



Fisheries New Zealand

Tini a Tangaroa

Review of sustainability measures for kina (SUR 3) for 2024/25

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Kina (SUR 3) – East Coast South Island

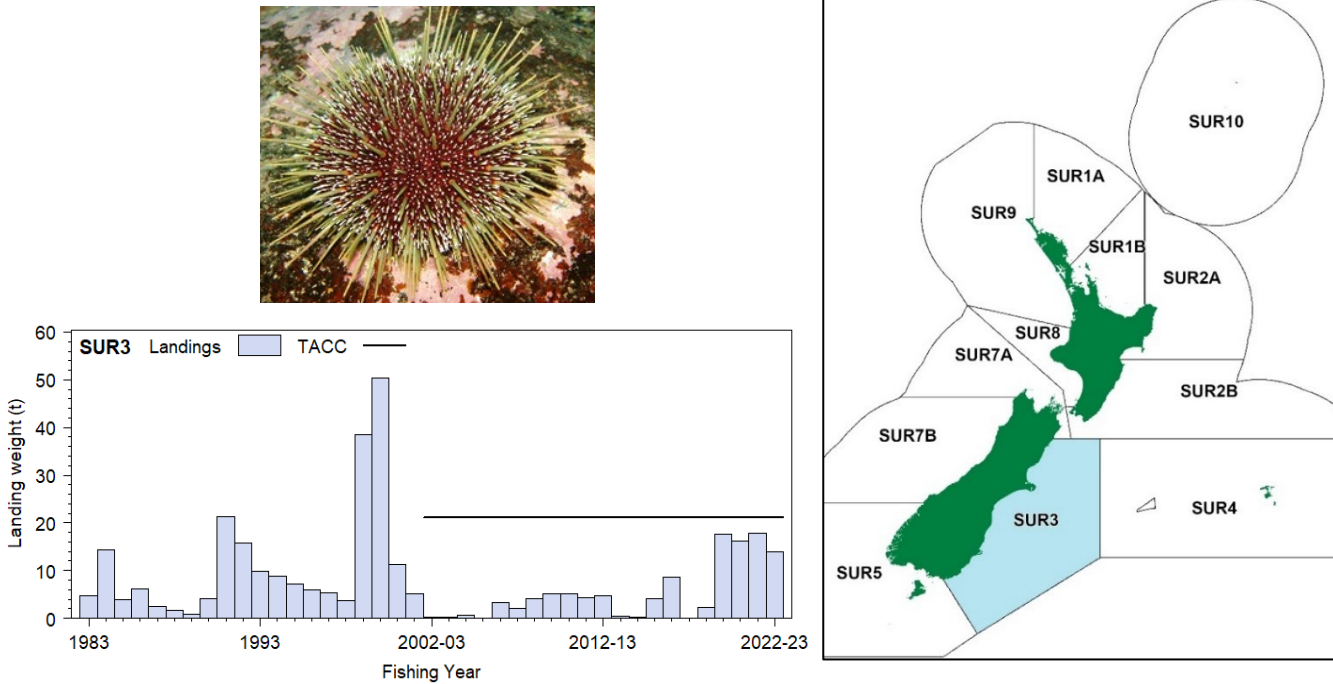


Figure 1: Quota Management Areas (QMAs) and total allowable commercial catches (TACCs) for kina (*Evechinus chloroticus*), with SUR 3 highlighted.

Why are we proposing a review?

1. Fisheries New Zealand (FNZ) is reviewing sustainability measures for kina (*Evechinus chloroticus*) in SUR 3 for the 1 October 2024 fishing year (Figure 1).
2. The Total Allowable Commercial Catch (TACC) for SUR 3 has remained at low levels and the fishery has been only lightly exploited since entering the Quota Management System (QMS). To date, little is known about the stock or the impacts of fishing on the kina population within SUR 3.
3. Estimates of biomass calculated by NIWA from a recent survey led by quota holders, however, indicate a high overall biomass in the areas surveyed within SUR 3. This suggests a utilisation opportunity is available through an increase to the Total Allowable Catch (TAC), TACC, as well as allowances for recreational, customary and all other mortality caused by fishing.
4. Uncertainties in the biomass estimates from a relatively new survey method, as well as the cultural significance, and increasing recreational importance of kina mean a cautious approach has been used to define the options to increase the TAC for this stock.
5. Under both Options 2 and 3 the increases proposed are modest relative to the estimated biomass from the surveys. Under Option 2 smaller increases to the TACC, customary and recreational allowances would occur while a harvesting plan is developed that takes into account the customary and recreational significance of kina and allows for the impacts of a higher catch on the fishery to be monitored.
6. Adjustment to the TAC of SUR 3 based on the options outlined below would be made under [section 13\(2A\) of the Fisheries Act 1996 \(the Act\)](#) and apply from 1 October 2024 (the beginning of the next fishing year).

Proposed options

Table 1: Proposed management options (in tonnes) for SUR 3 from 1 October 2024.

Option	TAC	TACC	Allowances		
			Customary Māori	Recreational	All other mortality caused by fishing
Option 1 (<i>Status quo</i>)	42	21	10	10	1
Option 2	163 (↑121)	121 (↑100)	20 (↑10)	20 (↑10)	2 (↑1)
Option 3	284 (↑242)	221 (↑200)	30 (↑20)	30 (↑20)	3 (↑2)

7. FNZ is satisfied that the current [deemed value rates](#) of SUR 3 provide sufficient incentives for fishers to balance their catch with ACE (consistent with [section 75\(2\)\(a\) of the Act](#) and the [Deemed Value Guidelines](#)). Therefore, no changes are proposed to the deemed value rates for this stock at this time. However, FNZ welcomes any feedback on these settings.
8. FNZ acknowledges that if the TACCs of these stocks are varied, subsequent changes in fishing behaviour and the ACE market may result in the need for deemed values to be re-evaluated in future.
9. For more information on the current management settings for SUR 3 see the [Fisheries Infosite](#). For general information about fisheries management in New Zealand, see our [fisheries management webpage](#), and our [webpage about the Quota Management System \(QMS\)](#).

Option 1: retain current settings (status quo)

Benefits	<p>This option recognises the uncertainties associated with estimating the weight of kina and scaling survey estimates of biomass to available habitats and allows for further assessment of the survey data before any management changes are made.</p> <p>It would allow further engagement with iwi, rūnaka, and relevant committees of customary protected areas recognising the cultural significance of kina to iwi (especially given that some of the surveyed areas are within customary protected areas).</p> <p>It recognises there is limited information regarding the impacts of fishing kina in SUR 3, as the fishery has been only lightly exploited in small areas to date.</p>
Risks	<p>The current TAC represents a very low exploitation rate. Retaining this TAC would forgo the utilisation opportunity indicated by the high biomass estimated from surveys (over 40,000 tonnes (McKenzie et al., 2024) across the areas surveyed (<i>Supporting information</i>, Table A1 and A2)). Despite uncertainty in aspects of the estimates, it is very likely that there is a larger biomass in SUR 3 that is not currently utilised under the present TAC.</p>

Option 2: 121-tonne TAC increase

Benefits	<p>This option would allow an increase in utilisation for all sectors, recognising the high biomass estimated, while adopting a cautious approach to a relatively new fishery that has not been heavily exploited previously. This more modest increase to the TACC (relative to Option 3) takes into account the significance of kina to customary fishers (see <i>'input and participation of tangata whenua'</i> below).</p> <p>The industry is developing a harvest plan to ensure catch is spread to reduce the risk of localised depletion. The more modest increase under this option would limit this risk while the plan is being implemented and monitoring is established to investigate the impacts of higher catch on the fishery. The harvest plan will also identify and avoid areas of particular importance to customary and recreational fishers so that commercial fishing can occur outside these areas.</p> <p>The increase of 10 tonnes to both the recreational and customary allowances recognises the increasing recreational interest indicated by the National Panel Survey of Marine Recreational Fishers (NPS) (see <i>Current settings within the TAC</i>), as well as the cultural significance of kina to iwi.</p> <p>This option is estimated to have an additional \$970,000 of landed revenue (based on the 2023-2024 port price of \$9.69/kg.)</p>
Risks	<p>The sedentary nature and irregular distribution of kina means they may be susceptible to localised depletion. Increased fishing effort under a higher TAC would increase this risk. Additionally, the surveyed areas in some cases overlap with areas of recreational and customary importance, including in close proximity to customary protected areas, highlighting the need to engage with tangata whenua on management approaches.</p> <p>On the other hand, the high biomass estimates from the survey suggests that there is a potential utilisation opportunity that may be forgone under this option for a modest increase in the TAC.</p>

Option 3: 242-tonne TAC increase

Benefits	<p>This is the preferred option of the commercial kina industry as it would provide a significant utilisation opportunity for commercial fishers based on the estimated large amounts of available biomass.</p>
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	<p>The TAC still represents a very low exploitation rate relative to the biomass estimated from industry-led surveys, which limits the risk of localised depletion while the industry harvest plan is developed and implemented, and monitoring is established to investigate impacts of higher catch on the fishery.</p> <p>Higher allowances for recreational and customary sectors (relative to Option 2) are provided under this option.</p> <p>This option is estimated to have an additional \$1.94 m of landed revenue (based on the 2023-2024 port price of \$9.69/kg.)</p>
Risks	<p>The TAC increase under this option is a less cautious approach with respect to sustainability which presents a greater risk of localised depletion and fishing impacts, including in areas that overlap with areas of recreational and customary importance.</p>

Who is affected by the proposed changes?

10. The SUR 3 kina fishery is an important shared fishery with harvesting by recreational, commercial and customary fishers. Kina are culturally significant to iwi, being listed as taonga species in the Te Waka a Māui fisheries plan and are an important part of the coastal marine ecosystem.
11. Based on the last three fishing years, in SUR 3 there have been on average 10 quota owners (of which 2 are settlement quota), providing ACE to 3 permit holders, landing kina to 3 licensed fish receivers (LFRs).
12. On average over the last three fishing years, there were 3 vessels landing kina in SUR 3.

Input and participation of tangata whenua

13. Te Waka a Māui me Ōna Toka Iwi Forum represents the iwi with an interest in SUR 3. The proposal to review SUR 3 was tabled with the forum in November 2023. Feedback from Ngāi Tahu representatives on the forum as well as the East Otago Taiāpure committee since the survey results became available in May has been unsupportive of a TAC review due to the cultural importance of kina, uncertainties in the biomass estimates, and overlaps between sectors, particularly within customary management areas.
14. FNZ will engage further with the iwi fisheries forums during consultation and welcomes any further input from tangata whenua on the proposed options outside of this planned engagement.

Fishery characteristics and current settings

<p>Commercial (TACC)</p> <p>Kina is commercially harvested for their roe (eggs) which are removed from the shell and typically sold in punnets or pottles, and almost exclusively consumed by the domestic market (James and Herbert, 2009). SUR 3 was introduced to the QMS in 2002 at a nominal level based on the limited catch that was occurring at the time SUR 3 entered the QMS, with a TACC of 21 tonnes (t). It has not been reviewed since entering the QMS. This initial TACC was set relatively low due to limited information about the stock – commercial harvest peaked at 40–50 t in the years before QMS introduction. Until recent biomass estimates there has been insufficient data to inform a TAC review.</p> <p>The use of underwater breathing apparatus (UBA) is prohibited when commercially harvesting kina, so gathering is conducted by hand gathering while freediving. Catches have remained at very low levels since 2002, with annual catch increasing to around 13-17 t since the 2019/20 fishing year. However, catches have never reached or exceeded the TACC. Most of the commercial harvest is currently taken in a relatively concentrated area in North Otago, with small amounts harvested in Canterbury and Kaikōura.</p>
<p>Customary Māori</p> <p>Kina is an important traditional food for Māori and continues to be gathered under provisions for customary fishing. The customary allowance is set at 10 t. There is limited quantitative information available on the level of customary take of kina and it is likely that many tangata whenua harvest kina under their recreational allowance. Reported customary authorisations in SUR 3 have been as high as around 16,000 kina but are generally much lower than this, ranging from around 160-6,000 kina. There are a number of customary protected areas within SUR 3, some of which include regulations that relate to kina, recognising their importance to tangata whenua.</p>

Recreational

Kina is a popular recreational species that is exclusively harvested through hand gathering while wading, freediving, or scuba diving, either from shore or from a boat. The use of UBA is permitted in the recreational fishery.

The current recreational allowance is 10 t. Recreational take is estimated by the National Panel Surveys of Marine Recreational Fishers (**NPS**) to have increased from around 5,000 kina in the 2017-18 survey (Wynne-Jones et al., 2019) to around 24,000 in the 2022-23 survey (Heinemann, in prep).

Estimates of mean kina weight are not available to allow recreational catch estimates reported in the NPS to be converted into harvested weight (catches in the NPS are reported as numbers of individual kina). However, by using a conversion factor of 715 g per individual (recently determined by analysis of mean weight from survey data), the recreational catch from SUR 3 can be estimated at approximately 3.5 t for 2017-18 and 17 t for 2022-23. It is thought that due to the low exploitation in SUR 3, kina are generally quite large. The catch estimates from the NPS are uncertain due to low participation rates. However, this trend may indicate that there is increasing recreational interest, which may further increase as a result of the high biomass suggested by the recent survey.

Other sources of mortality caused by fishing

This allowance is currently set at 1 t. It is intended to provide for unrecorded mortality of fish associated with fishing, including incidental mortality from fishing methods or illegal fishing. This is naturally difficult to quantify when considering the range of contributing sources and as a result there is uncertainty in the estimates used to set this allowance.

Although there is no minimum legal size for kina, some incidental mortality is likely because roe quality (recovery rate and colour) is commonly assessed by opening 'test' kina underwater. These animals are not subsequently landed. There are no estimates of the magnitude to this incidental mortality. Another potential source of kina mortality in SUR 3 is the use of kina as 'groundbait' to attract fish. Ground-baiting is a practice used among spearfishers that involves collecting kina, placing them in a pile in the middle of an open area, and then breaking them open using a knife, rock, or the butt of a speargun.

Additional supporting information and legal context

15. There are additional figures and more information on pages 5-6 below which support the above analysis and proposed options.
16. On the following pages (page 7 onward) FNZ has provided a series of tables outlining key matters that support an initial assessment of the proposed changes against provisions of the Fisheries Act 1996. This includes matters relevant to sections 9, 10, 11, and 13 of the Act, as well as mātaimai reserves and other customary management tools which are relevant to the Minister's decision making under section 21(4).
17. For information on the relevance of sections 5 (Application of international obligations and Treaty of Waitangi (Fisheries Claims) Settlement Act 1992), and 8 (Purpose) of the Act, as well as detail on the statutory considerations relevant to TAC decisions, please see the **Legal Appendix** ('*Overview of legislative requirements and other considerations in relation to sustainability measures for the 2024 October round*') on our [consultation webpage](#).

How to have your say

18. We welcome your views on these proposals. Please provide detailed information and sources to support your views where possible.
 - 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?
19. FNZ invites you to make a submission on the proposals set out in this discussion document. Consultation closes at 5pm on **Monday 29 July 2024**.
20. Please see the FNZ sustainability [consultation webpage](#) 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

Supporting information

Biomass estimates

Table A1: Kaikōura area and kina density and biomass estimates by strata. (McKenzie et al., 2024).¹

Strata	Number of sites	Mean density (kg/square metre)	Mean density standard deviation	Biomass (t)	Biomass standard error (t)	Biomass CV
1	12	1.273	0.785	6,588	1,173	0.18
2	3	1.083	0.559	999	298	0.30
3	3	0.043	0.075	171	171	1.00

Table A2: Moeraki area and kina density and biomass estimates by strata (McKenzie et al., 2024).

Strata	Number of sites	Mean density (kg/square metre)	Mean density standard deviation	Biomass (t)	Biomass standard error (t)	Biomass CV
4	3	4.499	0.825	7,147	757	0.11
5	7	1.872	1.033	20,444	4,263	0.21
6	11	1.184	0.520	19,154	2,534	0.13
7	8	0.035	0.017	477	82	0.17



Figure A1: Maps showing the approximate location of each stratum from kina surveys within SUR 3.

¹ This is an unpublished NIWA report prepared for Sustainable Fisheries Development Limited that is accessible at: <https://bestfile.io/3i3GCvWDSohFKL/file> or at <https://www.dropbox.com/scl/fi/meymbs4w7pgtoxiz6z2p/SUR3-final-report-NIWA-SFDL.pdf?rlkey=mfejvbw153f51ffx6rpv2sk0&st=84j83dvr&dl=0>.

Information on interdependence of stocks, biology, and environmental factors

Interdependence of stocks

21. Interactions between kina, their predators, and the algal species they graze on, is a highly studied aspect of New Zealand's marine ecology. Most of these studies are based in northeastern New Zealand where observations from marine reserves suggest that fishing of kina predators (snapper and rock lobster) has resulted in a trophic cascade, where in fished areas kina populations have increased and grazed down native kelp, resulting in extensive areas of unproductive barren reef habitat or "kina barrens." Fishing of kina predators is a concern for the development of kina barrens. However, there is no information to suggest kina barrens are widespread in SUR 3.
22. There is little information on the impact of reducing abundances of kina on healthy reef ecosystems, though experimental work in Fiordland suggests harvest of kina could have strong impacts on the structure of algal assemblages and should be treated with caution (Villouta et al., 2001). Some evidence suggests there is an inverse relationship between kina and pāua, as low pāua densities were observed in high concentrations of kina with the species occupying a similar ecological role as grazers (Naylor & Gerring, 2001).
23. For more information, see the [Plenary](#) and the [AEBAR](#).

Biological characteristics

24. Kina are found throughout New Zealand and the sub-Antarctic Islands in coastal habitats, generally in waters from the shallow subtidal to depths of at least 60 metres. Kina have an annual reproductive cycle which culminates in multiple spawning events across mid- and late summer. Size at maturity appears to vary between locations and may be as small as 30 mm test diameter (**TD**) and as large as 75 mm TD.
25. The rate of settlement is likely to vary between years and appears to differ among locations and habitats. Laboratory work has shown that recruitment is negatively impacted by sediment concentration. Likely highly variable recruitment in SUR 3 coupled with high levels of sediment input in some areas could impact successful recruitment.
26. Feeding experiments have indicated that kina possess a selective mode of feeding, being able to distinguish between algal species but with a preference for the kelp *Ecklonia radiata* and to a lesser extent *Sargassum sinclairii*, *Landsburgia quercifolia* and *Carpophylum maschalocarpum*. However, kina can also feed on encrusting organisms, such as sponges, when algal food is scarce.
27. For a more detailed summary of biological characteristics, see the kina chapter of the [Fisheries Assessment Plenary, May 2024](#).

Environmental conditions affecting the stock

28. In 2016, the Kaikōura earthquakes caused significant loss of habitat resulting from coastal uplift along the coastline between the Clarence River and Conway River (Alestra et al., 2019; Alestra et al., 2020; Schiel et al., 2021). This area was closed to commercial and recreational kina fishing to protect the surviving populations and associated habitats but has since been reopened.
29. In general, coastal shellfish resources fluctuate naturally and are susceptible to environmental degradation. Potential stressors, other than human harvesting include anthropogenic contaminants, changes in the marine environment associated with human activity, such as increased sediment loading, nutrient enrichment, and climate change; and natural phenomena, such as heat stress, and diseases/parasite events. Likely variable recruitment and settlement events in the area in combination with high sedimentation events from rivers or dredge disposal events could have a large impact on the stock if the timing of such events align, due to the evidence of impacts of sedimentation on larval settlement.

Relevant provisions of the Act

Key matters for assessment of the proposals against [section 13 of the Act](#)

Matters for assessment under section 13(2A) of the Act	
Section 13(2A)	<p>Because the status of SUR 3 cannot be reliably estimated in relation to the maximum sustainable yield (MSY) using the best available information, any changes to the TAC would be made under section 13(2A) of the Act. Under this section, the Minister must set a TAC using best available information that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above a level that supports <i>MSY</i>, while having regard to the interdependence of stocks, the biological characteristics of the stock, and any environmental conditions affecting the stock.</p> <p>As noted above, SUR 3 has been lightly exploited since introduction to the QMS, and recent surveys indicate that much higher yields are likely to be sustainable. Based on this, FNZ's initial view is that all the options presented for SUR 3 would not be inconsistent with the objective of maintaining the stock at or above a level that supports <i>MSY</i>.</p>
Harvest Strategy Standard	<p>Under the Harvest Strategy Standard (HSS) 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. It is currently unknown where biomass sits in relation to these default targets set out by the HSS, however, the information noted above suggests the biomass is likely to be well above these default HSS limits.</p>
Section 13(2A)(b) Interdependence of stocks	<p>The proposed increases to the TAC of SUR 3 could have some effect on their associated predators and prey, and potentially the structure of algal assemblages in localised areas where kina harvesting increases (see '<i>Interdependence of stocks</i>' above). However, the specific impacts are uncertain, and their extent cannot be quantified based on the information available.</p>
Section 13(2A)(b) Biological characteristics of the stock	<p>Kina recruitment can vary significantly and coupled with high levels of sediment input in some areas, this could impact the resilience of kina populations in SUR 3 to fishing pressure. However, the proposed TAC increases are modest relative to biomass estimates, so fishing pressure may not greatly impact on stock resilience.</p>
Section 13(2A)(b) Environmental conditions	<p>Environmental conditions (particularly sedimentation) will affect how the SUR 3 stock responds to increased fishing pressure. However, the specific impacts are uncertain, and their extent cannot be quantified based on the information available.</p>
Section 13(3) Factors to have regard to in considering the way and rate the stock is moved towards or above B_{MSY}	<p>Section 13(3) is not considered relevant to the TAC decision for SUR 3 because the options only aim to maintain the stock at or above <i>MSY</i>. They are not intended to move the stocks to a certain level in a certain way or rate (noting that forward projections are also not available to help FNZ determine what way and rate these options would move the stock in relation to <i>MSY</i>).</p>

Mātaimai reserves and other customary management tools

30. When making TAC decisions, the Minister must allow for Māori customary non-commercial interests. In doing so, the Minister must take into account any gazetted mātaimai reserve in SUR 3, and any area closure, fishing method restriction, or prohibition imposed in SUR 3 under section 186A or 186B.
31. For more information on how mātaimai reserves and other customary management tools are relevant for TAC decisions, see heading 2.7 in the Legal Appendix.

Mātaimai reserves and other customary management tools		
Customary area		Management type
Kahutara	Lyttelton Harbour/Whakaraupō	Mātaimai reserve Commercial fishing is not permitted within mātaimai reserves unless regulations state otherwise.
Koukourārata	Oaro (freshwater and marine)	
Mangamaunu	Ōpihi Waitarakao	
Moeraki	Puna-wai-Toriki	

Mātaaitai reserves and other customary management tools	
Otakou Rāpaki Bay Te Kaio Tutaepuaputa Waihao Waikouaiti	Tautuku Te Ahi Tarakihi Te Waha o te Marangai Tuhawaiki Waikawa Harbour/Tumu Toka Wairewa/Lake Forsyth
Te Taumanu o Te Waka a Māui Oaro-Haumuri Akaroa Harbour East Otago	Taiāpure All types of fishing are permitted within a taiāpure. The management committee can recommend regulations to manage commercial, recreational, and customary fishing.
Waiopuka	Temporary closures Section 186 temporary closures are used to restrict or prohibit fishing of any species of fish, aquatic life or seaweed or the use of any fishing method.

Key matters for assessment of the proposals against [section 9 of the Act](#)

32. When considering sustainability measures, the Minister must take into account the below environmental principles. For more information on how section 9 of the Act relates to TAC decisions, see heading 1.4. of the Legal Appendix.
33. SUR 3 is a target fishery where commercial harvesting is conducted through hand gathering while freediving; recreational fishers are able to use UBA. The selective nature of this method of harvesting ensures that there is no bycatch or incidental mortality of kina or non-target organisms. However, if significant (unsustainable) reductions in kina biomass were to occur this could impact ecosystem function, especially over small spatial scales.

Associated or dependent species should be maintained above a level that ensures their long-term viability - Section 9 of the Act	
Seabirds, mammals, fish and invertebrate bycatch	Kina are harvested by hand-gathering while freediving in SUR 3. The method of hand-gathering is a highly selective one and there is no bycatch of any fish or invertebrate species. Harvesting involves the use of vessels and there is a small risk of direct collisions between seabirds and the vessels, leading to injury or mortality. There are no known captures of marine mammals, seabirds, or protected fish species in New Zealand kina fisheries.
Biological diversity of the environment should be maintained - Section 9(b) of the Act	
<p>Harvesting of kina may lead to a reduction in herbivory on a reef resulting in an increase in the abundance of macroalgal and invertebrate species and a corresponding increase in associated biodiversity and change in depth range.</p> <p>The removal of predators (particularly large predators) through fishing, and the potential for kina barrens to develop as a result kina barrens as a result, will have an impact on associated biodiversity and productivity. The full extent of this impact is unknown (including on associated and dependent species), but a shift from productive kelp forests to kina barrens will result in reduced primary production and biodiversity. It is acknowledged that kelp habitats are important for a range of harvested and non-harvested species, and any reduction in such habitats is therefore likely to be adverse to species that rely on kelp.</p>	

Habitat of particular significance for fisheries management should be protected - Section 9(c) of the Act
There is little information available to guide identification of habitats of particular significance. None have been formally identified for SUR 3. General habitat that may potentially be significant is discussed in the table below.

Habitat of particular significance for fisheries management should be protected - Section 9(c) of the Act	
Potential habitat of particular significance	Rocky intertidal and subtidal reefs.
Attributes of habitat	Kina are found along most coastal habitats, particularly in rocky intertidal and subtidal reefs dominated by encrusting algae. They inhabit shallow subtidal waters to depths of about 60 metres. Kina populations are not uniformly distributed across all rocky reef habitats. Abundance is influenced by depth and wave exposure.
Reasons for particular significance	<p>Kina larvae spend between 20 to 40 days in the water column before settling on rocky substrate indicating the importance of the presence of suitable settlement surfaces.</p> <p>Rocky intertidal and subtidal reefs are also characterised by the growth of seaweed species and algae. Rocky shores provide stable platforms for seaweeds to anchor themselves to and create forests. These kelp forests provide shelter and nursery grounds for many fish species such as kina, snapper, and crayfish. They also provide food for grazing species such as kina, crabs and snails which serve as prey for large predatory fish species.</p> <p>Rocky shores in areas of wave exposure are important, as species that attach themselves to substrate permanently, such as barnacles and sea squirts, cannot forage for food, and therefore, rely on waves to transport food to them. Intertidal and subtidal reefs, as a result of the points mentioned above, are typically defined as ecosystems that are high in biodiversity.</p>
Risks/Threats	<p>The overfishing of key predator species, such as snapper and crayfish, is considered a key contributor to the formation of kina barrens. This is thought to be an issue in certain areas of New Zealand, with a lack of information on this issue in SUR 3.</p> <p>Fine sediments introduced from runoff from the land may have adverse effects on kina, particularly larvae, and habitat. Layers of fine sediment can reduce light levels for marine plant species which could impact food availability for intertidal and subtidal species.</p> <p>Changes in the environmental conditions associated with marine heatwaves may have impacts on the survival of larval kina and food availability for kina. However, the extent to which changes in climate and temperature may be affecting kina habitat suitability in SUR 3 is unknown.</p>
Existing protection measures	Kina fishing has negligible effect on habitats. Steps have been taken to reduce the effects of land-based gravel deposition along the coastline in some areas, such as Kaikōura, with the placement of concrete barriers and walls where hillsides are close to the coastline.
Evidence	Alestra et al (2019), Alestra et al (2020), Sutton & Bowen (2019), Kerr (2016).

Key matters for assessment of the proposals against [section 11 of the Act](#)

34. Section 11 of the Act sets out various matters that the Minister must take into account (sections 11(1) and 11(2A)) or have regard to (section 11(2)) when setting or varying sustainability measures such as the proposed TAC changes. The matters relevant to this review under section 11 are set out below. For more information on how section 11 is relevant for TAC decisions, see heading 2.2 in the Legal Appendix.

Effects of fishing on any stock and the aquatic environment – section 11(1)(a)	As discussed under ‘ <i>Key matters for assessment of the proposals against section 9 of the Act</i> ’, SUR 3 is a target fishery where commercial harvesting is conducted through hand gathering while freediving. The selective nature of this method of harvesting ensures that there is no bycatch or incidental mortality of kina or non-target organisms and there has been no reported protected species interactions.
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<p>Existing controls that apply to the stock or area – section 11(1)(b)</p>	<p>The recreational daily limit for most of SUR 3 is 50 kina per person. However, the daily limit for kina in the Kaikōura Marine Area and the Tuhawaiki, Te Ahi Tarakihi, Waitarakao Mātaitai reserves is 20 and the daily limit in the East Otago Taiāpure is 10.</p> <p>The use of UBA is permitted for recreational fishers but is not permitted for commercial fishers.</p> <p>There are marine reserves and other protected areas in SUR 3 as well as several closed areas for commercial fishers that relate to kina and shellfish generally.</p>
<p>The natural variability of the stock – section 11(1)(c)</p>	<p>Settlement of kina larvae within the SUR 3 fishery is likely to vary between years and may differ among locations and habitats, attributed to the variability in larval mortality.</p> <p>In laboratory and field studies, larval mortality and developmental abnormalities have been observed to increase with increasing concentrations of suspended sediment. This suggests that environmental conditions associated with terrestrial runoff are of importance.</p> <p>Population growth of kina and the establishment of kina barrens has been attributed to fishing of large predators in areas of New Zealand.</p> <p>FNZ does not anticipate a sustainability risk with the proposed increases to catch settings as the industry-led local area survey suggests kina abundance is high. Unsustainable reductions in kina biomass on a localised scale could impact ecosystem function.</p>
<p>Relevant statements, plans, strategies, provisions, and documents - section 11(2)</p>	<p>There are two regional councils that have coastlines within the boundaries of SUR 3: Canterbury and Otago.</p> <p>Each of these regions have policy statements and plans to manage the coastal and freshwater environments, including terrestrial and coastal linkages, ecosystems, and habitats. The provisions of these various documents are, for the most part, of a general nature and focus mostly on land-based stressors on the marine environment. There are no provisions specific to SUR 3. FNZ has reviewed the documents and the provisions that might be considered relevant. A summary of these can be found on our website. FNZ considers the options in this paper are all consistent with the objectives of these relevant plans.</p>
<p>Relevant services or fisheries plans – section 11(2A)</p>	<p>There are no fisheries plans approved under section 11(2A) specific to SUR 3, or of specific relevance to this review of measures for the fishery.</p>
<p>Other plans and strategies</p>	<p>Te Mana o te Taiao (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 SUR 3 are Objectives 10 (Ecosystems and species are protected, restored, resilient and connected from mountain tops to ocean depths) and 12 (Natural resources are managed sustainably).</p> <p>FNZ is working with the Department of Conservation and other agencies on implementation of the strategy. As part of that work, we are progressing to a more integrated ecosystem-based approach to managing oceans and fisheries. In that context, this review contains information on biodiversity impacts, ecosystem function and habitat protection associated with adjustments to sustainability measures.</p> <p>The Kaikōura (Te Tai o Marokura) Marine Management Act 2014</p> <p>The purpose of this Act is to recognise the local, national, and international importance of the coast and sea around Kaikōura as a consequence of its unique coastal and marine environment and distinctive biological diversity and cultural heritage. This Act aims to integrate and establish marine protection and fisheries measures in the Kaikōura marine environment.</p>

Information principles: [section 10 of the Act](#)

35. The best available information relevant to this review of SUR 3 is presented throughout this paper, and uncertainties in the information have been highlighted where relevant. As per section 10(c) of the Act, caution is required in decision making where information is uncertain, unreliable, or inadequate. However, as per section 10(d) of the Act, the absence of, or any uncertainty in, any information must not be used as a reason for postponing or failing to make a decision.
36. Key areas of uncertainty include that the survey is a relatively new method for estimating biomass of kina populations, with further development likely to improve accuracy. It was based on biomass estimates for kina in Tory Channel (Anderson et al., 2023).
37. In addition, the Shellfish Working Group noted that there is uncertainty in the estimates of the weight of individual kina from length measurements used for calculating overall biomass (summarised above on Page 5 under '*Supporting information*') and scaling of the weight estimates to a larger survey area due to considerations of available habitat within the area. Future work will likely improve accuracy of biomass estimates and may allow a more informed approach.
38. For more information on how section 10 is relevant for TAC decisions, see heading 1.5 in the Legal Appendix.

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