of TAC options differs in terms of the weight placed on the uncertainty that the accepted ECSI trawl survey and the bottom trawl CPUE series do not adequately sample large mature female rig, and that the core strata (30-400 m) of the ECSI winter

trawl survey are not fully representative of the rig population because there is a large and variable proportion of the rig biomass inside the 30 m depth contour.

Option 1 is the status quo. This is the most cautious option that places most weight on the uncertainty associated with the scientific assessment. It retains the TAC at 710. Catches exceeded the TACC in 2018 for the first time in this QMA. It is unknown if catches at this level will cause the stock to decline, however it is unlikely that current catch levels would cause the stock to decline below the soft or hard limit.

Option 2 sets the TAC at 806 tonnes. This option reflects the accepted CPUE standardisations and the increasing trend in the bottom trawl fishery. The trend in the bottom trawl fishery indicates good recruitment, an observation that seems to be corroborated by the ECSI trawl survey. An updated stock assessment of SPO 3 is scheduled for 2022 which will provide greater certainty about biomass trends and a further opportunity to review the fishery in 2023.

74. These proposals will contribute towards the achievement of the Te Waipounamu Iwi Forum Fisheries Plan management objectives; particularly objective 3, supporting environmentally responsible, productive, sustainable and culturally appropriate commercial fisheries that create long-term commercial benefits and economic development opportunities for South Island iwi.

75. Fisheries New Zealand considers the proposals in this paper will not impact on, or be impacted by, the taiāpure of Te Taumanu o Te Waka a Māui (Kaikōura), Oaro-Haumuri (Kaikōura), Akaroa Harbour (Canterbury) and East Otago (Otago). Commercial fishing is prohibited in the mātaitai reserves; and the large area of FMA 3 in combination with the modest TAC increases proposed, means there is unlikely to be any change in fishing patterns or the abundance of these stocks.

10.2 Customary, recreational and other sources of fishing-related mortality allowances

76. When setting a TAC, the Minister is required to make allowances for Māori customary non-commercial fishing interests, recreational fishing interests, and all other mortality to the stock caused by fishing. Recreational and customary harvests are relatively low compared to the commercial catch, but may be increasing due to the increased abundance of these stocks.

Recreational allowance

77. Based on the results of the 2017/18 National Panel Survey of Marine Recreational Fishers, recreational catch of blue moki, red gurnard and rig is estimated to have increased since the last survey in 2012. Leatherjacket is seldom caught by recreational fishers and the recreational harvest in 2012 for LEA 3 was 506 (number of fish) decreasing to 133 (number of fish) in 2017/18; both figures equate to less than 1 tonne.

78. Recreational catch of blue moki (estimated at 16.3 tonnes) has increased by 41% over the period from 2011/12 to 2017/18 according to the National Panel Survey of Marine Recreational Fishers. Under Options 2 and 3, Fisheries New Zealand proposes a 10% increase in the recreational allowance from 20 tonnes to 22 tonnes. The increase takes into account the increasing trend in recreational catch. The recreational allowance remains small relative to the TAC.

79. The current allowance for leatherjacket is low, but remains appropriate as it is seldom targeted by recreational fishers.

80. Estimates from the 2011/12 and 2017/18 National Panel Survey of Marine Recreational Fishers indicates a 24% increase in red gurnard catch. The recreational catch estimate remains, however, lower than the current recreational allowance and no increase is proposed.

81. Estimates from the National Panel Survey of Marine Recreational Fishers indicate catch is within the recreational allowance for SPO 3 of 60 tonnes. No change in the recreational allowance is proposed for SPO 3.

Customary allowance

82. Fisheries New Zealand has no new information to support changing customary allowances for blue moki, leatherjacket, red gurnard and rig. Should new information be provided through further input from iwi or during the consultation process, Fisheries New Zealand will consider this information and may recommend a change in customary allowances in advice to the Minister for his decision.

83. Blue moki customary harvests are relatively low compared to the commercial catch.

84. The options for leatherjacket retain the current customary allowances. Catch from this sector makes up a relatively small component of overall catch.

85. Red gurnard is an important species for customary non-commercial fishing interests, by virtue of its wide distribution in shallow, accessible coastal waters. It is identified by Te Waka a Mäui me Ōna Toka iwi forum as a taonga species in the Te Waipounamu Iwi Fisheries Plan. This plan contains objectives to support and provide for the customary and commercial interests of South Island iwi. There is no proposal to increase the customary allowance for GUR 3 as there is no information to indicate that customary catch has changed significantly over the last five years. The best available information suggests that current settings will provide for both current levels of catch and increased customary harvest of gurnard in GUR 3.

86. No increase is proposed for customary allowances in SPO 3 because best available information suggests that the current customary allowance adequately cover current catch and expected increases in abundance and availability of rig.

Other sources of fishing related mortality

87. Other sources of fishing related mortality (OSFRM) include mortality associated with the requirement to return fish below the minimum legal size to sea and other mortality from fish escaping fishing gear, or illegal discarding. Where appropriate, Fisheries New Zealand is proposing a standardised OSFRM for inshore trawl fish stocks at 10% of their respective TACCs unless we have evidence that a different allowance is appropriate.

88. On this basis Fisheries New Zealand is proposing to change the OSFRM allowance for leatherjacket (from 5% of the TACC to 10%), red gurnard (from 20% of the TACC to 10%), and rig (from 5% of the TACC to 10%). We propose no change to the allowance of 10% of the TACC for OSFRM for MOK 3.

89. There is anecdotal information to suggest leatherjackets are sometimes returned to the sea, due to this species being unmarketable or unwanted at certain times. The proposed decrease in the OSFRM for GUR 3 reflects the significant changes in commercial fishing practices in FMA 3 that are likely to contributed to a reduction in the level of OSRFM, including mesh sizes and changes in market preferences (increased domestic market demand).

10.3 Options for varying the TACCs

90. Based on the above analysis, the three options for the TAC for blue moki are; the status quo (Option 1), a cautious increase to the TACC of 10% (Option 2), or an increase of 20% to the TACC (Option 3).

91. Two options are proposed for leatherjacket, red gurnard and rig; the status quo (Option 1) or a cautious increase in the TACC of 10% (Option 2).

92. Options 2 (and 3 for MOK 3) provide greater economic benefits, and may better reflect the abundance of these stocks. They would assist commercial fishers to access a more comprehensive ACE package. However, they may potentially present greater sustainability risk.

93. The commercial industry provided Fisheries New Zealand with information on the direct economic benefit based on requested changes to the TACCs of those stocks. Additional benefits to fishers include avoidance of deemed value bills. Industry estimates that the short-term financial benefit of the changes proposed could be:

    - MOK 3, increase 30 tonnes, annual economic effect $42,900
    - LEA 3, increase 40 tonnes, annual economic effect $30,000
    - GUR 3, increase 180 tonnes, annual economic effect $440,000
    - SPO 3, increase 100 tonnes, annual economic effect $80,200

94. In addition to these values, increased utilisation can foster greater efficiency for fishers through minimising the impact of a fish stock being a "choke species" that limits catches of other stocks by-caught with that species.

95. More generally, ensuring that there is ACE to cover bycatch can be problematic in a multi-species fisheries. ACE that might have been used to cover bycatch is also used to target species.

96. Fisheries New Zealand has also estimated the value of the ECSI commercial fisheries for the 2018/19 fishing year, based on port prices[6], for MOK 3, LEA 3, GUR 3, and SPO 3. The combined total for these fish stocks, for the fishing year 2018/19, based on port prices is approximately $6.1 million. Rig is the highest value ($/kg) fish, followed by red gurnard, blue moki, then leatherjacket. A breakdown of each stock per port price and total catch is provided in Table 8.

Table 8: Stock and port prices, 2018/19

Fishing year 2018/19	Kg caught	Port Price (per kg)	2018/19 value ($)
MOK 3	149420	1.4294	$213,580.95
LEA 3	153601	0.6478	$99,502.73
GUR 3	1326623	2.4669	$3,272,646.28
SPO 3	614560	4.0673	$2,499,599.89
Total			$6,085,329.84

97. It is important to note that port price is what the commercial fisher receives, not what the fish is worth at market (which is higher). Nor does it reflect the income for Licensed Fish Receivers (including, wholesalers and/or processors) and retailers.

10.4 Multi-species effects

98. With this review Fisheries New Zealand is moving towards more explicit consideration of interactions within a fisheries complex and within a multi-stock management approach. To test the wider impacts of the proposed TAC and TACC options across the multiple stocks in the ECSI trawl fishery, Fisheries New Zealand has analysed the following (see Appendix 1):

    - catch proportions across the four stocks
    - percentage of TACC caught per fishing year for each stock
    - the target and bycatch relationship between the four stocks over the last four years
    - biological information
    - stock status and when it was last assessed.

[6] The surveyed average price paid by licensed fish receivers to independent fishers for fish landed to those licensed fish receivers.

99. This analysis suggests the following:

- When targeting blue moki, the typical bycatch mix (greatest to lowest proportion) is red gurnard, leatherjacket, rig.
- When targeting leatherjacket, the typical bycatch mix (greatest to lowest proportion) is red gurnard, rig, blue moki.
- When targeting red gurnard, the typical bycatch mix (greatest to lowest proportion) is leatherjacket, rig, blue moki.
- When targeting rig, the typical bycatch mix (greatest to lowest proportion) is red gurnard, leatherjacket, blue moki.

100. Overall, there appear to be three tiers of interdependency within the fishery. One with blue moki and gurnard, the second with leatherjacket and gurnard, and the third with gurnard and rig.

101. Blue moki are low-medium productivity fish because of their low growth rate and longevity. Leatherjacket display rapid initial growth, where both males and females reach maturity in 1–2 years and 50% of both sexes mature at 1.5 years (Visconti et al, 2018). Maximum age differs substantially between the sexes, at 9.8 years for males and 17.1 years for females. Growth rate is similar between sexes, although males reach greater mass at age than females in the early part of the lifespan (Visconti et al, 2018). Red gurnard is a fast growing, moderately short lived species, with a maximum age of 16 years, and reach sexual maturity at 2-3 years old. Rig live for 20 years or longer and mature late, with female rig reaching maturity at 5-6 years. Leatherjacket and red gurnard are higher productivity stocks as they are shorter lived and have relatively high natural mortality.

102. High productivity species are more resilient to fishing pressure and take less time to rebuild from a depleted state than those with low productivity. An appropriate management strategy for species such as red gurnard in GUR 3 is to be responsive to fluctuations in stock biomass (for example, to increase catches at times of high stock biomass and reduce catches at times of low biomass).

103. An increase in the TACC for blue moki and leatherjacket may result in an increase in bycatch of gurnard. An increase in the TACC of rig is likely to result in an increase in the catch of leatherjacket, which in turn may influence the bycatch of red gurnard. Leatherjacket is a bycatch of the ECSI bottom trawl fisheries, which primarily target flatfish or red cod. An increase of the TACC for GUR 3 would provide additional ACE to better reflect gurnard abundance and to cover current landings.

104. Fisheries New Zealand is rebuilding the east coast tarakihi fishery. This includes quota management area TAR 3, located along the east coast of the South Island. Tarakihi is an important commercial fishery, and its popularity has meant fish numbers have declined. The number of tarakihi is less than half of target levels. Commercial catch limits have been lowered to help stocks recover. Additionally, the Minister of Fisheries has agreed to an industry-developed rebuild plan that commits to a 20-year rebuild. Modelling indicates that reducing the amount of undersized fish caught could increase the rate of the rebuild. As a result, one of the plan's management measures is to avoid catching juvenile tarakihi.

105. The proposed increases to catch of red gurnard, rig and leatherjacket should not impact the catch of juvenile tarakihi along the east coast of the South Island. The distribution plots indicate that these species are taken inshore of the main juvenile and adult tarakihi distributions. The spatial distribution plots of catch rates for adult and juvenile tarakihi, red gurnard, rig, and leatherjacket for the 2014, 2016 and 2018 east coast South Island inshore trawl surveys are presented below.

106. Blue moki was not considered as part of this analysis due to a large portion of catch taken by set net, as well as not represented well in the ECSI trawl survey, and therefore not a good candidate for this analysis.

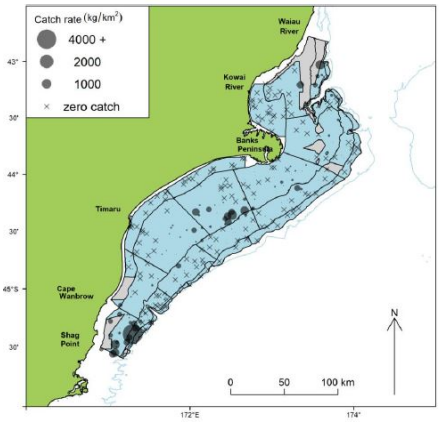

Figure 9: Catch rates of juvenile tarakihi

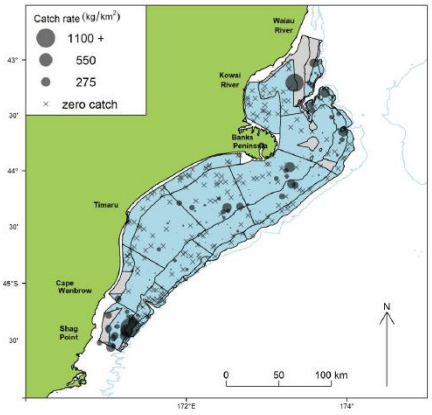

Figure 10: Catch rates of adult tarakihi

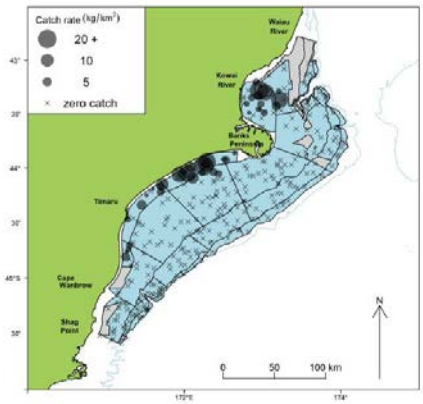

Figure 11: Catch rates of juvenile red gurnard

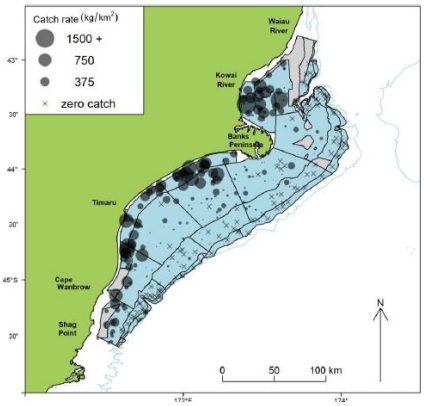

Figure 12: Catch rates of adult red gurnard

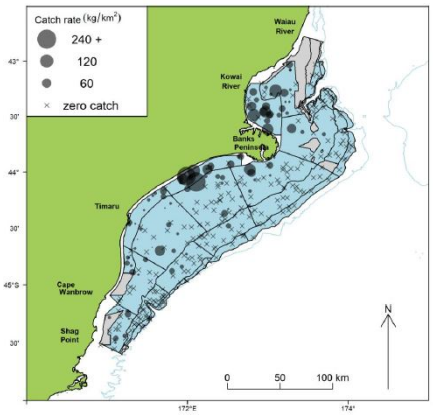

Figure 13: Catch rates of juvenile rig

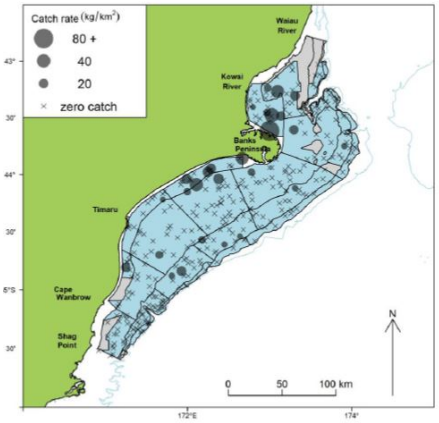

Figure 14: Catch rates of adult rig

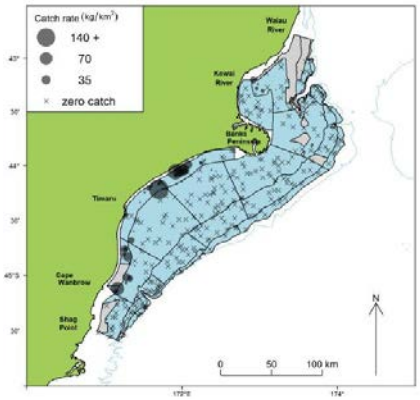

Figure 15: Catch rates of juvenile leatherjacket

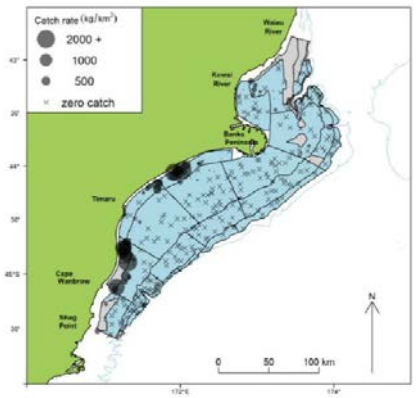

Figure 16: Catch rates of adult leatherjacket

11 Environmental interactions

107. Blue moki, leatherjacket, red gurnard and rig are predominantly taken by bottom trawl and set nets in FMA 3. Key environmental interactions to be taken into account when considering sustainability measures for these stocks include any impacts of fishing on Hector's dolphins, the incidental captures of seabirds and the damage by bottom trawling to benthic environments.

11.1 Marine mammals

108. Hector's dolphins are a cetacean endemic to the coastal waters of New Zealand. Hector's dolphins occur around most of the South Island in three recognised subpopulations. These subpopulations are located along the east, south and west coasts of the South Island. The north coast South Island Hector's dolphins may constitute a fourth subpopulation. The north coast South Island population is presumed but not yet verified based on genetic evidence. Hector's dolphin conservation status is 'threatened – nationally vulnerable', and have the greatest risk of extinction in the medium term.

109. Hector's dolphins are at risk of fishing-related mortality. The east coast of the South Island, along the Kaikōura coast, immediately to the north of Banks Peninsula and in the Southern Canterbury Bight, is identified as an area of elevated risk. It is estimated that commercial fishing is currently responsible for on average around 51 (22-105)7 Hector's dolphin death per year per year along the east coast from a subpopulation of roughly 9,782. However, the estimated population size and spatial distribution that underlie this estimate are both uncertain.

110. In recognition of the threat from commercial trawling, area-based restrictions have been put in place. The total area covered by restrictions has increased over time, reflecting improved information on the nature and extent of the risks.

111. In addition, there are voluntary protocols in place in the trawl fishery off the east coast of the South Island, designed to reduce the risk of death in that fishery. These include gear modifications, mortality limits and spatial closures. Setting mortality limits involves determining a level of mortality that is sustainable, and closing the fishery when it reached. Both these approaches have been used as Hector's dolphin management tools. Spatial closures where harmful activities are restricted or regulated, has been the management approach where there has been an apparent associated improvement in a vital rate for Hector's dolphins (Gormley et al., 2012).

112. Trawl gear is restricted outside 2 nautical miles from the coast between Cape Jackson in the Marlborough Sounds and Slope Point in the Catlins – only trawl nets with defined low headline heights may be used.

113. Existing restrictions along the east coast of the South Island are presented in the Table 9 below.

Table 9: Existing trawl restrictions along the east coast South Island

East coast South Island	Method	Existing measures
Pegasus Bay	Trawl	Low headline height required on trawl vessels operating within 2 nm of shore.
Banks Peninsula to Timaru	Trawl	Low headline height required on trawl vessels operating within 2 nm of shore.

114. In general, commercial set-net fisheries have been assessed as posing a substantially greater risk to dolphins than trawl fisheries. The risk of fishing-related deaths from trawling in the South Island is largely managed under the current trawl restrictions and through the Hector's and Māui Dolphin Threat Management Plan.

115. Fisheries New Zealand considers the increases to catch limit proposed in this paper reflect the increases in fish abundance and CPUE. The risk of the proposed options increasing the adverse effects on marine mammals is considered low. This is because is unlikely there will be

[7] Estimate of current annual commercial fisheries deaths – mean (and 5th-95th percentiles).

any increase in fishing effort or increased interaction with marine mammals as a consequence of these options

116. The Māui and Hector's Dolphin Threat Management Plan (the Plan) guides management approaches for addressing both non-fishing and fishing-related impacts on Māui and Hector's Dolphins. The Plan includes a range of measures designed to reduce interaction with Hector's dolphins in the bottom trawl fisheries. The Minister of Fisheries has a responsibility under the Fisheries Act 1996 to manage the risks to dolphins from fishing-related mortality. The Plan is under review by the Minister of Fisheries and the Minister of Conservation.

117. Research and scientific studies continue to increase our knowledge about Hector's dolphin ecology, conservation status, life history, and threats. Current research includes risk assessments, abundance and distribution studies, distribution and productive surveys and studies to understand the nature and extent of protected species with commercial fishing activities.

11.2 Seabirds

118. Management of seabird interactions with New Zealand's commercial fisheries are managed under the National Plan of Action to Reduce the Incidental Captures of Seabirds in New Zealand Fisheries (NPOA-Seabirds) with a 2020 update expected to be released in coming months, following consultation earlier this year. The NPOA-Seabirds reflects New Zealand's obligations under international law to take into account the effects of fishing on associated species such as seabirds. The NPOA-Seabirds has established a risk-based approach to managing fishing interactions with seabirds, targeting management actions at the species most at risk as a priority but also aiming to minimise captures of all species to the extent practicable.

119. Trawl vessels use a variety of mitigation measures to reduce the risk of seabird captures, including warp mitigation devices and fish waste management systems. Many of the species caught by the under-28 m trawl fleet are retained whole (green), although some target and key bycatch species (such as ling, school shark and stargazer) are processed at sea. All fish caught are stored on ice. No under-28 metre trawl vessels operate meal plants and any fish waste is discharged at sea. Trawl vessels 28 m or greater in length are required to deploy one type of seabird scaring device during all tows in accordance with Seabird Scaring Devices Circular 2018 to deter seabirds from approaching trawl warp(s).

120. Other mitigation measures deployed include the management of fish waste to ensure no fish waste is discharged during shooting or hauling with any discharge during towing occurring in batches; the use of specialist devices during times of high risk (i.e. net restrictors to limit the opening of the centre net during hauling); and minimising the amount of time the net spends at the surface during hauling. The warps and the trawl net itself are the two main components of trawl gear where there is the greatest risk of interaction with seabirds. Trawl nets generally only pose a risk to seabirds when the net is on or near the surface (while the gear is being deployed or retrieved). Seabirds can collide with the warps at any time the warps are in the water.

121. Estimated seabird commercial bycatch numbers decreased, from about 9,000 birds in 2003 to 5,000 in 2014. This is likely due in part to mitigation measures, such as bird-scaring devices deployed on fishing vessels. We do not have data on seabird bycatch from recreational fishing.

122. The level of observer coverage on board the under-28 m trawl fleet is relatively low with approximately 5% of tows observed between the 2013/14 and 2017/18 fishing years. The level of observer coverage has increased in recent years although coverage is highly skewed towards northern waters and seasonal hoki fisheries.

123. The Southern Inshore Fisheries Management Company has developed protected species risk management plans (termed seabird management plans) for 40 South Island inshore trawl vessels between 14 and 28 m long (this is 85% of all vessels of this type).

124. Seabird species at the greatest risk in the ECSI trawl fishery include black petrel, Salvin's albatross, Southern Buller's albatross, New Zealand white-capped albatross and Sooty shearwater. However, Fisheries New Zealand considers the number of incidental seabird captures is unlikely to increase under any of the options as it is not expected that the amount of trawling will increase significantly.

11.3 Benthic impacts

125. Bottom trawling can damage the marine environment; particularly where trawling occurs on benthic habitats. Trawling can also directly impact on biological diversity. However, the proposed increases are modest and are not likely to significantly increase trawl effort as they reflect increased fish abundance and CPUE. Trawling in this fishery is also typically confined to areas that have been consistently fished over time (i.e. not areas of high biodiversity).

126. Some concerns have been raised about catch being taken in "hay paddocks"; these are polychaete worm beds that are biologically sensitive, habitat forming areas, which appear to be diminishing in aerial extent as a consequence of disturbance from bottom trawling. Fisheries New Zealand does not expect increases to the amount or location of bottom trawling. Fisheries New Zealand will closely monitor any increase in targeted fishing, by activity and location, and if an increase in fishing activity does occur we can look at appropriate measures to manage any issue that may arise.

127. Research has characterised both New Zealand's benthic environment and the level of benthic impact from fisheries activity (Aquatic Environment and Biodiversity Annual Review 2018). The environmental impacts of fishing are summarised annually by Fisheries New Zealand. Fisheries New Zealand will continue to monitor the bottom trawl footprint of fisheries.

128. Overall, Fisheries New Zealand considers the increase to catch limit proposed reflects increased fish abundance and CPUE; and therefore unlikely to increase the current impact on the benthic habitat.

12 Deemed values

129. No changes to the deemed value rates of MOK 3, LEA 3, GUR 3 or SPO 3 stocks are proposed.

13 Questions for submitters on options for varying TACs, TACCs and allowances

130. Fisheries New Zealand seeks your input and views on the options in this paper. We are particularly interested in:

- Which option(s) do you support for varying the TACs, TACCs and allowances? Why?
- If you do not support any of the options listed, what alternative should be considered? Why?
- Are the allowances for customary fishing appropriate? Why?
- We ask tangata whenua to provide any additional information you may have on customary catch.
- Are the allowances for recreational fishing appropriate? Why?
- Are the allowances for other sources of mortality appropriate? Why?

131. The table in Appendix 1 provides a summary, which you may find useful to formulate your feedback. Please provide detailed, verifiable information and rationale to support your views.

14 Referenced reports

Draft National Inshore Finfish Fisheries Plan (2019): https://www.fisheries.govt.nz/dmsdocument/38045-national-inshore-finfish-fisheries-plan-draft

Draft NPOA Seabirds 2020: https://www.fisheries.govt.nz/dmsdocument/38054-national-plan-of-action-seabirds-2020-supporting-document

Eastern Tarakihi Management Strategy and Rebuild Plan 2019: https://www.fisheries.govt.nz/dmsdocument/37200-eastern-tarakihi-management-strategy-and-rebuild-plan-2019

Fisheries (Amateur Fishing) Regulations 2013: http://www.legislation.govt.nz/regulation/public/2013/0482/latest/DLM3629901.html?src=qs

Fisheries (South-East Area Commercial Fishing) Regulations 1986: http://www.legislation.govt.nz/regulation/public/1986/0219/latest/DLM109259.html?search=qs_act%40bill%40regulation%40deemedreg_east+coast+commercial+fishing_resel_25_h&p=1&sr=1

Fisheries (Commercial Fishing) Regulations 2001: http://www.legislation.govt.nz/regulation/public/2001/0253/latest/DLM76407.html?src=qs

Fisheries Assessment Plenary May 2020: https://www.fisheries.govt.nz/news-and-resources/science-and-research/fisheries-research/

Fisheries New Zealand 2019. The Aquatic Environment and Biodiversity Annual Review 2018: https://www.mpi.govt.nz/dmsdocument/34854-aquatic-environment-and-biodiversity-annual-review-aebar-2018-a-summary-of-environmental-interactions-between-the-seafood-sector-and-the-aquatic-environment

Gormley, A. M., Slooten, E., Dawson, S., Barker, R. J., Rayment, W., du Fresne, S., & Bräger, S. (2012). First evidence that marine protected areas can work for marine mammals. *Journal of Applied Ecology,* 49(2), 474-480.

Harvest Strategy Standard for New Zealand Fisheries, (2008): https://fs.fish.govt.nz/Doc/16543/harveststrategyfinal.pdf.ashx

Inshore trawl survey of Canterbury Bight and Pegasus Bay, April-June 2018 (KAH1803). New Zealand Fisheries Assessment Report 2019/03: https://fs.fish.govt.nz/Page.aspx?pk=113&dk=24664

Langley, A (2013) Characterisation and CPUE analysis for the LEA fishery. SINS-WG-2013-27. 37 p. *(Unpublished Working Group document held by Fisheries New Zealand.).*

National Panel Survey of Marine Recreational Fishers 2011/12, (2014): https://www.mpi.govt.nz/dmsdocument/4719-far-201467-national-panel-survey-of-marine-recreational-fishers-201112-harvest-estimates

National Panel Survey of Marine Recreational Fishers 2017/2018, (2019): https://www.fisheries.govt.nz/law-and-policy/legal-overviews/fisheries/quota-management-system/

NPOA Sharks 2013: https://www.mpi.govt.nz/dmsdocument/1138-national-plan-of-action-for-the-conservation-and-management-of-sharks-2013

Stock status table for fish stocks (2018): https://www.mpi.govt.nz/dmsdocument/17653-stock-status-table-for-fish-stocks

Visconti, V., E.D.L. Trip, M.H. Griffiths and K.D Clements, (2017). Reproductive biology of the leatherjacket, Meuschenia scaber (Monacanthidae) (Forster1801) in the Hauraki Gulf, New Zealand. *New Zealand Journal of Marine and Freshwater Research.* 52: 82-99.

Visconti, V., E.D.L. Trip, M.H. Griffiths and K.D Clements, (2018). Life-history traits of the leatherjacket Meuschenia scaber, a long-lived monacanthid. *Journal of Fish Biology.* 92(2):470-486.

15 How to get more information and have your say

132. Fisheries New Zealand invites you to make a submission on the proposals set out in this discussion document. Consultation closes at 5pm on 1 July 2020.

133. Please see the Fisheries New Zealand sustainability consultation webpage (: https://www.fisheries.govt.nz/news-and-resources/consultations/review-of-sustainability-measures-for-1-october-2020/) for related information, a helpful submissions template, and information on how to submit your feedback. If you cannot access to the webpage or require hard copies of documents or any other information, please email FMSubmissions@mpi.govt.nz.

Appendix 1: Characterisation of the East Coast South Island trawl fishery

Stock	Total Allowable Catch (tonnes)	Total Allowable Commercial Catch (tonnes)	Allowances (tonnes)			Catch												Biological info	Stock status	
			Customary **Māori**	Recreational	All other mortality to the stock caused by fishing	Catch proportions (%) across the four stocks only				% of TACC caught per fishing year				Percentage of catch mix associated with each stock's target trawls (descending down the rows for each stock from 2018/19 for each fishing year). Bycatch species in the following columns and target species in the stock column.				Harvest (t)	At or above target?	Date
						15/16	16/17	17/18	18/19	15/16	16/17	17/18	18/19	MOK	LEA	GUR	SPO			
MOK 3	197	160	1	20	16	7	8	7	6	114	101	111	93	6	10	80	4	Fast growing, attain sexual maturity at 5-6 years of age. Growth then slows. They can grow to a length of 90 cm and maximum age of 33 years.	Very likely	2017
														81	0	19	0			
														-	-	-	-			
														76	0	23	2			
LEA 3	140	130	1	2	7	6	6	6	6	102	94	104	118	0	88	7	6	Fast growing/short life. Average weight is 200-500 g, and average length is 25-40 cm. Maximum age was 9.8 years for males and 18.1 years for females.	Unknown	2013
														0	85	13	2			
														1	79	18	3			
														0	61	36	4			
GUR 3	1,593	1,320	3	6	264	62	61	60	62	111	105	116	111	2	10	86	2	Fast growing/short life, large fluctuations in stock biomass. Maximum age is about 16 years and maximum size is 55+ cm.	Likely	2015
														2	10	85	3			
														1	5	92	2			
														1	8	89	2			
SPO 3	710	600	20	60	30	26	26	27	26	93	90	108	102	1	9	26	64	Fast growing. Lifespan uncertain but likely to live for 20+ years. Male and female rig attain sexual maturity at 5-6 years of age (about 85 cm) and 7-8 years (about 100 cm), respectively. Females reach an average maximum length of 151 cm and males 126 cm.	About as likely as not	2019
														<1	10	21	70			
														<1	8	17	75			
														<1	14	18	68			

Table key:

Target vs bycatch relationships % (orange = highest proportion; green = 2nd highest; blue = 3rd highest)

Figure 17: The above table provides an overview of the TAC settings, catches, biological and stock status information of the multiple stocks included in this review. The information is intended to guide consideration of the interdependencies between the fish stocks described in section 10.4 of this paper. Fisheries New Zealand seeks feedback on the implications that changing the TAC and TACC for one fish stock will have on the others.