Fisheries New Zealand
Tini a Tangaroa

Review of Sustainability Measures for Gemfish (SKI 3 and SKI 7) for 2022/23

Fisheries NZ Discussion Paper No: 2022/13

ISBN No: 978-1-99-103916-3 (online)
ISSN No: 2624-0165 (online)

June 2022

New Zealand Government

Disclaimer

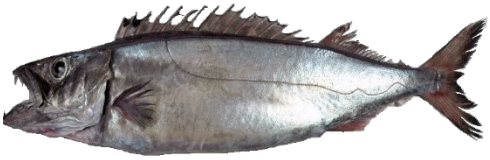
While every effort has been made to ensure the information in this publication is accurate, Fisheries New Zealand does not accept any responsibility or liability for error of fact, omission, interpretation or opinion that may be present, nor for the consequences of any decisions based on this information.

Contents

1 Stocks being reviewed

Gemfish (SKI 3, SKI 7) – South Island, Chatham Rise, West Coast off Taranaki & Wellington

Gemfish - *Rexea solandri,*
Maka-taharaki, Maka-tikati, Tiikati



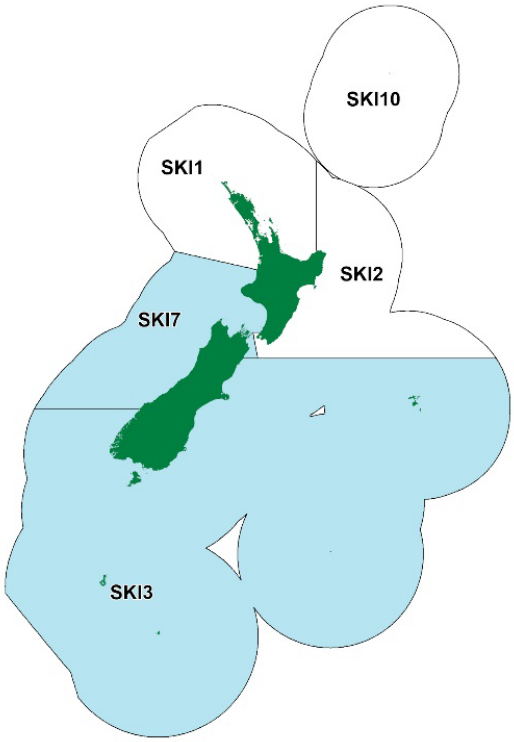


Figure 1: Quota Management Areas (QMAs) for gemfish, with SKI 3 and SKI 7 highlighted.

2 Summary

1. Fisheries New Zealand (FNZ) is reviewing sustainability measures for gemfish (*Rexea solandri)* in Quota Management Areas SKI 3 and SKI 7 for the 1 October 2022 fishing year (Figure 1).

2. Gemfish in SKI 3 and SKI 7 are considered to be a single biological stock and are managed based upon the status of the stock in relation to the default reference points set out in the Harvest Strategy Standard for New Zealand Fisheries, supported by a partial quantitative stock assessment.

3. The current Total Allowable Catch (TAC) for both stocks is 848 tonnes, made up of a Total Allowable Commercial Catch (TACC) of 839 tonnes, a customary Māori allowance of one tonne, a zero allowance for recreational fishing and an allowance for all other mortality caused by fishing of eight tonnes (equivalent to 1% of the TACC).

4. The best available information strongly suggests that the biomass of gemfish in both SKI 3 and SKI 7 has increased considerably during recent years. The bycatch of gemfish from target fisheries such as hoki has increased in line with increased abundance. The information suggests that a modest increase in catch limits for gemfish would be unlikely to cause the stock to decline in the short term. Consequently, a utilisation opportunity is available.

5. This will be the third TAC adjustment since 2018/19. FNZ has proposed increased catch limits incrementally because the size of the absolute increase in gemfish biomass is unknown and

stock status is unknown. Gemfish have wide biomass fluctuations over time. A strong increase in Catch Per Unit Effort (CPUE) indices has been observed since 2017/18.

6. Three options are proposed for SKI 3 and SKI 7, as outlined in Table 1. A modest increase to the TAC is considered to be a cautious response and provides a utilisation benefit at a time of higher abundance of gemfish. It is unlikely to lead to the targeting of gemfish. Close monitoring of the stock will continue to take place and the TAC will be adjusted in future based on CPUE indices.

Table 1: Proposed management options (in tonnes) for SKI 3 and SKI 7 from 1 October 2022.

Stock	Option	TAC	TACC	Allowances		
				Customary Māori	Recreational	All other mortality caused by fishing
SKI 3	**Option 1** *(Status quo)*	848	839	1	0	8
	Option 2	1,018 ↑ (170 t)	1,007 ↑ (168 t)	1	0	10↑ (2 t)
	Option 3	1,103 ↑ (255 t)	1,091 ↑ (252 t)	1	0	11 ↑ (3 t)
SKI 7	**Option 1** *(Status quo)*	848	839	1	0	8
	Option 2	1,018 ↑ (170 t)	1,007 ↑ (168 t)	1	0	10↑ (2 t)
	Option 3	1,103 ↑ (255 t)	1,091 ↑ (252 t)	1	0	11 ↑ (3 t)

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

3 About the stocks

3.1 Fishery characteristics

8. Gemfish in SKI 3 and SKI 7 are almost entirely caught by commercial fishers, with most catch taken as non-target catch by large (> 28 m) vessels using midwater and bottom trawl gear between 120 and 550 metres depth.

9. There are two main areas where gemfish are caught in SKI 3 and one area where gemfish are caught in in SKI 7:

   (i) **SKI 3**: Stewart-Snares Shelf and Pukaki Rise – gemfish are caught year round by a mixed target trawl fishery (squid, barracouta, hoki, silver warehou, gemfish and ling). Around 22% of the catch from the southern gemfish stocks is taken in this fishery;

   (ii) **SKI 3**: East Coast South Island – gemfish are caught year round in a mixed target trawl fishery (squid, barracouta, hoki, red cod and tarakihi) in Pegasus Bay/Canterbury Bight. This fishery takes around 15% of the catch from the southern gemfish stocks; and

   (iii) **SKI 7**: West Coast South Island – gemfish are mainly caught in the winter hoki target trawl fishery from May to September. Around 60% of the catch from the southern gemfish stocks is taken in this fishery.

10. Historically, several thousand tonnes of gemfish were annually taken from both SKI 3 and SKI 7, both as bycatch and as the target species. Catches declined substantially from the mid-1980s onwards with the TACs of both stocks reduced to 300 tonnes in the mid-1990s. Between the mid-1990s and 2015/16, landings of gemfish from both SKI 3 and SKI 7 generally remained below the TACC.

11. Consistent with the increase in stock abundance from strong year classes recruiting into the fishery, catches from both stocks have noticeably increased during recent years (Figures 6 and

7). As landings exceeded the available Annual Catch Entitlement (ACE) by considerable margins, both stocks have incurred significant deemed value invoices since the 2017/18 fishing year. In 2020/21 $403,611 was incurred for SKI 3 and $327,102 for SKI 7.

12. Gemfish product is primarily exported with a FOB[1] value of NZ $3.2 million for all gemfish stocks in the 2021 calendar year. It is unknown how much is sold on the domestic market.

3.2 Biology

13. Gemfish (also known as southern kingfish) are benthopelagic fish found over the continental shelf and slope around the coastline of New Zealand mainly in waters between 120 metres and 550 metres in depth.

14. Gemfish in SKI 3 and SKI 7 are considered to be one biological stock. Adult fish migrate from the Stewart-Snares shelf in the south (SKI 3) to the West Coast of the South Island (SKI 7) to spawn in August and September.

15. Gemfish feed on benthopelagic fish such as hoki, squid and crustaceans. They grow rapidly, attaining a length of approximately 30 cm at the end of the first year and growing to around 63 cm at the end of the fourth year. The maximum age of gemfish is around ten years and individuals recruit into the fishery at age two when they are around 45 cm fork length.[2] The recruitment variability of gemfish in SKI 3 and SKI 7 was correlated with wind and sea surface temperature patterns during the spawning season (in the 1980s and 1990s) although no correlation has been found more recently.

3.3 Management background

16. Gemfish stocks entered the Quota Management System (QMS) on 1 October 1986.

17. The TACs of SKI 3 and SKI 7 were both last reviewed for the 2021/22 fishing year, at which time the TACs for both stocks were increased from 606 to 848 tonnes.

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

4 Status of the stocks

19. The best available information on the status of these stocks can be found within the May 2022 Fisheries Assessment Plenary report (the Plenary).

20. The status of SKI 3 and SKI 7 in relation to the default reference points[3] is unknown. Gemfish are low-medium knowledge stocks and the main monitoring/assessment tool used to manage the stocks are Catch per Unit Effort (CPUE) indices.

21. Langley (2020) reviewed trends in abundance and length composition of gemfish from the West Coast South Island (WCSI) Research Vessel (RV) RV *Kaharoa* and RV *Tangaroa* trawl survey series. The surveys indicated the presence of relatively strong 2014, 2015, and 2016 year-classes (fish in the 50-70 cm length range). These strong cohorts were also present in the length compositions from observer sampling of gemfish from the summer squid trawl fishery on the Stewart-Snares shelf (SQU 1T) and the WCSI hoki fishery. The Deepwater Working Group (DWWG) concluded that there had been a considerable increase in stock abundance from the recruitment into the fishery of the three strong cohorts.

[1] Free on board. The value of export goods, including raw material, processing, packaging, storage and transportation up to the point where the goods are about to leave the country as exports. FOB does not include storage, export transport or insurance cost to get the goods to the export market.

[2] The length of a fish as measured on a line tracing the contour of the body from the tip of the upper jaw to the fork of the tail.

[3] Under the Harvest Strategy Standard, the default management target is 40% B_0 (unfished biomass), the soft limit is 20% B_0, and the hard Limit is 10% B_0.

22. Starr et al (in press) conducted an extensive analysis of all available catch-effort data for SKI 3 and SKI 7 in 2021. Ten standardised CPUE series covering the three gemfish fisheries were reported based on four distinct data sets. Three data sets were based on statutory catch, effort and landings data and used event-based CPUE, daily CPUE, and daily processed catch. The fourth data set created observed CPUE using data from fisheries observers. All series showed a sharp increase in CPUE beginning in 2017/18 (three examples are shown in Figures 2-4).

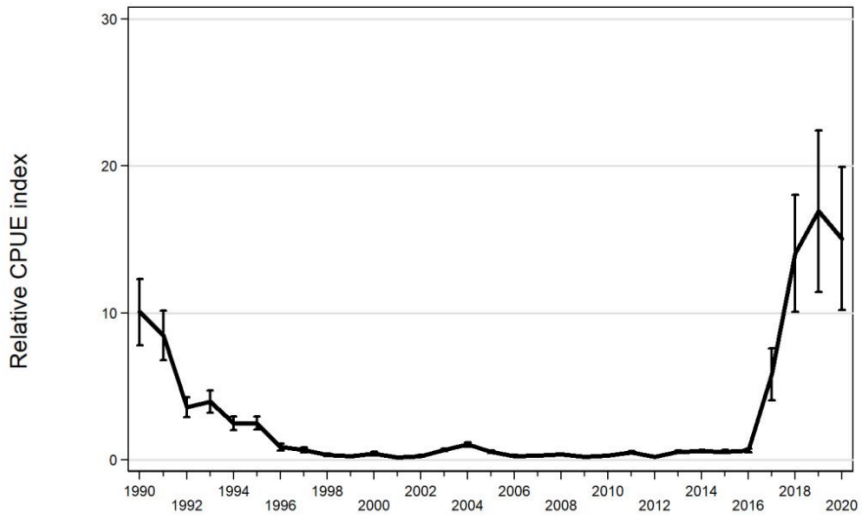


Figure 2: Daily processing combined delta-lognormal CPUE indices for the SKI 3 Stewart-Snares shelf fishery showing approximate 95% confidence intervals. Years on x axis are fishing year (Starr et al in press).

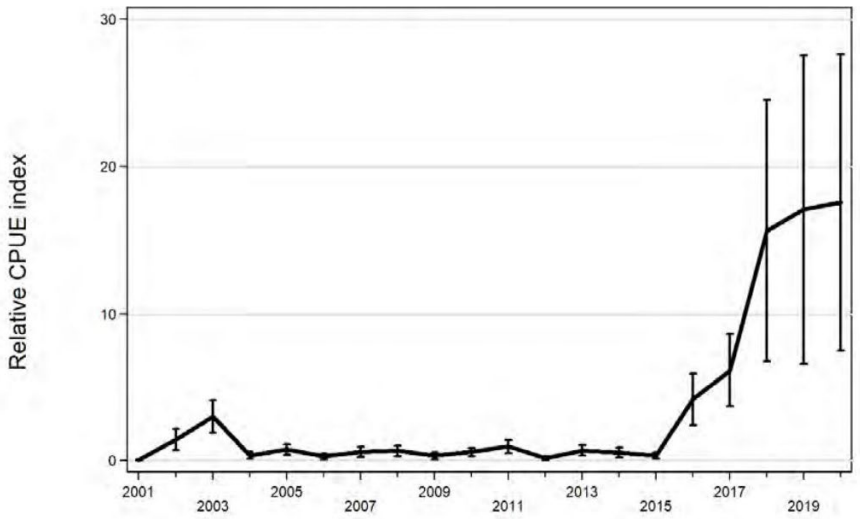


Figure 3: Daily processing combined delta-lognormal CPUE indices for the SKI 3 East Coast southern gemfish fishery showing approximate 95% confidence intervals. Years on x axis are fishing year (Starr et al in press).

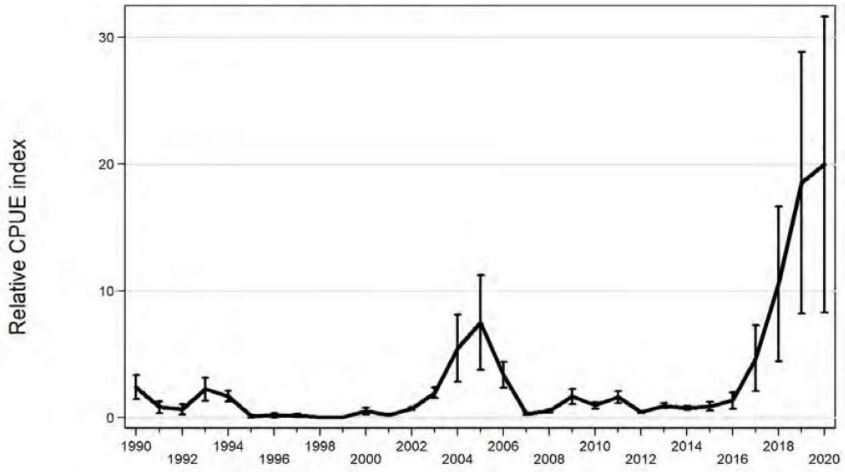


Figure 4: Daily processing combined delta-lognormal CPUE indices for the SKI 7 HOK target fishery showing approximate 95% confidence intervals. Years on x axis are fishing year (Starr et al in press).

23. The DWWG accepted that all ten CPUE series indicated a considerable increase in apparent relative biomass compared with the low levels of gemfish observed from 1989 to 2015 assuming these CPUE series were indexing gemfish biomass. The strong increase in SKI 7 was corroborated by the RV *Tangaroa* WCSI trawl survey biomass indices in 2018 and 2021. A Level 2 partial quantitative stock assessment (ranked '1 High Quality') was accepted by the 2021 Fisheries Assessment Plenary for SKI 3 and SKI 7.

24. The DWWG concluded in 2021 that given recent recruitments, SKI 3 and SKI 7 stock size is likely to increase over the short term (one to three years) and that it is unlikely (< 40% probability) that biomass will decline below hard limits. Biomass has increased by about ten-fold from 2015 following improved recruitment.

25. New information since the gemfish plenary and consultation on catch limits in 2021 is the corroboration of the strong increase in SKI 7 by the RV *Tangaroa* trawl survey biomass index in 2021. Gemfish were widespread on the survey with a similar biomass to the 2018 RV *Tangaroa* trawl survey (Figure 5).

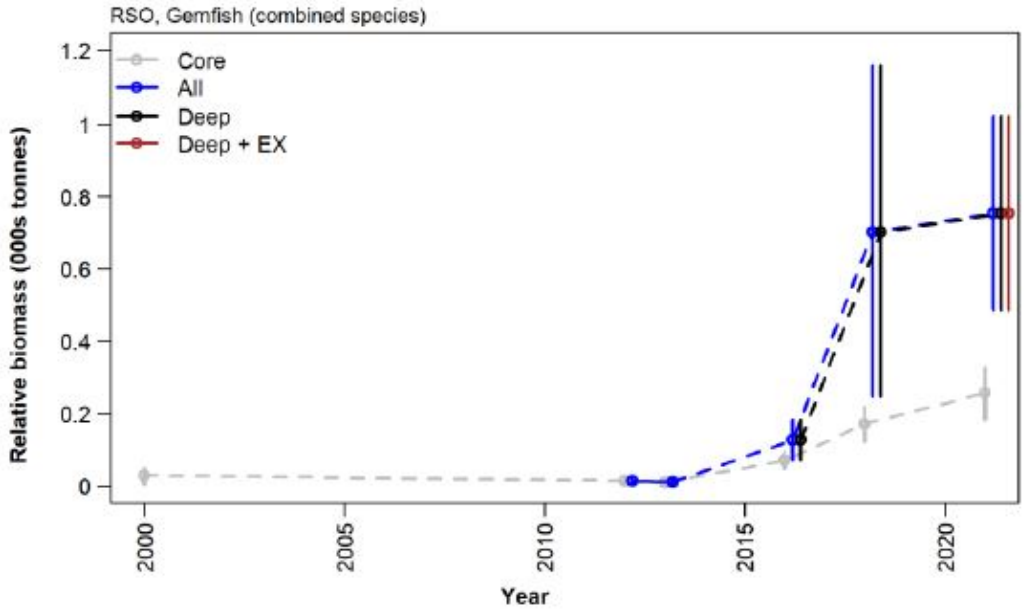


Figure 5: Relative biomass estimates (thousands of tonnes) of gemfish sampled by the west coast South Island Tangaroa trawl survey time series. Grey lines show fish from core (300–650 m) strata, blue lines show fish from all strata (200–800 m), and black solid lines show fish from deep (200–1000 m) strata. Error bars show ± 2 standard errors (Devine et al 2022 in press).

5 Catch information and current settings within the TAC

5.1 Commercial

26. Annual catches of southern gemfish (SKI 3 and SKI 7) increased significantly from 1980/81 with a combined total peak catch of 8,253 tonnes in 1985/86 (Figures 6 and 7). Catches subsequently declined in the late 1980s. TACCs were reduced to 300 tonnes for both stocks from 1997/98 until 2018/19. Between these years, catches of gemfish generally stayed below the TACC until 2016/17.

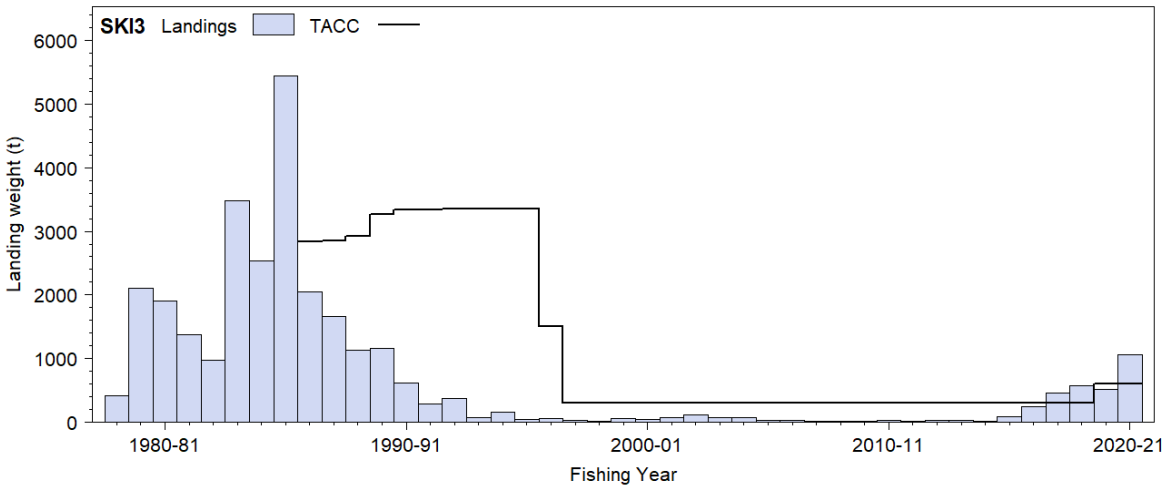


Figure 6: Reported commercial landings (in tonnes) and TACC for SKI 3 between 1978/79 and 2020/21.

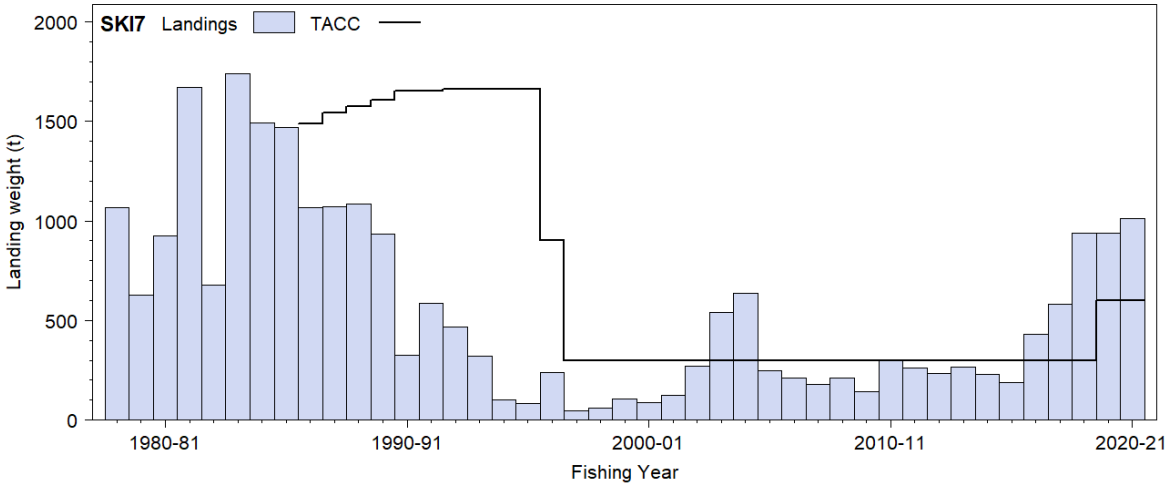


Figure 7: Reported commercial landings (in tonnes) and TACC for SKI 7 between 1978/79 and 2020/21.

27. Cumulative estimated catch of gemfish for SKI 3 and SKI 7 for the last three fishing years (2018/19 to 2020/21) shows that catch of gemfish up to 19 May in the current 2021/22 fishing year (Figures 8 and 9) continues to track the increased abundance of gemfish. Catch of gemfish in SKI 3 normally levels off in May each year as fish migrate to SKI 7 to spawn and effort reduction in FMAs 3-6 takes place (Figure 8). Catches in SKI 7 increase rapidly in June each year as the hoki fishery takes place (Figure 9).

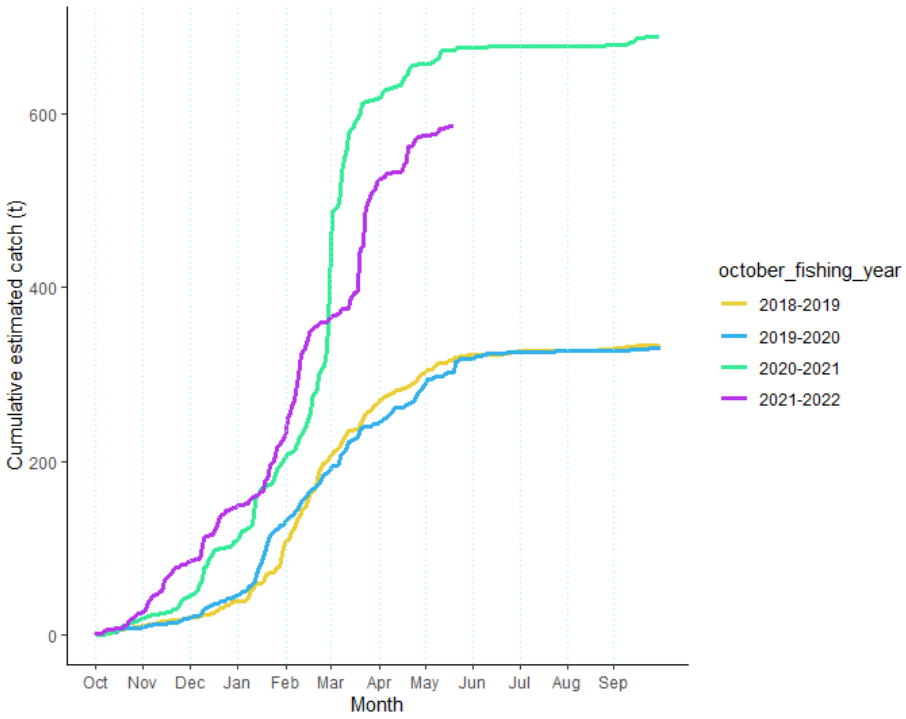


Figure 8: Cumulative estimated catch of gemfish (in tonnes) for SKI 3 for the 2018/19 to 2021/22 fishing years (note that current fishing year data is up to 19 May 2022).

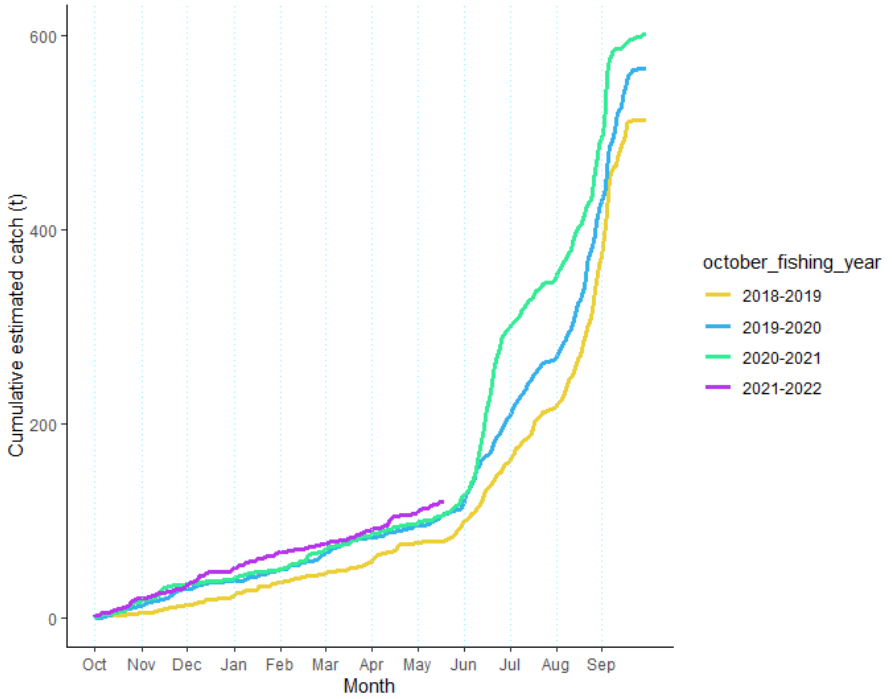


Figure 9: Cumulative estimated catch of gemfish (in tonnes) for SKI 7 for the 2018/19 to 2021/22 fishing years (note that current fishing year data is up to 19 May 2022).

5.2 Customary Māori

28. There has been no recorded customary harvest of gemfish in SKI 3 or SKI 7. Under the Fisheries (South Island Customary Fishing) Regulations 1999, gemfish (Maka-taharaki, Maka-tikati, Tiikati) has not been reported as taken. However, the current level of customary catch for finfish in QMA 7 is uncertain. In SKI 7, tangata whenua north of Kahurangi Point and in the Marlborough Sounds and Tasman/Golden Bays area are still operating under regulation 50 of the Fisheries (Amateur Fishing) Regulations 2013, which do not require that customary permits or catches be reported.

29. A one tonne allowance was introduced in both SKI 3 and SKI 7 in the 2019/20 fishing year to provide for gemfish taken under a pātaka arrangement (a place where fish is stored for customary purposes), whereby fish (including gemfish) for the use of tangata whenua may be caught by commercial trawlers under a customary permit.

5.3 Recreational

30. Although gemfish are often caught by recreational fishers around the North Island in SKI 1 and SKI 2, there has been negligible reported catch in SKI 3 and SKI 7.

31. The National Panel Survey of Marine Recreational Fishers (2017/18) reported 27 individual gemfish were caught by recreational fishers in SKI 7 in the 2017/18 fishing year and nil reported catch in SKI 3 for the same year. The negligible level of reported recreational catch for these stocks is reflected in their recreational allowances, which are currently both set at zero.

5.4 Other sources of mortality caused by fishing

32. The allowance for all other mortality caused by fishing is set at a level equivalent to approximately 1% of the TACC for both SKI 3 and SKI 7. This allowance is to provide for unrecorded mortality of gemfish, such as fish escaping through the trawl net and subsequently dying from injuries, accidental loss from ripped trawl nets and unreported discarding. FNZ has no new information to suggest this proportion (1%) should be changed.

6 Treaty of Waitangi obligations

33. Section 5 of the Fisheries Act 1996 (the Act) requires that the Act be interpreted and people making decisions under the Act to do so in a manner that is consistent with the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (the Settlement Act). The Settlement Act provides that non-commercial customary fishing rights continue to be subject to the Principles of the Treaty of Waitangi and give rise to Treaty obligations on the Crown.

34. Section 10 of the Settlement Act requires the Minister to develop policies and programmes to give effect to the use and management practices of tangata whenua. Consistent with Section 10, the Ministry has worked with Iwi to develop engagement processes that enable iwi to work together to reach a consensus where possible and to inform the Ministry on how tangata whenua wish to exercise kaitiakitanga in respect of fish stocks in which they share rights and interests and how those rights and interests may be affected by sustainability measures proposed by the Ministry.

6.1 Input and participation of tangata whenua

35. The manner in which the Ministry provides for input and participation of Māori is not discretionary but arises as a legal obligation from section 10 of the Settlement Act[4] and section 12 of the Act[5]. Section 12 (b) of the Act requires that before undertaking any sustainability process the Minister shall provide for the input and participation of tangata whenua who have a non-commercial interest in the stock or an interest in the effects of fishing on the stock. In considering the views of tangata whenua, the Minister is required to have particular regard for Kaitiakitanga from the perspective of tangata whenua.

36. Consistent with the agreements with iwi under section 10 of the Settlement Act, input and participation of tangata whenua into the sustainability decision-making process is provided mainly through Iwi Fisheries Forums, which have been established for that purpose.

37. Each Iwi Fisheries Forum can develop an Iwi Fisheries Forum Plan that describes how the iwi in the Forum exercise kaitiakitanga over the fisheries of importance to them, and their objectives

[4] Section 10 of the Treaty of Waitangi (Fisheries Claims) Settlement act 1992 refers to the effect of settlement on non-commercial Māori fishing rights and interests https://www.legislation.govt.nz/act/public/1992/0121/latest/DLM281461.html

[5] Section 12 of the Act 1996 refers to consultation https://legislation.govt.nz/act/public/1996/0088/latest/DLM395504.html

for the management of their interest in fisheries. Iwi Fisheries Forums may also be used as entities to consult iwi with an interest in fisheries (however, FNZ will also engage directly with iwi on matters that affect their fisheries interests in their takiwa).

38. At 2022 hui, FNZ provided Te Waka a Māui me Ōna Toka Iwi Fisheries Forum with summary information on the proposal to amend the TAC/TACC for SKI 3 and SKI 7. While no specific feedback on gemfish was received, the options presented in this paper will also be discussed with Te Waka a Māui me Ōna Toka Iwi Fisheries Forum hui in July 2022. In response to the forums' input, further options may be presented to the Minister for his consideration.

39. FNZ also welcomes any input and submissions on the options from tangata whenua outside of this planned engagement.

6.2 Kaitiakitanga

40. Te Taihauāuru Iwi Fisheries Forum, Te Waka a Māui me Ōna Toka (Te Waka a Māui) and Te Waipounamu Iwi Forums represent iwi with an interest in these two gemfish stocks. Iwi Forum Fisheries Plans contain objectives to support and provide for the interests of the relevant iwi and these Forums regard all fish species as taonga species.

41. Te Tai Hauāuru Iwi Fisheries Plan provides specific objectives in respect of commercial fisheries, that commercial fisheries are sustainable and support economic well-being of their iwi, and that the value of Annual Catch Entitlement is stable or increasing.

42. FNZ considers that the management options presented in this consultation paper are in keeping with the objectives of the Te Waipounamu Iwi Fisheries Plan in relation to Management Objective Three:

> *'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.'*

43. There are no customary fisheries management tools such as mātaitai, taiāpure or Section 186B temporary closures relevant to these proposals, as the majority of gemfish SKI 3 and SKI 7 are caught offshore at depths between 200 m and 500 m.

44. FNZ considers that the proposed management options are in keeping with the objectives of the Iwi Fisheries Forum Plans which generally relate to active engagement with iwi and the maintenance of healthy and sustainable fisheries but seeks further input from iwi to help inform final advice on this review.

45. FNZ is seeking input from tangata whenua on how the proposed options for SKI 3 and SKI 7 may or may not provide for kaitiakitanga as exercised by tangata whenua, and how tangata whenua consider the proposal may affect their rights and interests in these stocks.

7 Current and proposed settings within the TAC

7.1 Option 1 – *status quo*

SKI 3 and SKI 7

TAC: 848 t	**TACC:** 839 t	**Customary**: 1 t	**Recreational**: 0 t	**Other mortality**: 8 t

46. Option 1 is the status quo. It retains the existing catch limits and allowances for 2022/23. This is the most cautious approach and results in the lowest risk to the stock, and wider ecosystem.

47. However, by retaining the status quo, there is likely to be a missed opportunity for utilisation.

48. Catch has exceeded the TACC and available ACE in the last four years for SKI 7, and three of the last four years for SKI 3.

49. Landings for the 2020/21 fishing year exceeded the current TACC for SKI 3 by just over 26% (a total of 1,063 tonnes were landed) and by just over 20% for SKI 7 (a total of 1,012 tonnes were landed).

50. Under the status quo, deemed values will continue to be incurred if gemfish biomass remains high in the short term.

7.2 Option 2

SKI 3 and SKI 7

TAC: 1,018 t (↑ 170 t)	**TACC:** 1,007 (↑ 168 t)	**Customary**: 1 –	**Recreational**: 0 –	**Other mortality**: 10 t (↑ 2 t)

51. Under Option 2 FNZ proposes to increase the TAC, TACC and allowances of both stocks to reflect the increase in abundance of gemfish in SKI 3 and SKI 7.

52. The proposed option would set the TACC at the approximate current catch levels based on the previous fishing year (in the 2020/21 fishing year 1,063 tonnes were landed in SKI 3 and 1,012 tonnes were landed in SKI 7).

53. Option 2 equates to a 20% increase to the TACC (168 tonne increase). As the Deepwater Working Group estimated that current catch levels are unlikely to result in a biomass reduction over the short term, there is no information to suggest that the proposed increase under option 2 would pose a sustainability risk to either stock.

54. By increasing the TACC to recent catch levels, Option 2 would provide for an increased quantity of gemfish to be taken as unavoidable bycatch (as a result of the greater biomass). Therefore, FNZ considers it unlikely that the proposed option would result in an increase in the level of commercial fishing effort targeting either gemfish, or any other species in SKI 3 and SKI 7. As such, the environmental impacts of the proposed TACC increases are likely to be negligible.

55. Given the above, FNZ does not anticipate the proposed option to directly result in an increase in the volume of gemfish landed (and consequent increase in export revenue). However, with additional ACE available, the proposed option is likely to result in reduced deemed value invoices for the commercial fishing industry.

7.3 Option 3

SKI 3 and SKI 7

TAC: 1,103 t (↑ 255 t)	**TACC:** 1,091 t (↑ 252 t)	**Customary**: 1 –	**Recreational**: 0 –	**Other mortality**: 11 t (↑ 3 t)

56. Under Option 3 FNZ proposes to increase the TAC, TACC and allowances of both stocks to reflect the increase in abundance of gemfish in SKI 3 and SKI 7. The proposed option would set the TACC slightly above recent catch levels based on the previous fishing year.

57. Option 3 proposes a 30% increase to the TACC (255 tonne increase). There is no information to suggest that the proposed increase under Option 3 would pose a sustainability risk to either stock.

58. By increasing the TACC, option 3 would provide for an increased quantity of gemfish to be taken as unavoidable bycatch (as a result of the greater biomass). Therefore, FNZ considers it unlikely that the proposed option would result in an increase in the level of commercial fishing effort targeting either gemfish, or any other species in SKI 3 and SKI 7. As such, the environmental impacts of the proposed TACC increases are likely to be negligible.

59. Given the above, FNZ does not anticipate the proposed option to directly result in an increase in the volume of gemfish landed (and consequent increase in export revenue). However, with

additional ACE available, the proposed option is likely to result in reduced deemed value invoices for the commercial fishing industry.

8 Environmental interactions

60. The key environmental principles, which must be taken into account when considering sustainability measures for SKI 3 and SKI 7 are as follows:
    (a) Associated or dependent species should be maintained above a level that ensures their long-term viability (in particular marine mammals, seabirds, fish and invertebrate bycatch).
    (b) Biological diversity of the aquatic environment should be maintained (in particular the benthic impacts from fishing); and
    (c) Habitats of particular significance for fisheries management should be protected.

61. There have been no reported protected species interactions involving vessels targeting gemfish in SKI 3 or SKI 7. Gemfish are predominantly a bycatch species of the squid trawl fishery off the Stewart/Snares shelf (SKI 3), mixed trawl fishery off the east coast of the South Island (SKI 3) and hoki target fishery on the west coast of the South Island (SKI 7).

62. Since the 2018/19 fishing year there have been less than 20 target tows for gemfish in SKI 3 and SKI 7 (steadily decreasing from a peak of 82 tows in 2011/12). As such, it is unlikely that the proposed options will result in increased commercial targeting of gemfish in both areas. Likewise, the amount of trawl effort targeting other fish species is not expected to increase as a consequence of the proposed options.

63. It is important to note in some cases FNZ has made some assumptions about environmental interactions based on fisher reported data that may not have been independently verified (for example, by an on-board FNZ Observer). Over the last five fishing years (2016/17 to 2020/21) the average observer coverage was 48.6% of events that caught gemfish in SKI 3 and 24.2% of events that caught gemfish in SKI 7.[6]

64. The Minister recently announced key details of the nationwide rollout of cameras on commercial fishing vessels.[7] Deepwater vessels that account for most catch of gemfish in SKI 3 and SKI 7 are not being targeted by this camera rollout since there is already high levels of monitoring on those vessels. However, on-board cameras will be installed and transmitting footage on a range of smaller vessels (some of which catch gemfish) by November 2024.[8] This rollout will improve FNZ's ability to monitor any environmental interactions occurring in those fisheries.

8.1 Marine mammals

65. New Zealand sea lions, New Zealand fur seals, common dolphins and other marine mammals inhabit the marine environment where gemfish are caught in SKI 3 and SKI 7. These species periodically interact with large trawl vessels, however, there have been no reported captures of marine mammals while targeting gemfish in these areas.

8.2 Seabirds

66. The management of seabird interactions with New Zealand's commercial fisheries is guided by the National Plan of Action for Seabirds (NPOA-Seabirds 2020), which sets out the New Zealand government's commitment to reducing fishing-related captures and associated mortality of seabirds.

67. Seabird species that overlap with the main fisheries that catch gemfish include the Westland petrel, white-chin petrel, sooty shearwater, white-capped albatross and southern Buller's albatross. There have been no reported seabird captures from vessels targeting gemfish in SKI 3 or 7. In 2019/20 (the most recent data) 2,378 trawl tows were observed on the West Coast

[6] This coverage was calculated based on fishing events in which the fish stock was recorded as caught and an observer was on board. This metric does not reflect the overall level of monitoring in the fishery.

[7] Rollout of cameras on fishing vessels to begin. Honourable David Parker, Minister for Oceans and Fisheries.

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

South Island (24% of total effort) and 10 seabird captures were observed. On the Stewart-Snares Shelf in 2019/20, 3,526 trawl tows were observed (36% of total effort) and 232 seabird captures were observed.

8.3 Fish bycatch

68. The gemfish stocks are rarely targeted, so do not have associated bycatch species. The main associated species are those associated with their main target fisheries (hoki and squid).

8.4 Benthic impacts

69. Because gemfish are rarely targeted, the proposed options will not increase benthic impacts for the fisheries involved. Trawling effort for target QMS species that bycatch gemfish interact with the seabed and the associated benthic environment. The nature and extent of those impacts depends on a range of factors such as seafloor type (e.g., mud/sand/rock), gear type, types of organisms encountered and oceanographic characteristics. Contact of the trawl gear with the seabed can lead to bycatch of benthic organisms including corals, sponges and sea anemones.

70. The impact of tows on the benthic environment (the trawl footprint) is mitigated by the spatial concentration of the fishery where vessels typically trawl along previously trawled tow lines. The trawl footprint is mapped and monitored annually (Baird and Mules 2021).

71. FNZ monitors the trawl footprint annually and the cumulative fishable area contacted by trawl fishing. Management measures to address the effects of trawl activity have focused on avoiding benthic impacts. Around 30% of New Zealand's fisheries waters are closed to trawling. These closures are primarily Seamount Closures and Benthic Protection Areas (BPAs) which were implemented to avoid adverse effects of fishing on the benthic environment.

8.5 Habitats of particular significance for fisheries management

72. Gemfish are broadly distributed in SKI 3 and SKI 7 and there is little information available to guide in identifying habitats of particular significance to the stocks. Some general habitats that may potentially be significant for SKI 3 and SKI 7 are discussed in Table 2 below.

Table 2: Summary of information on habitats of particular significance for fisheries management for SKI 3 and SKI 7.

Fish Stock	SKI 3 and SKI 7
Potential habitat of particular significance	• Water column between 120 and 550 metres depth West Coast South Island (WCSI). There may be other spawning grounds for the southern gemfish biological stock, however the WCSI spawning ground appears to be the most important.
Attributes of habitat	• Continental shelf and slope. • The sea surface temperature of the WCSI I winter is variable over time. Records have shown occasional periods of increased temperature and less fluctuation.
Reasons for particular significance	• Spawning is critically important in supporting the productivity and recruitment of gemfish. • Observer data and research trawl surveys have suggested that the southern gemfish stock (SKI 3 and SKI 7) migrate to spawn off the west coast of the South Island during August-September. • Recruitment is highly variable, periodic increases in sea surface temperatures, as well as less than average strength south-westerly winds have been correlated with the presence of strong gemfish year classes.
Risks/Threats	• Long term current and circulation patterns could be impacted by climate change (sea surface temperature change and changes to wind patterns). • Due to the unknown significance of the benthic environment to the life cycle of gemfish it cannot be determined whether bottom-contacting fishing activities will have an impact on any habitats of particular significance to the management of SKI 3 or SKI 7.
Existing protection measures	• There are no known habitats of particular significance to this species that are protected by existing management measures.

73. FNZ will be starting an online consultation in mid-2022 on draft guidelines for identification of habitats of particular significance for fisheries management and the operational proposals to support its application. We would welcome your feedback. More information will be available on https://www.mpi.govt.nz/fishing-aquaculture/ when the consultation starts.

9 Relevant plans, strategies, statements and context

74. The following plans and strategies are relevant for SKI 3 and SKI 7.

9.1 National Fisheries Plan for Deepwater and Middle-depth fisheries 2019

75. Gemfish in SKI 3 and SKI 7 are managed as a Tier 2 species within the National Fisheries Plan for Deepwater and Middle-depth fisheries 2019 – Part 1A (National Deepwater Plan 2019). Tier 2 fisheries are typically less commercially valuable, comprise bycatch fisheries, or are only targeted periodically throughout the year.

76. The National Deepwater Plan 2019 sets out a series of Management Objectives for deepwater fisheries, the most relevant to SKI 3 and SKI 7 being:

- Management Objective 1: Ensure the deepwater and middle-depth fisheries resources are managed so as to provide for the needs of future generations
- Management Objective 4: Ensure deepwater and middle-depth fish stocks and key bycatch fish stocks are managed to an agreed harvest strategy or reference points

9.2 Regional Plans

77. There are eight Regional Councils that have coastline within SKI 3 and SKI 7 boundaries respectively. Each of these regional councils have multiple plans to manage the coastal and freshwater environments, including terrestrial and coastal linkages, ecosystems and habitats.

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

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

79. Te Mana o te Taiao – the Aotearoa New Zealand Biodiversity Strategy sets a strategic direction for the protection, restoration and sustainable use of biodiversity, particularly indigenous biodiversity, in Aotearoa New Zealand. The Strategy sets a number of objectives across three timeframes. The most relevant to setting sustainability measures for SKI 3 and SKI 7 are objectives 10 and 12:

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

    Objective 12: Natural resources are managed sustainably

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

10 Economic considerations

81. It is unlikely that changes to the TACC will affect fishing effort or the quantity of gemfish landed in SKI 3 or SKI 7. Therefore, the export value of SKI 3 or SKI 7 is also unlikely to be impacted by the proposed options.

11 Deemed values

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

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

84. The deemed value rates for SKI 3 and SKI 7 are shown in Table 3.

Table 3: Standard deemed value rates ($/kg) for SKI 3 and SKI 7.

	Interim Rate ($/kg)	Annual Differential Rates ($/kg) for excess catch (% of ACE)					
		100-120%	120-140%	140-160%	160-180%	180-200%	200%+
SKI 3 & 7 Status quo	0.65	0.72	0.86	1.01	1.15	1.3	1.44

85. The existing basic annual deemed value rate is below the port price ($1.30 for SKI 3 and $1.35 for SKI 7). On this basis FNZ is satisfied that the deemed value settings are consistent with the Principles of the Deemed Value Guidelines.

86. No changes are proposed to the deemed value rates of either stock at this time. However, FNZ welcomes feedback on these deemed values.

12 Uncertainties and risks

87. While the CPUE and trawl survey biomass indices reveal that stock abundance has increased considerably in recent years, the magnitude of the recent increase (in relation to historical levels) is poorly determined. The status of SKI 3 or SKI 7 in relation to the management target, is also unknown.

88. Additionally, catches from gemfish stocks both in New Zealand, and elsewhere (i.e. Australia) have shown a similar pattern over time; high initial catches followed by a rapid decline after which catches remained low and relatively stable. Such historical patterns suggest that some aspect of gemfish biology may result in the species being particularly vulnerable to fishing pressure.

89. Given the above, FNZ considers that the recent increase in gemfish abundance should be managed conservatively to promote the long-term sustainability of the stocks. By setting the TACC at about the recent 2020/21 catch levels to provide for increased utilisation, FNZ considers the proposed options consistent with this aim.

90. Furthermore, we will closely monitor gemfish abundance in the future by undertaking CPUE analysis and comparing with trawl survey biomass indices to determine when abundance is declining. This will enable catch limits to be adjusted accordingly.

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

- Which option do you support for revising the TAC and allowances? Why?
- If you do not support any of the options listed, what alternative(s) should be considered? Why?

- Are the allowances for customary Māori, recreational and other sources of mortality appropriate? Why?
- Do you think these options adequately provide for social, economic, and cultural wellbeing?
- Do you have any concerns about potential impacts of the proposed options on the aquatic environment?

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

14 How to get more information and have your say

92. FNZ invites you to make a submission on the proposals set out in this discussion document. Consultation closes at 5pm on 22 July 2022.

93. Please see FNZ's sustainability consultation webpage (https://www.mpi.govt.nz/consultations/review-of-sustainability-measures-2022-october-round/) 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.

15 Legal basis for managing fisheries in New Zealand

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

16 Referenced reports

Baird, S.J.; Mules, R. (2021). Extent of bottom contact by commercial trawling and dredging in New Zealand waters, 1989–90 to 2018–19. *New Zealand Aquatic Environment and Biodiversity Report,* No. 260. 157 p.

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

Devine, J.A.; Stevens, D.W.; Ballara, S.L. (in press 2022). Trawl survey for middle depth fish species on the west coast South Island, July–August 2021 (TAN2107). New Zealand Fisheries Assessment Report 2022/xx. xx p.

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

Fisheries New Zealand (2019). National Fisheries Plan for Deepwater and Middle-depth Fisheries. Accessible at: https://www.mpi.govt.nz/dmsdocument/3967-National-Fisheries-Plan-for-Deepwater-and-Middle-depth-Fisheries-2019.

Fisheries New Zealand (2020). Guidelines for the review of deemed value rates for stocks managed under the Quota Management System. Accessible at: https://www.mpi.govt.nz/dmsdocument/40250/direct.

Fisheries New Zealand (2021). Fisheries Assessment Plenary, May 2021: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. 1782 p. Available at: https://www.mpi.govt.nz/science/fisheries-science-research/about-our-fisheries-research.

New Zealand Government (2020). Te Mana o te Taiao - Aotearoa New Zealand Biodiversity Strategy 2020. Accessible at: https://www.doc.govt.nz/nature/biodiversity/aotearoa-new-zealand-biodiversity-strategy/.

Langley A. (2020) Fishery characterisation, CPUE analysis and preliminary modelling of gemfish in SKI 3 and SKI 7. New Zealand Fisheries Assessment Report 2020/03, 43 p.

Starr, P.J.; Tornquist, M.G.; Middleton, D.A.J.; Neubauer, P.; Langley, A.D. (2021). Characterisation and CPUE analyses for the gemfish fisheries in SKI 3 and SKI 7. New Zealand Fisheries Assessment Report 2021 (in press).

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