SEAFOOD NEW ZEALAND

FATHOM

Commercial fisheries in the vicinity of TTR's proposed mining site

September 2025

Contents

Introduction

Context

Trans-Tasman Resources (TTR) has lodged an application under the Fast-Track Approvals Act 2024 to undertake seabed mining in the South Taranaki Bight. The application follows similar applications that were lodged by TTR and assessed under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 over the periods 2013-14 and 2016-24. During these earlier processes, fishing industry submitters expressed concern that TTR had not adequately assessed potential adverse effects of the proposal on commercial fishing.

Purpose of report

This report describes the commercial fisheries that are potentially impacted by TTR's proposed seabed mining operations in the South Taranaki Bight.[1] The aim is to set out what is at stake for the fishing industry.

The report provides a snapshot of the potentially affected commercial fisheries in 2025, while also describing significant historical trends and fisheries management considerations that are relevant to assessing potential impacts of the mining proposal.

Overview of South Taranaki Bight fisheries

The South Taranaki Bight is part of the Central (West) Fisheries Management Area known as FMA 8, which runs from Tirua Point in north Taranaki to a point north of Titahi Bay near Wellington (see **Figure 1**). The area supports a productive and diverse range of valuable inshore commercial fisheries (see **Figure 2**).

The main commercial fisheries that directly overlap the area of TTR's proposed mining activities in the South Taranaki Bight are:

- Set netting for school shark and rig; and
- A mixed inshore bottom trawl fishery for gurnard, snapper, trevally and other species.

Adjacent fisheries that may be affected by mining activity include:

- The coastal rock lobster fishery;
- The coastal surf clam fishery; and
- A mid-water jack mackerel trawl fishery seaward of the proposed mining site.

Other fisheries operate occasionally in the vicinity, including:

- Bottom longlining for snapper, school shark, hapuka and bass;
- Potting for blue cod, crabs or other species;
- Purse seining for tuna and English mackerel; and
- Trolling for albacore.

[1] Although the fisheries in the South Taranaki Bight are the focus of this report, fisheries further afield may also be affected by TTR's seabed mining proposal. For example, if TTR's mining vessel or support vessels seek shelter in adverse weather in Admiralty Bay, impacts on fisheries at the top of the Marlborough Sounds could arise as a result of unanticipated events such as an oil spill or vessel grounding.

Figure 1: Fisheries Management Area 8[2]

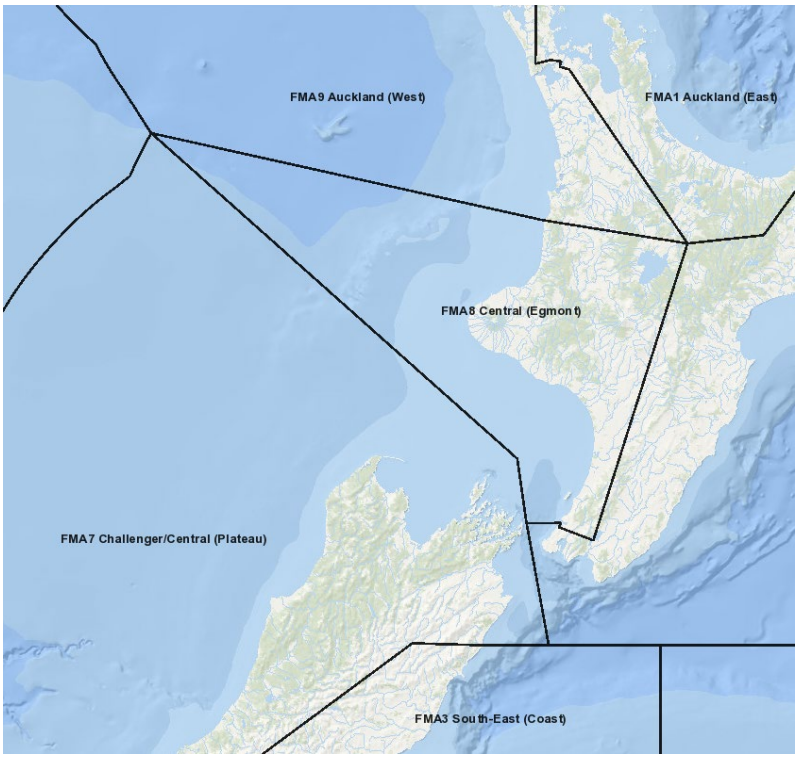
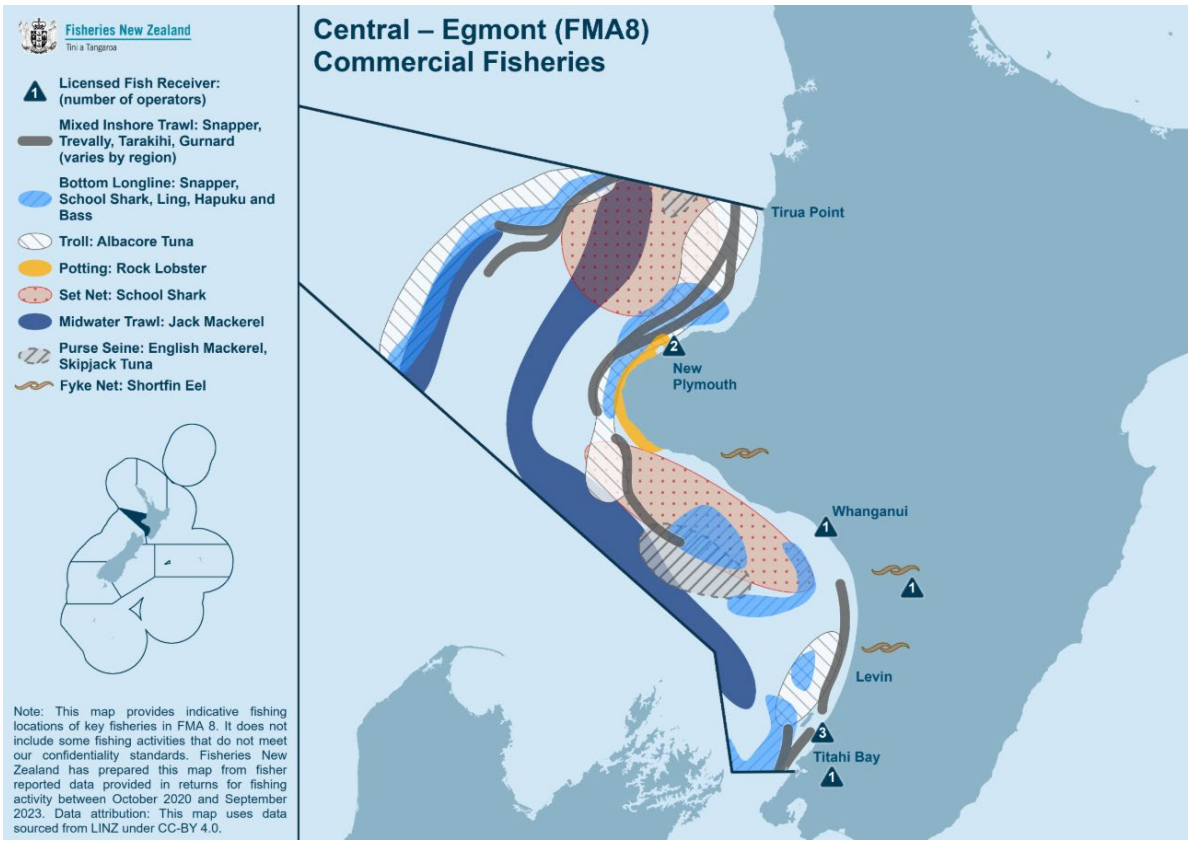


Figure 2: Overview of FMA 8 fisheries[3]



[2] Source: NABIS.
[3] Source: Fisheries New Zealand website.

Methodology and structure of report

The main commercial fisheries of the South Taranaki Bight are described using qualitative and quantitative methods. Fisheries catch and effort data was provided by FishServe.

Fisheries are described at three spatial scales (see **Figure 3**):

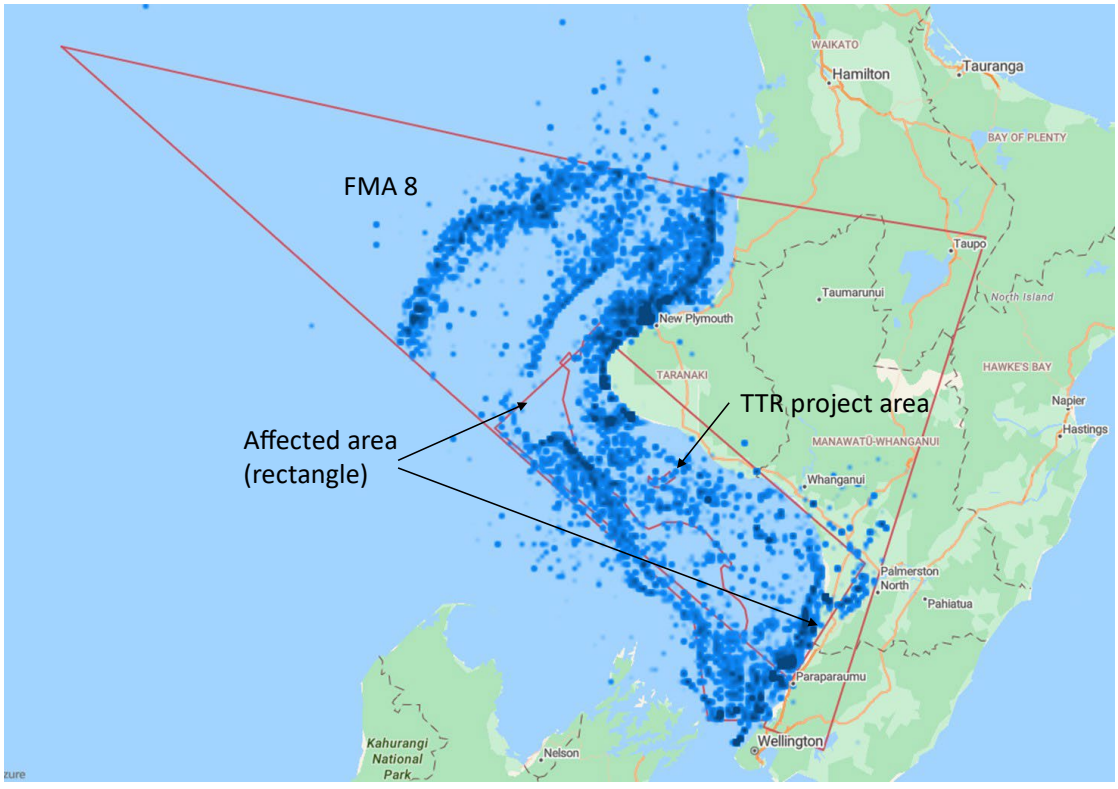
1. The TTR project area – i.e., TTR's proposed project application area;
2. The 'affected area' – i.e., an area in which environmental impacts arising from mining activity (suspended sediment, noise etc) may potentially interact with fish, fish habitats or fishing activity. This area is approximately contiguous with TTR's 'sediment modelled domain' and is described by TTR as '*the area where any potentially significant impacts from sediment discharged by the project could occur*';[4]
3. The wider fishery – i.e., FMA 8 or, in some cases, the quota management area (QMA) which the fishery is part of.

The report describes each affected fishery separately, covering:

- An overview of the fishery (fishing method, main species taken);
- Commercial utilisation of the fishery, as indicated by fishing vessels, fishing effort data and catch data (snapshot and trends); and
- Fisheries management considerations relevant to understanding impacts on the fishery.

For all potentially affected fisheries combined, high level information is provided on commercial fishing interests (fishing vessels and quota ownership) and estimated value.

Figure 3: Spatial scale of fisheries descriptions[5]



[4] TTR application (2025), Figure 5.1, page 132, and page 134.
[5] Source: FishServe.

Set net fishery

Overview

Set netting is the second most common fishing method in the TTR project area (after trawling) and is also a very common fishing method within the affected area. In both areas, and in FMA 8 as a whole, the number of set net events has fluctuated over time, but declined overall.

The FMA 8 set net fisheries primarily target school shark and rig. Details of the species, fish stocks and Total Allowable Commercial Catches (TACCs) are shown in **Figure 4**. The South Taranaki Bight is particularly important for rig and school shark compared to northern areas of FMA 8.

School shark is also targeted in the bottom long line fishery and, together with rig, is taken as bycatch in FMA 8 bottom trawl fisheries.

Figure 4: Main species and TACCs for South Taranaki Bight set net fishery

Species	QMA (and area)	TACC (t)
School shark *Galeorhinus galeus*	SCH 8 (FMA 8)	529
Rig *Mustelus lenticulatus*	SPO 8 (FMA 8)	310
Blue (or common) warehou *Serioella brama*	WAR 8 (FMA 8)	160

Commercial fishing

Set net vessels

The number of set net vessels operating in FMA 8 has declined over the years. In particular, set net vessels fishing out of New Plymouth reduced following extensive closures intended to protect Māui dolphins.

The South Taranaki Bight set net fishery is fished by 4 vessels, comprising 1 full time New Plymouth-based vessel and 3 part-time vessels based in New Plymouth and other ports. [6]

Set net fishing effort

In FMA 8 set net effort reached a very low level in 2021 following the implementation of extensive regulatory closures to protect Māui dolphins, but has shown a slight up-tick since then (**Figure 5**).

After the regulatory closures were put in place in 2020, the number of set net fishing events declined and has since fluctuated without any clear trend. Within the affected area, an average of 283 annual set net events took place over the last five years. Within the TTR project area, a small number of set net fishing events occur in most years, with an average of 2.4 annual events for the last five years and a maximum of six events in 2021/22 (**Figure 6**).

Over the last two years, New Plymouth-based set net fishers have been spending more time in the South Taranaki Bight than in areas north of New Plymouth. This reflects more benign weather

[6] One fisher operates partly as a set netter and also in the rock lobster fishery. Keith Mawson, Egmont Seafoods, pers comm (March 2025). A Wellington-based vessel and new Napier vessel are expected to fish the South Taranaki Bight occasionally. Richard Kibblewhite, pers comm (September 2025).

conditions in the southern area and stronger catches of rig and school shark than in areas further north.[7]

Figure 5: Number of fishing days set netting (South Taranaki Bight and Tasman Bay)[8]

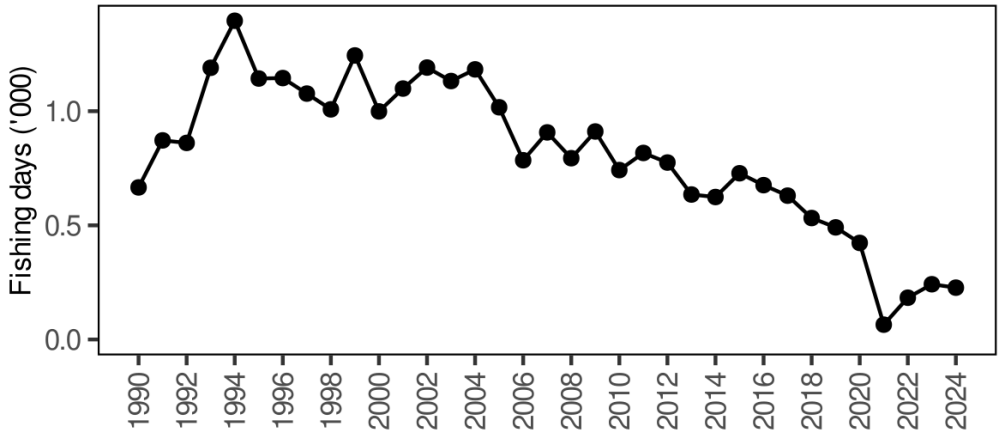


Figure 6: Number of set net events in the affected area and TTR project area

Year	Reported fishing events using set net method	
	Affected area	TTR project area
2019/20	372	0
2020/21	218	1
2021/22	321	6
2022/23	284	3
2023/24	222	2

Catch and catch trends

South Taranaki Bight is considered to be one of the most important set net fisheries for rig (SPO 8).[9] From the early 1990s through to the time of TTR's original application in 2013, the fishery had landings of about 200 tonnes of rig annually. Since that time, the percentage of the SPO 8 TACC caught has declined. This trend accelerated from 2021, with only 15-21% of the TACC caught in recent years. Rig is taken primarily within 4 nautical miles of the coast, and the declining catch reflects the cumulative effect of regulatory closures intended to protect Māui dolphins.

Catches of school shark (SCH 8), which was previously less important than rig, have fluctuated over time while also generally declining. In 2020/21 the SCH 8 catch reached a low point of 41% of the TACC but has trended upwards again in the last three years.

Figure 7 shows the estimated catch of the two main set net species, school shark and rig, for each of the last five fishing years within the TTR project area and the affected area. The estimated catch from each area is expressed as a percentage of the total catch of the species from FMA 8. As both

[7] Keith Mawson, Egmont Seafoods, pers comm (March 2025).
[8] Source: Kahawai Collective https://fonz.kahawai.org.nz/
[9] Fisheries New Zealand, Fisheries Assessment Plenary, May 2024.

these species have a QMA that coincides with FMA 8, the percentage also reflects the percentage of catch from the relevant QMA (SCH 8 or SPO 8).

Although reasonable catches of school shark are taken within the TTR project area, these catches are only a small proportion of total SCH 8 catch, with a maximum of 2.46% in 2020/21. In all other years the percentage of total SCH 8 and SPO 8 catch taken from within the TTR project area was less than 1%. However, in most of the last five fishing years more than 40% of the catch of both SCH 8 and SPO 8 was taken from within the affected area, with a maximum of 65.62% for SPO 8 in 2019/20. This indicates that the set net fishery would be significantly affected by the proposed mining activity if adverse effects on fish or fishing are experienced in the affected area.

Figure 7: Catch analysis for school shark and rig in TTR project area and affected area

Year	Species & stock	TTR project area		Affected area	
		Estimated catch (t)	% FMA 8 catch	Estimated catch (t)	% FMA 8 catch
2019/20	School shark SCH 8	0.130	0.07	87.935	46.50
	Rig SPO 8	0.151	0.14	69.230	65.62
2020/21	School shark SCH 8	0.400	0.21	72.558	38.47
	Rig SPO 8	0.108	0.24	16.857	37.66
2021/22	School shark SCH 8	5.568	2.46	103.039	45.46
	Rig SPO 8	0.556	0.96	29.458	50.68
2022/23	School shark SCH 8	0.558	0.24	97.638	41.63
	Rig SPO 8	0.087	0.13	35.238	54.24
2023/24	School shark SCH 8	0.195	0.10	106.990	55.22
	Rig SPO 8	0.177	0.28	26.121	40.80

Fisheries management considerations

Seasonality and weather

Rig is mostly caught during spring and summer, when the fish aggregate close to the shore. School shark is caught year-round, but the highest catch rates occur in May and again in November – the species is generally found inshore in summer and offshore in winter.[10] Fishing effort for both species is highest from December through to April.[11] Because of the seasonality of the target species, Taranaki-based set netters typically target different species at different times of the year. Seasons and weather play a big part in how often the proposed mining site is fished by small set net vessels.

Cumulative impact of regulatory closures

Regulatory closures intended to protect Māui dolphins have had a significant effect on the distribution of set net effort and catch on the west coast of the North Island and in Taranaki in particular. The closures, which were progressively implemented from 2003 to 2020, currently extend along the entire length of the west coast of the North Island (**Figures 8 & 9**).

In FMA 8, set netters are prohibited from operating:

- From the northern boundary of FMA 8 (Tirua Point) south to the Waiwhakaiho River (New Plymouth) out to 12 nautical miles offshore;

[10] Fisheries New Zealand, Fisheries Assessment Plenary, May 2024.
[11] Kahawai Collective https://fonz.kahawai.org.nz/

- From the Waiwhakaiho River south to Hawera out to 7 nautical miles offshore; and
- From Hawera south to the southern boundary of FMA 8 (north of Titahi Bay near Wellington), out to 4 nautical miles offshore.

The implementation of regulatory closures in FMA 8 in 2012 and, in particular, the extension of those closures in 2020, resulted in:

- A significant drop in the catch of rig and school shark in FMA 8;
- A switch in the target species from rig, which is primarily found in shallow waters within 4 nautical miles of the coast, towards school shark which is commonly targeted further from the shore in waters up to 50m deep (although rig is beginning to become more important again); and
- The remaining set netting effort shifting offshore into areas that are more likely to be affected by seabed mining activity.

The ability of set netters based in New Plymouth and other ports to shift fishing effort for rig and school shark from areas affected by seabed mining activity to other locations within FMA 8 is now severely limited as:

- The regulatory closures extend the entire length of FMA 8, providing no available areas within 4 nautical miles of the shore for set netting, and only limited areas within 7 nautical miles of the shore;
- Most New Plymouth-based set netters use a single fishing method (set netting) which means they have few options to adjust their activities or fishing methods if their pattern of fishing is disrupted; and
- The relatively small QMAs for rig and school shark (covering FMA 8 only) provide fishers with less flexibility about where they can harvest their Annual Catch Entitlement (ACE) than is the case for stocks which are managed in larger QMAs – for example, fishing effort for rig and school shark cannot be shifted to Tasman Bay because it is a different QMA.

Figure 8: Implementation of regulatory closures for commercial set netting on the WCNI

Year	Closure
2003	Maunganui Bluff to Pariokariwa Point out to 4 nautical miles offshore
2008	Closure extended out to 7 nautical miles offshore, plus entrances of harbours[12]
2012	Closure extended south around cape Egmont to Hawera, with commercial set netting allowed between 2 and 7 nautical miles offshore only with an observer on board the vessel
2013	Closure of Pariokariwa Point to Waiwhakaiho River (New Plymouth) between 2 and 7 nautical miles offshore
2020	Closure extended northwards, southwards and offshore – i.e., Cape Reinga to Maunganui Bluff out to 4 nautical miles offshore; Hawera to Wellington out to 4 nautical miles offshore; Maunganui Bluff to Waiwhakaiho River to 12 nautical miles offshore; Waiwhakaiho River to Hawera between 2 and 7 nautical miles offshore; closures in Manukau harbour extended

[12] An appeal by affected commercial fishers allowed commercial set net fishing between 4 and 7 nautical miles offshore during daylight hours between 1 October and 24 December for three years and the full closure (out to 7 nautical miles offshore all year round) was reinstated in March 2011.

Figure 9: Map showing west coast North Island set netting restrictions[13]

[13] Source: Fisheries New Zealand website.

Inshore trawl fishery

Overview

Bottom trawling is the most common fishing method within the TTR project area and is also a very common fishing method in the affected area.

The bottom trawl fishery in the South Taranaki Bight is a mixed species fishery. As is typical in inshore trawl fisheries, trawl vessel operators target a range of different species at different times and in different places, meaning that the overall pattern of commercial fishing is complex.

Species typically targeted or caught in the FMA 8 inshore trawl fisheries include trevally, gurnard, snapper, tarakihi, barracouta, warehou, flatfish, John dory and kahawai (**Figure 10**). Within the TTR project area, trevally, snapper, gurnard and barracouta have been the most-caught species over the last five years. In addition to the main trawl species, a range of other species is taken as bycatch, including species such as rig and school shark that are also targeted by set netters.

Figure 10. Main species and TACCs for FMA 8 inshore trawl fisheries

Species	QMA (and area)	TACC (t)
Trevally *Pseudocaranx dentex*	TRE 7 (FMA 7, 8 & 9)	2,153.353
Gurnard *Chelidonichthys kumu*	GUR 8 (FMA 8)	543.200
Snapper *Pagrus auratus*	SNA 8 (FMA 8 & 9)	2,240.000
Tarakihi *Nemadactylus macropterus*	TAR 8 (FMA 8)	225.400
Barracouta *Thyrsites atun*	BAR 7 (FMA 7, 8 & 9)	11,172.853
John dory *Zeus faber*	JDO 2 (FMA 2 & 8)	135.000
Spiny dogfish *Squalus acanthias*	SPD 8 (FMA 8 & 9)	307.000
Blue warehou *Serioella brama*	WAR 8 (FMA 8)	160.000
Kahawai *Arripis trutta*	KAH 8 (FMA 8 & 9)	520.000
Flatfish *Colistium nudipinnis* *Peltorhampus novaeseelandiae* *Colistium guntheri* *Rhombosolea retiaria* *Rhomobsolea plebeian* *Rhombosolea leporine* *Rhomobsolea tapirina* *Pelotretis flavilatus*	FLA 2 (FMA 2 & 8)	150.000

Commercial fishing

Inshore trawl vessels

The number of vessels operating in the FMA 8 inshore trawl fishery has declined over the last two decades as a result of industry consolidation and regulatory costs.

The trawl fleet currently operating in the affected area consists of:[14]

- 2 New Plymouth-based trawlers owned by Egmont Seafoods;
- 2 trawlers that fish for Moana and are based in New Plymouth for periods of time; and
- Up to 10 South Island- based trawlers, including 4 to 5 trawlers of 20-30m in length that operate regularly in the general area comprising Cook Strait, South Taranaki Bight and off Farewell Spit, and smaller trawlers which may occasionally fish in the South Taranaki Bight.

The South Island vessels are occasional visitors to South Taranaki. Most South Island inshore trawlers fishing in the South Taranaki Bight land their fish in Nelson, but it is possible that trawlers from other ports such as Picton may fish the area occasionally.[15] Wellington-based trawlers may also occasionally fish in the southern part of the affected area.

Bottom trawl effort

Within the TTR project area, over the last five years the number of bottom trawl fishing events declined from 6 events in 2019/20 to a low of zero in 2021/22 and then increased again to 5 events in 2023/24. During the same period, the number of bottom trawl events in the affected area varied between a high of 584 events and a low of 379 events, with a similar trend of decreasing effort up to 2021/22 followed by an upturn of effort in 2023/24. In addition to bottom trawling using conventional trawl gear, a smaller number of bottom trawl events using precision seafood harvesting gear took place within the affected area (**Figure 11**).

Figure 11. Number of bottom trawl fishing events

Year	Number of bottom trawl (BT) and precision bottom trawl (PRB) fishing events	
	Affected area	TTR project area
2019/20	584 BT + 10 PRB	6 BT
2020/21	469 BT + 10 PRB	2 BT
2021/22	430 BT + 10 PRB	0 BT
2022/23	379 BT + 2 PRB	1 BT
2023/24	407 BT + 16 PRB	5 BT

Catch and catch trends

The FMA 8 inshore trawl fishery has changed significantly over time. In the 1990s snapper was the main target whereas today snapper is mostly caught as bycatch when targeting trevally, gurnard and tarakihi. Historically the fishery was seasonal whereas it is now a year-round fishery. The fishery has gradually moved into deeper waters and new gear configurations are used. These changes have been driven by a range of factors including increased snapper biomass and the implementation of trawl prohibition areas intended to protect Māui dolphins.

[14] Keith Mawson, Egmont Seafoods, pers comm (March 2025); Doug Saunders-Loder, Talleys Fisheries, pers comm (March 2025).
[15] Doug Saunders-Loder, Talleys Fisheries, pers comm (March 2025).

Figure 12 shows the estimated catch of the three main trawl-caught species – i.e., trevally, snapper and gurnard – for each of the last five fishing years within the TTR project area and within the affected area. The estimated catch from each area is expressed as a percentage of the total catch of the species from FMA 8.

Although catches of all three species are taken every year within the TTR project area, these catches are usually only a very small proportion (< 0.5%) of total FMA 8 catch of the species. However, in 2019 the proportions of TRE 7 (6.32%) and SNA 8 (2.29%) taken within the TTR project area were more significant.

Over the last five fishing years, 34% - 71% of the FMA 8 catch of each of the three species was taken from within the affected area. On average, the affected area provided 54% of the TRE 7 catch, 45% of the GUR 8 catch and 37% of the SNA 8 catch taken in FMA 8. This indicates that the inshore trawl fishery would be significantly affected by the proposed mining activity if adverse effects on fish or fishing are experienced in the affected area.

Figure 12: Catch analysis for trevally, snapper and gurnard in TTR project area and affected area

Year	Stock	TTR project area		Affected area	
		Estimated catch (t)	% FMA 8 catch	Estimated catch (t)	% FMA 8 catch
2019/20	TRE 7	14.625	6.32	115.420	50
	SNA 8	6.500	2.29	116.574	41
	GUR 8	1.099	0.30	176.713	49
2020/21	TRE 7	0.070	0.08	45.701	51
	SNA 8	0.240	0.08	107.818	35
	GUR 8	0.282	0.12	115.107	50
2021/22	TRE 7	0.088	0.09	40.312	43
	SNA 8	0.179	0.05	144.985	39
	GUR 8	0.102	0.05	85.228	39
2022/23	TRE 7	0.122	0.07	117.032	71
	SNA 8	0.152	0.04	147.887	39
	GUR 8	0.048	0.06	37.727	48
2023/24	TRE 7	0.346	0.23	87.077	57
	SNA 8	0.485	0.11	143.043	34
	GUR 8	0.633	0.40	61.629	39

Fisheries management considerations

Spatial distribution of fishing effort

Catch for inshore trawl fisheries is not evenly distributed and centres around specific areas in the South Taranaki Bight often related to higher benthic productivity. Generally, bottom trawling effort in the affected area is concentrated between the 30m to 50m contour lines from Opunake south to Pātea and at similar depths (but closer to the coastline) southwards along the Manawatu coast.[16] This reflects fishers' experience that larger fish of the target species congregate at this depth range.

[16] MacGibbon, D.J.; Mules, R. (2023). Extent and intensity of bottom contact by commercial trawling and shellfish dredging in New Zealand waters, 1990–2021. New Zealand Aquatic Environment and Biodiversity Report No. 316; and TTR Application under the EEZ Act (2016). Primary Expert Evidence on Fisheries Management from Andrew Smith for Fisheries Submitters. 23 January 2017.

The highest bottom trawl fishing effort is typically reported in the southernmost and coastal areas of the South Taranaki Bight, whereas the highest reported catch numbers are in waters within and adjacent to the TTR project area. This implies that these waters are highly productive compared to other areas of the South Taranaki Bight.[17]

The area inshore of and partly overlapping TTR's proposed mining site is known to commercial fishers as 'the rolling ground' because of its undulating seafloor. Trawl operators consider that the seafloor formation makes the area particularly suitable as a fish habitat. It is referred to by fishers as a 'nursery ground' as it supports a relatively high incidence of juvenile fish. In addition, areas of rough of foul ground and mounds exceeding 5m in places make parts of it unsuitable for trawling. This area is therefore trawled less frequently, but is used by set-netters and potters. [18]

Seasonality and weather

Trawling occurs year-round with no obvious seasonality when viewed as a whole. However, the catch rates of the individual key species are more seasonal; snapper catch rates peak during October-December, while catch rates of trevally are highest in December-February and the catch rate of gurnard tends to remain relatively constant throughout the year with a slight peak in September-October.[19] The South Taranaki Bight is exposed to the elements, and this has an impact on the amount of trawling effort in the area by limiting the number of fishable days.

2024 SNA 8 TACC increase

Snapper abundance has increased substantially in recent years. As a result, the relatively low SNA 8 TACC caused snapper to become a 'choke' species for the mixed inshore trawl fishery. Many fishers have had to adapt their fishing behaviour to try to minimise their bycatch of snapper while targeting other species as they were unable to balance snapper bycatch with their annual catch entitlement (ACE). This dynamic has threatened the economic viability of some trawl operators, in particular smaller fishing companies and owner-operators.

In response to a new stock assessment, on 1 October 2024 the Minister for Oceans and Fisheries increased the SNA 8 TACC by 40% and reduced the deemed value rate. The Minister's decisions will result in additional utilisation opportunities not only for snapper, but also for other stocks targeted and taken in conjunction with snapper in mixed inshore trawl fisheries in the South Taranaki Bight. The ability of fishers to capitalise on this opportunity will depend upon their access to SNA 8 ACE which is concentrated in a small number of entities. Nevertheless, the importance and value of the inshore trawl fishery prior to 2024 under-estimates its potential current and future value.

ACE availability in mixed species fisheries

Fisheries in which a large variety of fish are caught, such as the mixed inshore trawl fishery in the South Taranaki Bight, require fishers to hold a portfolio of ACE that matches the composition of their catch. As catch composition can vary significantly over relatively small spatial scales, any external factors that affect the mix and distribution of trawl-caught species can have serious implications for trawler operators. Fishers may have to purchase additional or different ACE, or if they cannot cover their catch with ACE, pay significant deemed values.

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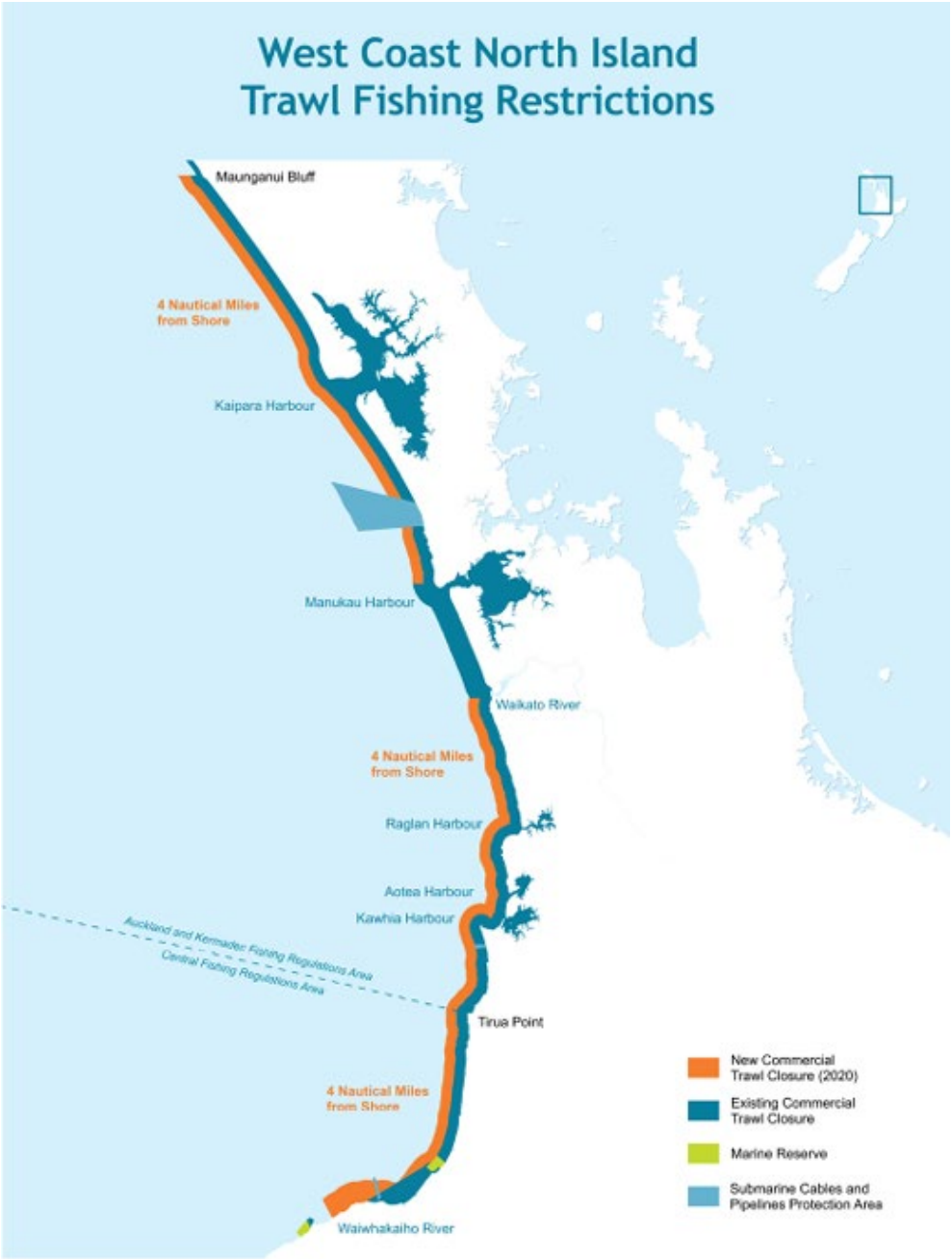
[17] TTR application under the EEZ Act (2016). Primary Expert Evidence from Dr Gregory Barbara on Marine Ecology for Fisheries Submitters. 23 January 2017.
[18] TTR application under the EEZ Act (2016). Primary Expert Evidence from Andrew Smith on Fisheries Management for Fisheries Submitters. 23 January 2017.
[19] Kahawai Collective https://fonz.kahawai.org.nz/

Regulatory closures

Regulatory closures intended to protect Māui dolphins have affected the distribution of trawling effort and catch on the west coast of the North Island north of the affected area. The most recent closure (2020) includes the northern part of the coastline of FMA 8, prohibiting trawling out to 4 nautical miles offshore (**Figures 13 and 14**).

Figure 13: West Coast North Island trawl fishing restrictions[20]



[20] Source: Fisheries New Zealand website.

Figure 14: Implementation of regulatory trawl closures on west coast of North Island

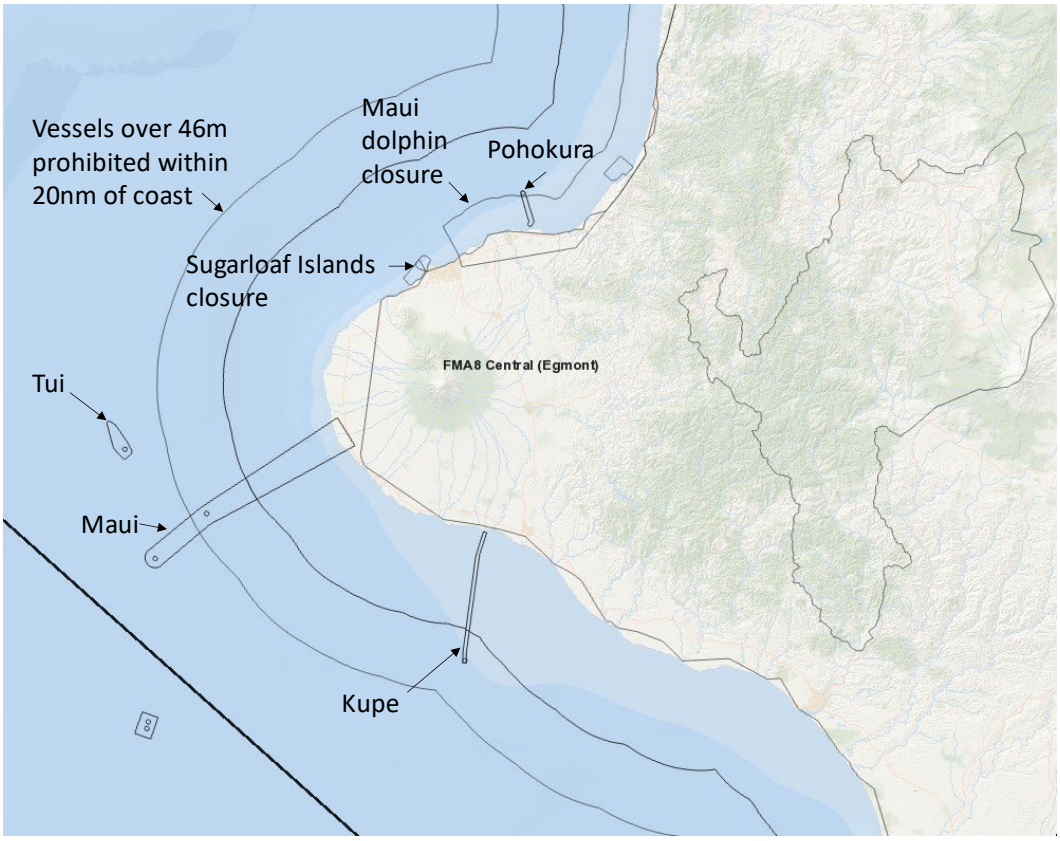
Date	Regulatory closures
October 2003	Maunganui Bluff to Pariokariwa Point out to 1 nautical mile offshore, extending to 2 nautical miles offshore in areas adjacent to harbours and river mouths
October 2008	Maunganui Bluff to Pariokariwa Point out to 2 nautical miles offshore, and within that area between the Manukau Harbour and Port Waikato out to 4 nautical miles offshore
October 2020	Extension of above area south to the Waiwhakaiho River (New Plymouth) and out to 4 nautical miles offshore

Trawl fisheries in FMA 8 are also affected by the following regulatory prohibitions (**Figure 15**):

- Fishing is prohibited in safety zones and submarine cable and pipeline protection zones around oil and gas infrastructure for Kupe, Maui A, Maui B, Tui, and Pohokura;
- Vessels over 46m in length are prohibited from fishing within 20 nautical miles of the coastline under fisheries regulations; and
- Fishing is prohibited in Tapuae marine reserve and under fishing regulations in an adjacent area at Sugarloaf Islands south of New Plymouth.

Regulatory closures and restrictions limit the ability of trawler operators to shift fishing effort if fish distribution changes or there is a need to avoid particular areas of the fishery.

Figure 15: Main regulatory closures to trawling in FMA 8[21]



[21] Source: NABIS

Jack mackerel fishery

Overview

Large mid-water trawlers target jack mackerel offshore from the TTR project area. The jack mackerel fishery catches three species – New Zealand species *Trachurus novaezelandiae* (known as yellowtail horse mackerel or golden mackerel) and *T. declivis* (greenback or greentail horse mackerel) and Chilean species *T. murphyi* (Murphy's mackerel, 'Chilean' or redtail jack mackerel). The three species, which are of similar appearance, are managed in the QMS as if they were a single species, 'jack mackerel', with the species code JMA. The three species have different geographical distributions although their ranges overlap. The Chilean species has contracted in its distribution and is now not typically seen in the South Taranaki Bight.

The South Taranaki Bight is part of JMA 7, a large QMA which comprises FMAs 7, 8 and 9. Barracouta and blue (English) mackerel are taken in much smaller quantities as part of the fishery.

In 2024 the JMA 7 TACC was increased from 32,536.763 to 35,537 tonnes.

Commercial fishing

Mid-water trawl vessels

The JMA 7 fishery is fished by large factory trawlers. Until 2016, the majority of vessels in the fishery were foreign charter vessels fishing on behalf of New Zealand quota owners. Now all of the seven vessels that operate in the JMA 7 fishery are flagged to New Zealand.

Mid-water trawl effort

No mid water trawling takes place in the TTR project area.

Mid water trawl fishing effort in the affected area fluctuates without any particular trend with an average of 445 annual events over the last five fishing years (**Figure 16**).

Figure 16: Mid water trawl events in the affected area and TTR project area

Year	Number of mid water trawl events	
	Affected area	TTR project area
2019/20	443	0
2020/21	489	0
2021/22	417	0
2022/23	461	0
2023/24	415	0

Catch and catch trends

Over the last 20 years, jack mackerel catch has typically fluctuated around the JMA 7 TACC. **Figure 17** shows the estimated catches of jack mackerel within the affected area for the last five fishing years. Catches from the affected area are also shown as a percentage of the total catch of JMA 7 within FMA 8 and within the wider JMA 7 QMA. Substantive catches of jack mackerel are taken in the affected area, equivalent to 35% – 69% of total jack mackerel catch taken in FMA 8 and 25% – 39% of total JMA 7 catch. Therefore, if the proposed mining activity has impacts on the distribution or

abundance of jack mackerel or on fishing activity in the area of the jack mackerel fishery, a substantial proportion of the valuable JMA 7 fishery could be at risk.

Figure 17: Jack mackerel catch in the affected area

Year	Affected area estimated catch (t)	Percentage of FMA 8 catch	Percentage of JMA 7 catch
2019/20	8,186.314	57	26
2020/21	12,572.304	69	39
2021/22	8,129.339	57	29
2022/23	8,542.930	43	25
2023/24	8,500.874	35	25

Fisheries management considerations

Seasonality

Fishing effort for jack mackerel is seasonal, with a concentration in January and February, and a secondary peak in July. The large trawlers that fish in JMA 7 also fish elsewhere in the EEZ in the southern blue whiting, squid and hoki fisheries. The strong seasonality of these other fisheries determines the availability of the fleet for the JMA 7 fishery and it is this, rather than the availability of jack mackerel, which gives the fishery its seasonal character.

Location of fishing

Although commercial fishing activity is relatively widely spread within JMA 7, the location of trawl towlines varies significantly in response to weather conditions and jack mackerel behaviour. Jack mackerel is a very mobile species and the fish tend to aggregate around their food sources – small crustaceans and fish – which are also mobile. The availability of ACE for some bycatch species can also influence where fishing takes place. For example, skippers avoid known hotspots for kingfish and snapper if they do not have sufficient ACE to cover their catches of these species when targeting jack mackerel. In addition, the large factory trawlers used in this fishery are longer than 46m in length and are therefore prohibited by fisheries regulations from operating within 20 nautical miles of the coast in the South Taranaki Bight.[22] These factors restrict the ability of fishers to move to alternative fishing locations.

Rock lobster fishery

Overview

The rock lobster fishery targets spiny (red) rock lobster (*Jasus edwardsii*) using the potting method. The fishery in the vicinity of TTR's proposed mining activity is located in the coastal waters of Taranaki.

The South Taranaki Bight is part of the CRA 9 rock lobster fishery which extends from Kaipara Harbour in the north to Bruce Bay on the West Coast of the South Island (all of FMA 8 as well as parts of FMAs 7 and 9). Although the CRA 9 QMA is very large, commercial lobster fishing primarily occurs

[22] In JMA 7, vessels longer than 46m are prohibited from fishing in waters within: 20nm of the North Island west coast from the entrance to the Kaipara Harbour in the north to near Kapiti Island in the south; the outer Tasman Bay/Golden Bay area; and 25nm of the South Island west coast from approximately Cape Foulwind in the north to Jackson Bay in the south.

in smaller areas either on the northwest coast of the South Island or in the area between Pātea and Kawhia on the Taranaki coastline.

The current CRA 9 TACC of 60.8 tonnes was set in 2014/15. Before this, the TACC had remained unchanged at 47 tonnes since soon after its introduction to the QMS in 1992/93. The TACC has been more or less fully caught in all years.

Commercial fishing

Rock lobster vessels

Less than 10 vessels have operated in CRA 9 since 2003–04, with 7, 6, and 5 vessels in 2020–21, 2021–22, and 2022–23, respectively.[23] In rock lobster statistical area 935 (which includes the South Taranaki Bight) [24] the number of vessels has fluctuated between 1 and 4 annually over the past two decades. In each of the most recent fishing years since 2019/20, 3 rock lobster vessels have reported catch from area 935,[25] indicating that approximately half of the vessels operating in CRA 9 fish regularly in the South Taranaki Bight area.

Rock lobster potting effort

No rock lobster potting takes place within the TTR project area.

Within the affected area, the number of rock lobster potting events declined from 261 events in 2019/20 to a low of 128 in 2022/23, increasing again to 147 events in 2023/24 (**Figure 18**).

Figure 18: Rock lobster potting effort in the affected area and TTR project area

Year	Number of rock lobster potting events	
	Affected area	TTR project area
2019/20	261	0
2020/21	259	0
2021/22	167	0
2022/23	128	0
2023/24	147	0

Catch and catch trends

Rock lobster statistical area 935 (which includes the South Taranaki Bight) is historically one of the most productive areas of CRA 9, with 40-50% of total CRA 9 landings coming from that area every year since 2019/20.[26] Over the last five years, between 26 and 38 tonnes of rock lobster catch has been taken from the affected area (**Figure 19**). This is equivalent, on average, to 80% of the total rock lobster catch from FMA 8 and 49% of the total CRA 9 catch.

The area potentially affected by TTR's proposed mining activities is therefore a very significant part of the CRA 9 rock lobster fishery.

[23] FNZ Fisheries Assessment Plenary, November 2024.
[24] Statistical reporting area 935 runs from just south of New Plymouth to near Bulls.
[25] Starr, P.J. (2024). Rock lobster catch and effort data: 1979–80 to 2022–23. New Zealand Fisheries Assessment Report 2024/10. 146 p.
[26] Ibid.

Figure 19: Rock lobster catch in the affected area

Year	Affected area estimated catch (t)	Percentage of FMA 8 catch	Percentage of CRA 9 catch
2019/20	29.795	77	51
2020/21	28.403	74	45
2021/22	37.874	84	62
2022/23	25.873	84	42
2023/24	26.185	82	43

Fisheries management considerations

Habitat constraints

Although the CRA 9 QMA is geographically large, it has the smallest TACC of any of the commercially-fished rock lobster stocks. Habitat constraints restrict the CRA 9 commercial lobster fishery to the north-west coast of the South Island and the area between Pātea and Kawhia, in particular the Taranaki coastline. Habitat constraints therefore significantly limit the opportunities for fishers to move to other areas if favoured fishing areas are affected by the proposed mining activity.

Stock connectivity

Lobsters have a long pelagic larval stage of 1-2 years and can be carried considerable distances in the water column during this time. Modelling indicates that about 75% of CRA 9 rock lobster larvae originate from Fiordland, Southland and Stewart Island. Of the larvae produced in CRA 9, only 17% settle as juveniles within the same region. Most of the larvae are carried northwards, and around 80% of CRA 1 rock lobsters (i.e., east and west coasts of Northland) originate from the CRA 9 area.[27] Therefore, any impacts of mining activities on CRA 9 rock lobsters may also be experienced as changes to rock lobster stocks further to the north.

Surf clam fishery

Overview

Surf clam is a generic term covering different species of molluscs which live on exposed surf beaches. Three species of surf clams are harvested regularly in FMA 8 – deepwater tuatua (PDO 8), large trough shell (MMI 8), and triangle shell (SAE 8) – and two other species occasionally (**Figure 20**).

Surf clams were introduced into the QMS on 1 April 2004 with initially low TACCs in FMA 8. The TACCs were adjusted to their current settings in 2012/13 or 2013/14 following a biomass survey which established that there were substantial quantities of surf clams available off the Manawatu coast.

Surf clams are harvested using hydraulic winnowing clam rakes.[28] The fishing method is reported as 'dredging'.

[27] Chiswell, S.M.; Booth, J.D. (2008). Sources and sinks of larval settlement in *Jasus edwardsii* around New Zealand: Where do larvae come from and where do they go? *Marine Ecology Progress Series* 354: 201-217.
[28] TTR application under the EEZ Act (2016). Primary non-expert evidence of Anthony Piper for the fisheries submitters. 24 January 2017.

Figure 20: FMA 8 surf clam species and TACCs

Species	Stock and area	TACC (t)
Deepwater tuatua *Paphies donacina*	PDO 8 (FMA 8)	262
Large trough shell *Mactra murchisoni*	MMI 8 (FMA 8)	589
Triangle shell *Spisula aequilatera*	SAE 8 (FMA 8)	1,720
Ringed dosinia (moon shell) *Dosinia anus*	DAN 8 (FMA 8)	214
Trough shell *Mactra discors*	MDI 8 (FMA 8)	27

Commercial fishing

Vessels

A single vessel has operated in the FMA 8 surf clam fishery.

Dredging effort

No fishing for surf clams takes place within the TTR project area.

Within the affected area, the annual number of dredging events has varied between 12 and 102 over the last five fishing years (**Figure 21**).

Figure 21: Number of dredging events in affected area and TTR project area

Year	Number of dredging events	
	Affected area	TTR project area
2019/20	27	0
2020/21	29	0
2021/22	102	0
2022/23	34	0
2023/24	12	0

Catch and catch trends

The FMA 8 surf clam fishery is considered to be a 'developing fishery' and only a small proportion of the TACC of each species is harvested annually. PDO 8 is currently the largest of New Zealand's deepwater tuatua fisheries. Catches increased gradually from 2016/17 and have remained relatively constant since 2019/20. Catches of SAE 8 and MMI 8 have fluctuated at a low or very low level relative to the TACC since 2015/16 and smaller catches of DAN 8 and MDI 8 have been taken in some years only.

No surf clams are taken from within the TTR project area.

The affected area coincides with the total area of the FMA 8 surf clam fishery – i.e., 100% of the surf clam catch is taken from within the affected area (**Figure 22**).

Figure 22: Surf clam estimated catch in the affected area

Year	PDO 8		MMI 8		SAE 8	
	Affected area catch t	% FMA 8 catch	Affected area catch t	% FMA 8 catch	Affected area catch t	% FMA 8 catch
2019/20	44.785	100	0.357	100	24.280	100
2020/21	44.301	100	2.506	100	11.300	100
2021/22	86.759	100	5.580	100	41.707	100
2022/23	35.792	100	1497	100	31.971	100
2023/24	21.535	100	0.439	100	2.393	100

Fisheries management considerations

Developing fishery

The FMA 8 surf clam fishery is relatively new and has developed largely during the period after TTR's original application. Although the status of the stocks is currently unknown, the TACCs are significantly under-caught, indicating that there may be considerable potential for future development of the fishery. Historical measures of catch and value are unlikely to be representative of the future potential of the fishery.

It has been estimated that FMA 8 could potentially sustain an annual commercial surf clam catch of at least 10,000 tonnes with a gross income of $100m/year, supporting 50 full-time employees plus associated service providers in the region.[29]

Vulnerability to environmental change

Surf clams are robust species because of their demanding habitat but, like other bivalve molluscs, they are very sensitive to environmental change. For example, they are ideal for identifying accumulated toxins, heavy metals, and biotoxins in the water. New Zealand therefore operates a mandatory shellfish quality assurance programme for all bivalve shellfish grown and harvested in areas for human consumption, including in the FMA 8 surf clam fishery. The programme includes regular monitoring of the water and shellfish, biotoxin testing, and closure after rainfall and when biotoxins are detected. Heavy metal testing to monitor accumulated levels generally takes place on an annual basis.

Any increase in mud or fine particles makes the surf-zone habitat less hospitable for clams. The clams feed by extracting water through a fine filter mechanism on their siphon and passing that water across their gills, extracting both oxygen and nutrients. Clam siphons can exclude the suspended sands, but cannot exclude finer particles such as mud.[30]

Line fisheries

Overview

Line fisheries target school shark (SCH 8), hapuku and bass (HPB 8), gurnard (GUR 8) and snapper (SNA 8) in the South Taranaki Bight. Lining effort and catches of all species are relatively low and have fluctuated over time, with hapuku showing a significant drop in 2022.

[29] Anthony Piper. Ibid.
[30] Anthony Piper. Ibid.

Commercial fishing

Lining vessels

One long-line vessel is currently operating out of New Plymouth, but that vessel primarily fishes to the north of New Plymouth.[31] The South Taranaki Bight is fished occasionally by lining vessels based further afield.

Line fishing effort

No line fisheries operate regularly within the TTR project area, although a single bottom long line event was reported in the TTR project area in 2020/21.

Within the affected area, line fishing methods, including bottom longlining, handlining, and drop / dahn lining are used reasonably regularly (**Figure 23**).

Figure 23: Number of line fishing events in the affected area

Year	Number of line fishing events in affected area		
	Bottom long line	Hand line	Drop/dahn line
2019/20	149	39	0
2020/21	70	46	8
2021/22	62	27	0
2022/23	96	13	1
2023/24	98	8	0

Fisheries management considerations

SNA 8 TACC increase

Snapper was previously targeted in line fisheries in this area, and the 2024 TACC increase for SNA 8 may result in more targeting of this species in line fisheries in future.

Other fisheries

Other fishing methods which have been used occasionally within the affected area over the last five fishing years up to 2023/24 are:

- Potting for blue cod (BCO 8), paddle crab (PAD 8), or other species;
- Diving (spearfishing in the south of the affected area);
- Purse seining for skipjack tuna (SKJ) and English mackerel (EMA 7); and
- Trolling for albacore tuna (ALB).

Trolling effort is variable, but the method is used frequently in some years (e.g., 262 events in 2021/22). Trolling has very occasionally been reported within the TTR project area – i.e., 4 events over the last five combined fishing years

[31] Keith Mawson, Egmont Seafoods, pers comm (March 2025).

Fisheries management considerations

Non-QMS tuna species

Skipjack and albacore tuna are not in the QMS. These two tuna species are among New Zealand's few remaining 'open access' fisheries which fishers can operate in without having to purchase quota or ACE. The fisheries are therefore valued by fishers for their ease of access in comparison with QMS species.

Migratory stocks of tuna species such as skipjack and albacore vary significantly in terms of volume and location. Catches of skipjack tuna in New Zealand waters fluctuate significantly, with peak catches recorded in 2010 to 2014. Since 2021/22 catches have been very low. Catches of albacore have been more constant, but also declined somewhat from 2021/22. Commercial fishers have previously expressed concern that tuna species are very sensitive to prey distribution and noise and their distribution may therefore be impacted the proposed mining operations.

Commercial spearfishing

The small number of dive fishing events reported in the affected area are likely to be for spearfishing for species such as butterfish (BUT 1) off the Kāpiti coast under a special permit.[32]

From 10 April 2025, commercial fishers have been able to use the method of spearfishing in most areas around the South Island and in parts of the lower North Island, including in the South Taranaki Bight. The introduction of a new commercial fishing method may allow fishers to target species that are currently difficult to catch because of the extensive set net prohibitions on the west coast of the North Island. The use of a highly selective fishing method may increase the value of catch (although only a small proportion of catch is likely to be taken by this method).

Overview of commercial fishing interests

The fisheries of the South Taranaki Bight are fished by a variety of commercial fishing interests, ranging from small owner operators to large vertically integrated seafood companies. Many companies, individuals and Iwi entities own quota shares in FMA 8. All of these are considered to be 'existing interests' in the area of TTR's proposed mining activities.

Fishing vessel operators

The number of commercial fishing vessels operating in the vicinity of the mining proposal has remained relatively stable over the last five fishing years, with no clear trend. The TTR project area has been fished by 2 to 4 commercial fishing vessels annually over the past five years. During that same period, the affected area has been fished by an average of 68 different vessels every year (**Figure 24**).

Fishers may operate from New Plymouth or from more distant ports including Nelson, Picton, Wellington and Onehunga. Vessels may be owned by large or medium-sized integrated seafood companies or by owner-operators.

[32] Other commercial dive fisheries, such as for pāua or kina, do not operate in the affected area.

Figure 24: Commercial fishing vessels operating in the affected area and TTR project area

Year	Number of vessels	
	Affected area	TTR project area
2019/20	71	3
2020/21	63	3
2021/22	84	4
2022/23	64	3
2023/24	60	2

Quota ownership

FMA 8 has 97 different QMS fish stocks, each with a different pattern of quota ownership. An overview of quota ownership in five indicative FMA 8 stocks caught in the vicinity of TTR's proposed mining activities is shown in **Figure 25**.

Figure 25: Number of quota owners in five key FMA 8 stocks

Stock	Total number of quota owners	Number of settlement quota owners
School shark (SCH 8)	39	13
Rig (SPO 8)	44	13
Gurnard (GUR 8)	45	13
Snapper (SNA 8)	68	20
Trevally (TRE 7)	83	28

Quota ownership in a stock typically includes large companies which may own quota across multiple fish stocks, smaller quota owners who may own quota in multiple stocks or a single stock (e.g., CRA 9 rock lobster), and iwi who own settlement quota in all FMA 8 stocks.

The companies with the largest quota ownership across inshore finfish stocks in FMA 8 are Talley's Group and Sanford. Talley's is the largest quota owner in the set net species school shark and rig (owning 10.7% of SCH 8 quota shares and 37% of SPO 8) as well as in gurnard (37% of GUR 8). Sanford is dominant in snapper (70.5% of SNA 8) and trevally (51% of TRE 7). ACE derived from Sanford's North Island inshore quota is used by Moana New Zealand under a long-term arrangement.

Other significant FMA 8 quota owners include Māori-owned companies such as Aotearoa Fisheries Limited, Raukawa Moana Seafoods (Tainui), Ngāti Porou Seafoods and Ngāi Tahu Seafood Resources as well as local seafood companies such as New Plymouth-based Egmont Seafoods Ltd and private quota owning entities.

Quota ownership in the trawl target stocks (especially the valuable SNA 8 and TRE 7 stocks) is relatively concentrated (even though there are more quota owners in these stocks), whereas in the shark set net fisheries quota ownership is more diffuse. For example, the top three SNA 8 quota owners between them own 82% of the quota shares. This compares with SCH 8, where the top three quota owners own 48% of the quota shares.

Settlement quota

Settlement quota comprises 10% of quota shares every fish stock introduced into the QMS prior to 1992 and 20% of quota shares in fish stocks introduced into the QMS subsequently.[33]

Settlement quota is allocated among iwi according to whether a stock is classified as a deepwater stock or an inshore stock. For deepwater stocks, 75% of quota shares are allocated according to an iwi's population, and 25% are allocated according to the percentage of coastline within the QMA that iwi claim and agree with neighbouring iwi. For inshore stocks, all quota shares are allocated based on the percentage of coastline within the QMA that iwi claim and agree with their neighbours. Te Ohu Kai Moana holds quota on behalf of those iwi who have yet to reach agreement on their coastline interests (including in FMA 8).

The incorporation of coastline into the allocation model means that the number of iwi who have a settlement interest in a particular fish stock depends on the geographical extent of the QMA, and whether the fish stock is classified as deepwater or inshore for allocation purposes. For example:[34]

- Rig (SPO 8) is classified as an inshore stock for allocation purposes. All iwi with coastline that falls within SPO 8 own a share of the settlement quota. The SPO 8 QMA coincides with FMA 8, meaning that the settlement quota is allocated among 15 iwi with coastline interests; and
- Jack mackerel (JMA 7) is classified as a deepwater stock for allocation purposes. That means 75% of the settlement quota is shared amongst all 57 iwi based on their population and 25% of the quota shares is allocated to those iwi whose coastline is included within the QMA. Because the JMA 7 QMA is large (encompassing FMAs 7, 8 and 9), 30 iwi have coastline interests within the QMA.

The allocation model for settlement quota means that iwi that are distant from the mining site will have ownership interests in some fisheries at the mining site.

Provisions in the Māori Fisheries Act currently prevent the sale of settlement quota outside the entities involved in the allocation of the commercial settlement assets – that is, iwi (through Mandated Iwi Organisations and Asset Holding Companies), Te Ohu Kai Moana and Aotearoa Fisheries Limited. This group as a whole must retain ownership of settlement quota. Therefore, if the value of quota is at risk as result of seabed mining operations, iwi cannot trade their settlement portions outside this group.[35]

Licenced fish receivers

Egmont Seafoods is the major export licensed fish receiver on the West Coast of the North Island between Wellington and Auckland.[36] The company receives fish from its own three vessels and three other commercial fishing vessels, as well as occasionally product from others that are working in the area. Egmont supplies ACE derived from its own quota or purchased from other quota owners to six vessels – three set netters, two trawlers and one longliner. Collectively these vessels provide about 50 direct jobs and supporting jobs (including within Egmont Seafoods). Egmont's processing factory

[33] Some stocks may have less than 10% settlement quota as a result of statutory preferential allocation rights (known as s.28N rights) which have the effect of altering the amount of quota shares an entity owns when a TACC is increased – e.g. SNA 8.
[34] Examples provided in evidence of Kirsty Woods, Te Ohu Kaimoana (26 January 2017) on the TTR application under the EEZ Act (2016).
[35] Evidence of Kirsty Woods, Ibid.
[36] There is also a smaller LFR at Raglan (Raglan Fish).

currently processes around 600 tonnes of fish annually with a market value of $5.5 to 6 million. Around 90 percent of the product comes from the West Coast. Egmont currently employs 20 people in processing and retailing and contracts a further two.[37]

The other significant processor of finfish caught in the South Taranaki Bight is Talleys Fisheries, which has processing facilities in Nelson and Motueka. Talleys views the South Taranaki Bight as an important area within their overall fishing operations – it provides variety for vessels that usually operate in the Challenger area (FMA 7), and is known as a productive fishery with good quality fish, particularly snapper and gurnard.[38]

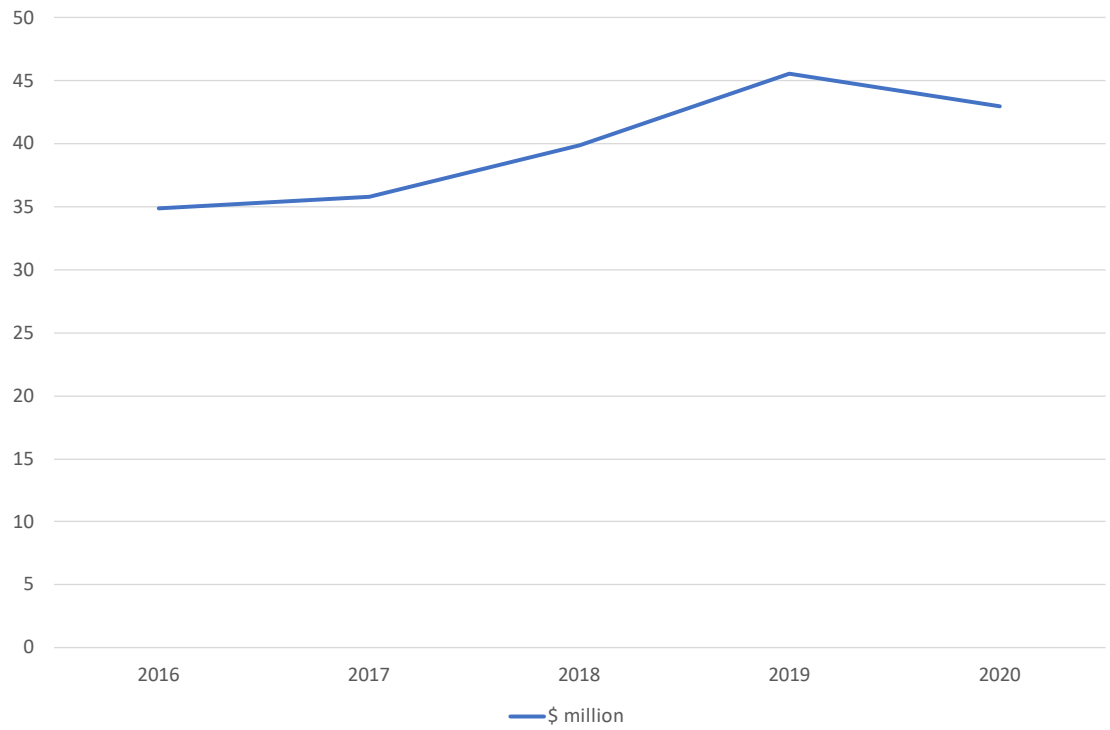
Value of potentially affected fisheries

The most recent assessment of the value of commercial fishing in New Zealand was undertaken by BERL in 2022 using data from the period 2016 to 2020.[39]

Catch value

BERL estimated that the average annual commercial catch value of FMA 8 fisheries was $39.8 million over the period 2016-2020. Catch value increased over this period 2016-2020 (**Figure 26**).

Figure 26: FMA 8 commercial catch value, 2016-2020



[37] Keith Mawson, Egmont Seafoods, pers comm (March 2025).
[38] Doug Saunders-Loder, Talleys Fisheries, pers comm (March 2025).
[39] BERL (2022). The economic contribution of commercial fishing. Fisheries Inshore New Zealand (FINZ) report. March 2022.

Economic contribution

BERL estimated the average annual economic contribution from the harvesting of FMA 8 fisheries as follows (**Figure 27**):

- Output value: $107 million;[40]
- GDP: $44 million; and
- Employment: 416 FTEs.

The estimates apply to harvesting only and do not include seafood processing value.

BERL used multiplier analysis to estimate the values provided above. The total values are the sum of direct effects, indirect effects and induced effects (**Figure 26**).[41]

Figure 27: Average annual economic contribution of fishing (harvesting only) in FMA 8, 2016-2020

Measure	Direct	Indirect	Induced	Total
Output (2020$m)	51	45	11	**107**
GDP (2020$m)	17	21	6	**44**
Employment (FTEs)	157	200	59	**416**

[40] Gross output is the value of production, built up through the national accounts as a measure, in most industries, of gross sales or turnover. This is expressed in $million at constant prices. Gross output is made up of the sum of: compensation of employees (i.e. salaries and wages); income from self-employment; profits; indirect taxes less subsidies; intermediate purchases of goods (other than stock in trade); and intermediate purchases of services.

[41] An initial expenditure (direct effect) in an industry creates flows of expenditures that are magnified, or "multiplied", as they flow on to the wider economy. This flow occurs in two ways: (1) The industry purchases materials and services from supplier firms, who in turn make further purchases from their suppliers. This generates an indirect (upstream) effect. (2) People employed in the direct development, and in firms supplying services, earn income (mostly from wages and salaries, but also from profits) which, after tax is deducted, is then spent on consumption. There is also an allowance for some savings. These are the induced (downstream) effects.