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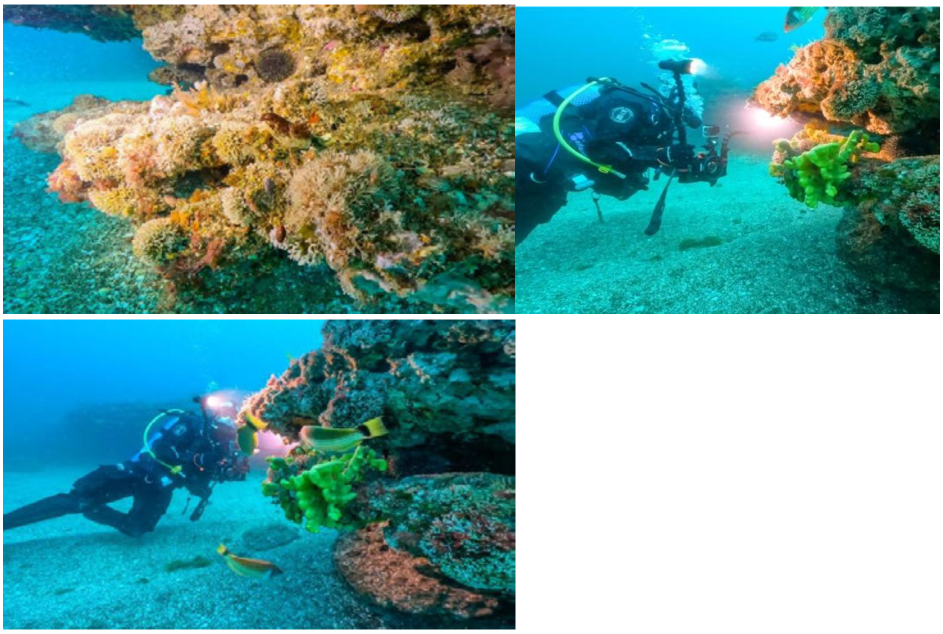
REEF CONDITION

1. Each reef has a variety of coverage, changing over short distances. We notice this at the Project Reef – there are the sides of the reef, the under ledges parts, and the flatter higher top to the reef. Also the channels. Each geological change, also appears to 'encourage' a different character of plants and animals.
2. It is not surprising that each South Taranaki reef is 'unique', due to location, depth, size, width etc. No diver of the club has described a reduction in vibrance of life at a reef, they are regarded as all healthy. Crayfish can be caught, and the fish allowance easily caught without spending much time.
3. The "Project Reef" has the most footage, as the purpose of diving this reef is predominantly to document life on it – although divers also gather crayfish, and have fished close by the reef. Since 2016 we have not noticed any significant changes. We have noticed that *Ecklonia* around the insitu camera can change in density between each deployment.
4. On our most recent dive we noticed a significant density of bryozoans covering the ledge of the Project Reef– but as we don't survey this area on a regular basis, it is hard to determine if this is an increase, or simply us surveying the area more intently. We only have around 25minutes for each dive, which when we have to re-deploy our insitu camera, can lesson general observational dive time.



(bryozoan densities)

5. Sponges have remained in good condition. Some of the *Economía alata* species stretch for many metres across the reef, indicating they have been there for many decades.
6. Jewel anemones that stretch over many metres on one side of the Project Reef have also remained in consistent good condition.
7. Club members (other than Project Reef divers) place an emphasis on diving for crayfish at various offshore reefs, rather than taking footage.
8. One exception has been a club member, who was also a MPI officer, Steve Hornby, who took considerable footage over a number of years at one of his favourite reef spots, the 4-mile reef. This expansive reef changes over short distances – which can be easily seen in some of his video footage. His footage *covers significant crayfish densities* for one of the video sessions. The geology of *this particular area of reef* that the footage was taken, was different to the 'Project Reef', as it contained river stones and also some very dense beds of *Caulerpa flexilis*.

9. Pg.197 of our comments = 'Netting Coastal Knowledge' 2006 – sizeable reefs with some of the best fishing in Taranaki

10. One of the members of the STUC Club, knew Mr Cummerfield well, so the Project Team are aware of his submission to the EPA at the first Hearing. This description fits those given by STUC members at our recent (November 2025 Club meeting, where we discussed how we would respond to the minute requests for information

11. *REEFS I am familiar with the North and South Traps, which are limestone reef systems approximately 10Km SE from Patea entrance. They cover areas of 50 and 60 hectares. They are easy to dive on, being 10-16m deep, rising up from the 24m deep surrounding seabed. In my experience these provide the best scuba diving of any area off the west coast of the North Island, including the Kapiti Island reserve and the Marlborough Sounds.* ***I think of these reefs as our Poor Knights of the west coast.*** *The fish life is varied and bountiful, with blue cod, snapper, kingfish and tarakihi to be seen, as well as the usual range of reef fish.*

    The reefs have diverse eco-systems with invertebrates such as soft corals, sponges, anemones and gorgonian fans. The ***varied rock formations have many channels and small cave systems that provide shelter for rock lobsters,*** *which are often seen in their shelling phase, sheltering in the caves. When shelling, the rock lobsters do not seem to enter crayfish pots and I assume for this reason, they are not commercially fished in this area. However for the amateur scuba diver, who can selectively gather the crayfish, these reefs have been of great benefit for many years.*

    There are several other reef systems in this area, which are probably similar quality marine ecosystems, as the Patea Trap reefs. Please see the attached marked-up chart of the reefs and banks in this area.

    There is also a low lying reef, assumed to follow an old shore line, now 27-30m deep, running from Waverly to south of Turakina. This doesn't show on the marine charts but can be picked up in places with an echo sounder. It provides good fishing.

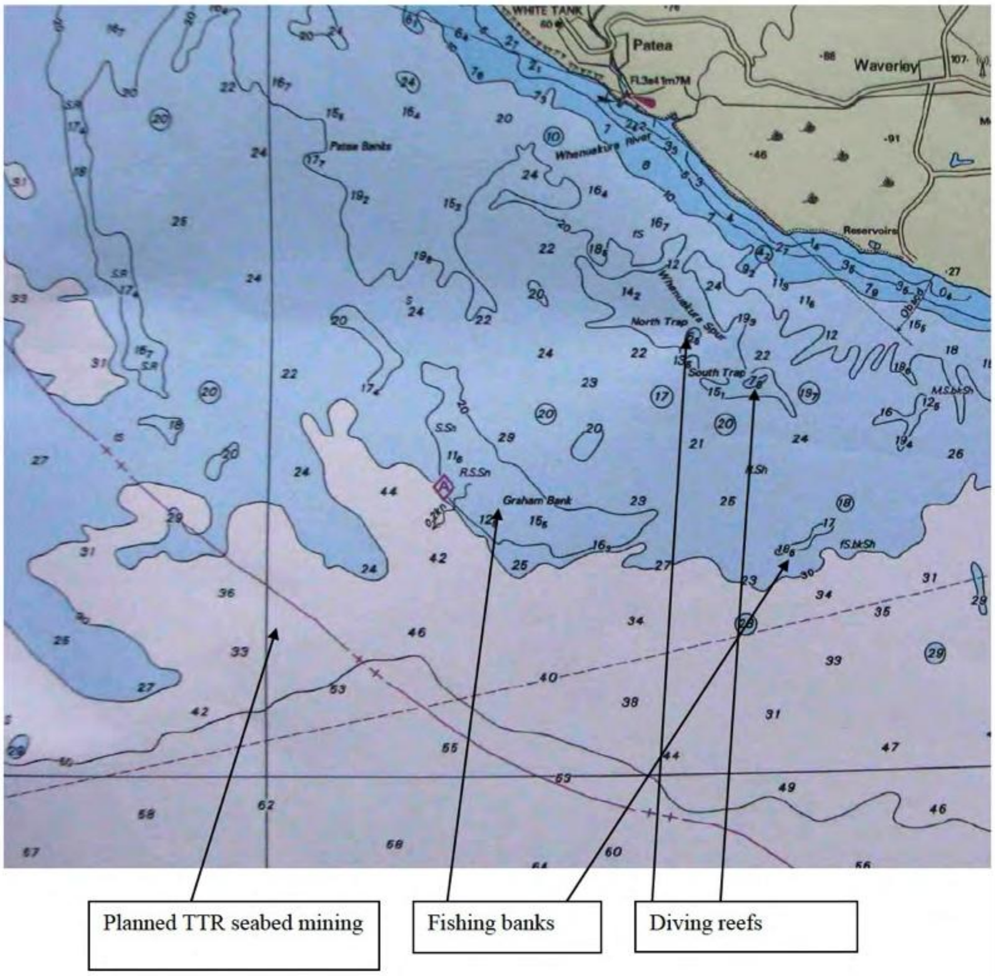
    2 BANKS ***The Graham bank, only 7Km northeast of the proposed seabed mining area, is a rich blue cod fishing area****. This bank is approximately 1200 hectares in area, raised up to 12m - 15m deep from the surrounding 25m - 40m deep seabed.* ***Fishers have located dozens of spots where they can catch good-sized blue cod as well as tarakihi and snapper.*** *The fish life on this bank is quite rich, regenerating itself over the years, although it has decreased to some extent recently due to increased commercial and recreational fishing. In Section 11.7 of the TTR application, the Graham bank has been, in my opinion, incorrectly omitted from the list of affected natural features. Access to Graham bank (15Km from land) is weather dependent, which may explain why recreational fishing has not shown up on flyover checks of fishing locations (Section 6.18 of the TTR application).*

There are about ***9 other marine banks along this coast that are favourites with fishermen. These are typical banks - raised sand with some sedimentary rock areas, rich in bottom life****. They are fragile and susceptible to disturbance from trawling and sedimentation.*

Good fishing for snapper and gurnard is possible on the flatter seabed *between the reefs.*

https://www.epa.govt.nz/assets/FileAPI/proposal/EEZ000004/Submissions-and-or-comments/bd04dab731/EEZ000004-Cooke-to-Cutting-Submissions.pdf pg. 1081

(https://www.epa.govt.nz/database-search/eez-applications/view/EEZ000004/)



PATEA SEABED – Showing some fishing and diving areas.

Cut of NZ45 marine chart.

G. Cummerfield, Oct2013

Cummerfield's map

Club member S

39.4   174.1

Ball Road   "reef up to 3m, with other bits of reef around. Snapper and blue cod, go here for fishing"

39.4   174.1

"The Crack". "3m in height, excellent fishing and diving. Crays and fish

39.4   174.1 "192".

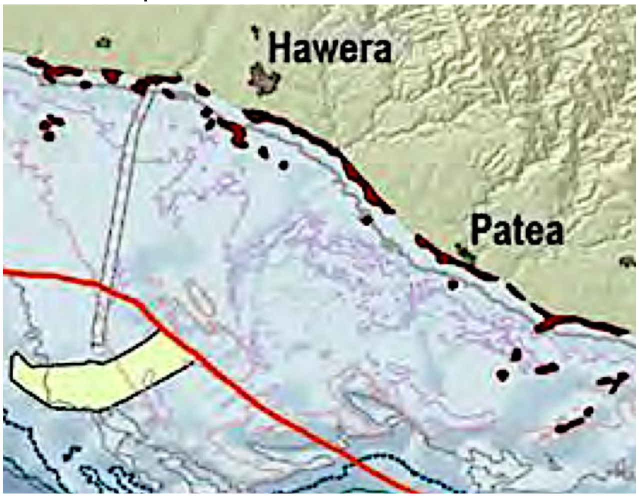
"The Pancake" Big snapper here. 3m height.

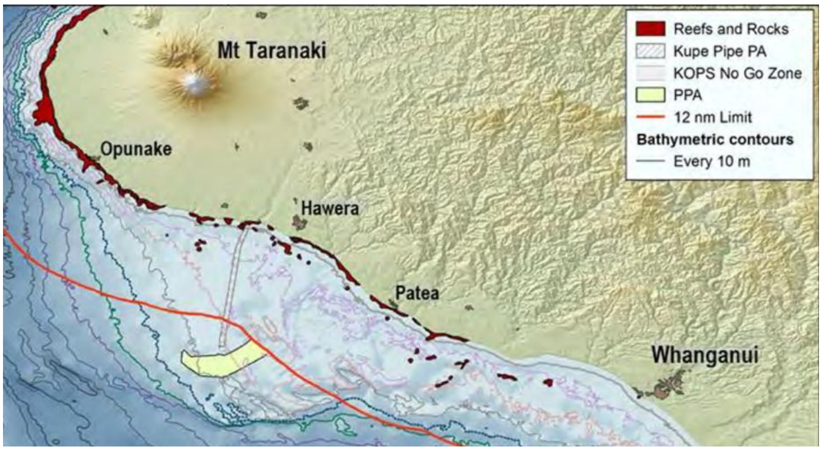
39.4   174.2

. "RodCra". "Big horse-shoe shape about 1.5m in height, with a sandy basin, with algae, ledges, fish and crays – the ledges are about 1m in depth

"Clarky". "ledge flat on the top with a hole in the middle, 3m high, hard reef, green algae, incredible fish life

When you look at the bathymetry shown in the NIWA Pātea Shoals Benthic Ecology report, it looks far from a flat sand seabed. It is not surprising that locals have numerous reefs known to them. It seems many of them seem to align with what appears to be bumps on the seafloor.





Pg.12 https://www.fasttrack.govt.nz/__data/assets/pdf_file/0015/4272/Report-3-NIWA-Patea-Shoals-Benthic-Ecology-FINAL.pdf

STUC divers comments about reefs and impacts of sediment & health of reefs

1. Despite some reefs being nearshore, and impacted by poor visibility at some times of the year, depending on weather and ocean conditions, the reefs and the biodiversity they contain, appear to be constantly in good health and robust.

2. Divers have commented that past 8km offshore, they notice clearer conditions.

3. For the South Taranaki divers, the rivers that run into the ocean are not particularly large, nor are there sediment loads that big – comparative to other areas in NZ.

4. The Rivers entering South Taranaki's ocean and their 'fines' (per Hadfield) **Koupokonui (9,700 tonnes sediment p.a), Waingongoro (9,100 tonnes sediment p.a), Tāngahoe, (43,900 tonnes p.a) Manawapou (15,000 tonnes p.a), Pātea (310,600 tonnes p.a)** Whenuakura (275,900 p.a.), Waitōtora (475,400 tonnes p.a). source - see table below

   (for comparative purposes TTRL = 700,000 tonnes p.a. 'fines' discharged from 22km-36km offshore)

5. Those rivers that have been bolded **are the ones most likely to be impacting the offshore reefs that the STUC members dive.** Their annual sediment discharges are taken by currents predominantly south, but currents and wind can influence this.

6. The STUC divers comments about conditions past 8km being clearer – were corroborated by Pinkerton.

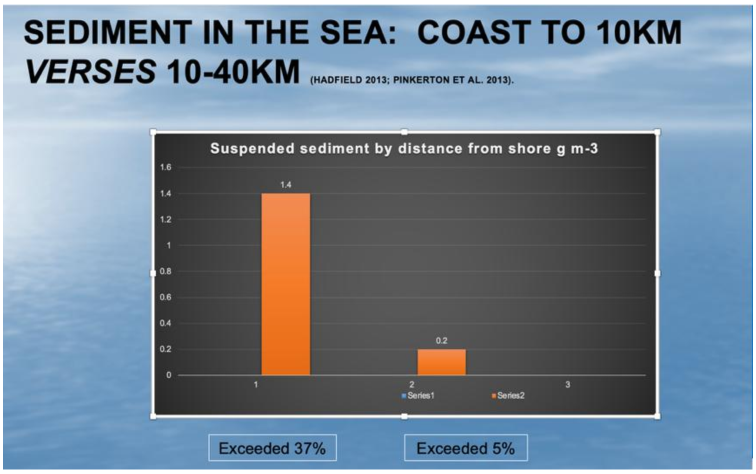


Table 2-2: Mean water flows and mean annual suspended sediment inputs from the rivers flowing into the study area. The data is sourced from NIWA's WRENZ model (http://wrenz.niwa.co.nz/webmodel/), and has been compiled in a manner described in Hicks et al. 2011). A factor of 2 has been used to convert sediment yield in tonnes/yr to cubic metres/yr.

River	Upstream area (km^2)	Mean flow (m/s)	Sediment yield (tonnes/yr)	Sediment yield (m^3/yr)
Waiaua River (Opunake)	46.4	3.6	4900	2450
Kaupokonui Stream	146.3	8.6	9700	4850
Waingongoro R (Ohawe)	233.1	7.8	9100	4550
Tangahoe River	285.1	4.2	43900	21950
Manawapou River	120.9	1.9	15000	7500
Patea River	1048.5	30.4	310600	155300
Whenuakura River	465.3	9.9	275900	137950
Waitotara River	1162.0	23.3	475400	237700
Kai Iwi Stream	191.0	1.8	16900	8450
Whanganui River	7113.8	229.0	4699800	2349900

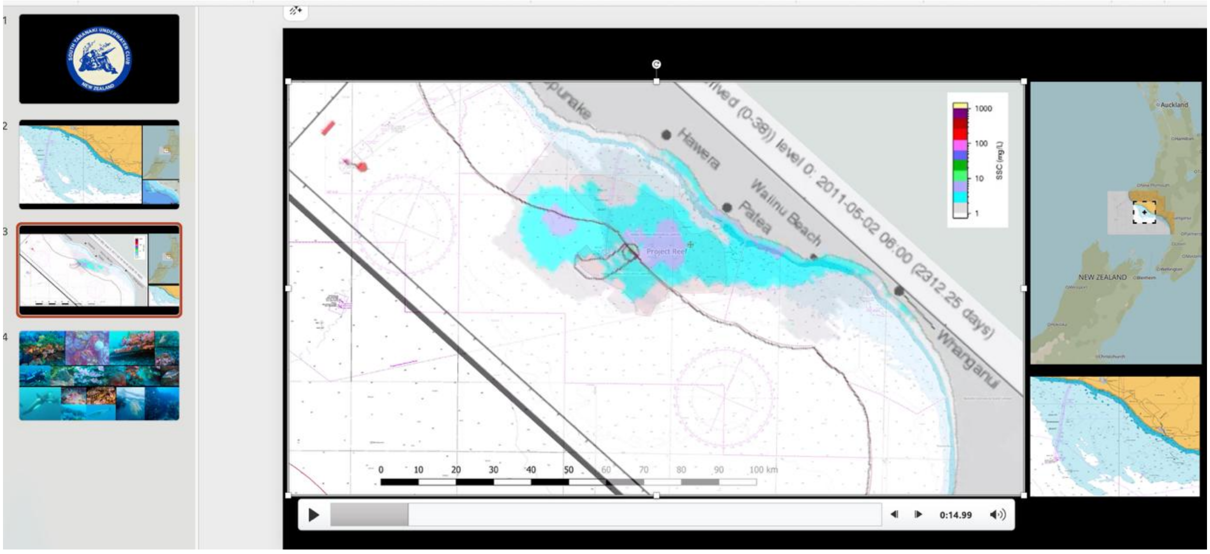
South Taranaki Underwater Club PP presentation to Fast-track panel October 25

Divers have commented that there are unique impacts on near-shore reefs by the ocean conditions – which makes it difficult to generalise – each area being impacted differently.

The third PowerPoint is a video, showing NIWA's Plume Modeller Hadfield's video (from the first Hearing) for the 0-38micron sediment plume which was overlaid on a Chart by E. Smith of Ngā Motu Marine Reserve Society.

This shows the **impacts of currents, wind and waves for the local area and its variability, but also its main direction being southerly along the coast.**

https://www.fasttrack.govt.nz/projects/taranaki-vtm/conferences,-workshops-and-hearings See 22nd October 2025

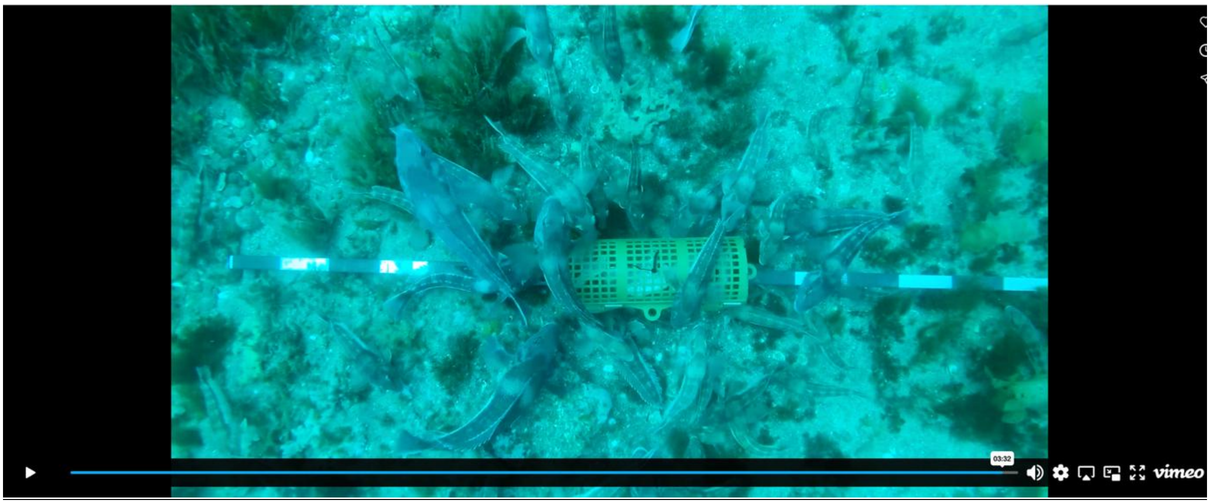


South Taranaki Underwater Club video presentation to Fast-track panel October 25

Minute 17 asks about fish species. One point of relevance are the blue cod densities. STUC members state since the last eight years when fishing they catch more snapper than before.
However 'Project Reef's' BUV survey results have been impressive on a national scale, when compared to DOC BUV survey results for blue cod (Goat Island max (N) for Blue Cod a while back was 5. It is acknowledged that DOC do many more replicates – but nevertheless, the method Project Reef applies is the same as that used by DOC in terms of deployment equipment and the 30 minutes of video time.

https://www.fasttrack.govt.nz/projects/taranaki-vtm/conferences,-workshops-and-hearings See 22nd October 2025

This photo is from the video shown to the Fast-track panel, towards the end.



Footage from the 2021 BUV drop: Max(N) 71 Blue Cod

Below are some more photo extracts taken from the BUV footage:

Blue Cod seen on the top of the reef are older ages.

Juveniles are more seen out on the interface of the reef and sand.

Blue Cod: A total of #1,666 blue cod were recorded and #405/**19% were juveniles**. Of the juvenile blue cod, 231 (**57%) were recorded at Reef V** which is located at the outer edge of the Graham Bank.

Reef D "The Crack" had **10% of the blue cod juvenile sightings**, and "Project Reef" 5%. (see page 51) .

Baited Underwater Video: Morrison at el. page 59

The STUC comments on page 104 briefly cover the BUV work.
Below is a fuller explanation of our work, captured in Morrison at el.

3.5 Project Reef (site K) blue cod and fish assemblage

3.5.1 Baited Underwater Video (BUV)

Four single BUV drops were carried out on the Project Reef between November and March in 2017, 2018, 2019 and 2021. The respective Nmax numbers were 20, 30, 17, and 71. These numbers cannot be directly compared to the fish trap Nmax numbers due to the different methodological approach (e.g., vertical versus horizonal cameras, use of traps), but nevertheless have upper/higher values (Table 9). Other species were not counted, but included snapper, scarlet wrasse, tarakihi, and carpet shark; and three species not seen in either the CoastCam or fish trap videos: octopus, seven-gilled shark (*Notorynchus cepedianus*), and school shark (*Galeorhinus galeus*).

Two BUV drops were also made in 2020 but these were unable to be quantified (one too short, the other dragged in the current).

REEFS, BENTHIC HABITATS AND FISH locations A-Z and Z1-Z9:

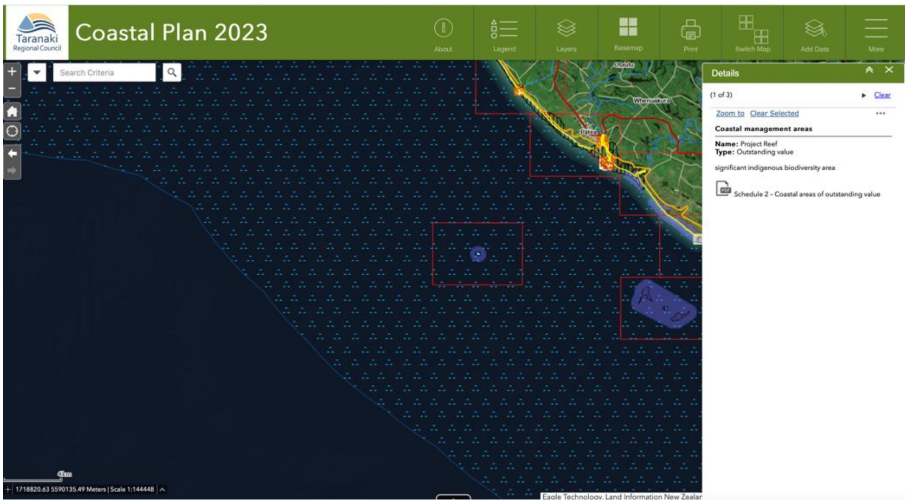
1. Our comments referred to the Morrison report, but did not delve into detail, as the TRC had covered some of the information. In addition, we felt the panel and experts had access to the report. But in light of the request for fish species using the area, and the flora and fauna and biogenic features – we have provided some extracts, and added in more localised knowledge, as well as the context from MPI reports that corroborate or provide context to the findings.

2. Collaboration with Dr Mark Morrison, Marine ecologist and Fisheries Scientist with NIWA – now Earth Sciences.
   (the survey is a ***sub-set area* of the *shallow shelf*** **and *deeper areas* offshore** of South Taranaki dived and fished by South Taranaki Underwater Club members)

Go to page 82

STUC comments in relation to Morrison at el.

1. The South Taranaki Underwater Club's project 'Project Reef', which was established in 2015, and is now regarded as an 'outstanding natural feature' in the TRC Coastal Plan. **It's location is documented as location 42 in the Coastal Plan:** https://maps.trc.govt.nz/LocalMapsViewer/?map=6f0f4492c76244d5ace0422efa7e6b0c



2. The 'Project Reef' team have established connections with various marine scientists around NZ – including from 2017, **Dr Mark Morrison, a marine ecologist and fisheries scientist at NIWA. Various video footage of fish and the benthic habitats found at the 'Project Reef'** (11km offshore of Pātea) **has been shared with him over the years.**

3. "Outreach collaboration between NIWA's MBIE-funded 'Juvenile fish habitat bottlenecks' **CO1X1618 research programme**, (led by Dr Morrison) and the Taranaki-based citizen science **Project Reef** group (see https://www.projectreefsouthtaranaki.org/, https://www.youtube.com/watch?v=QX_eAeyZgTE) **led to two field sampling events in 2020 and 2021, to search for potential key juvenile blue cod habitats/nurseries on Pātea Bank**. This field work *targeted subtidal rocky reefs*, using a combination of multibeam sonar mapping, high resolution towed video, and fish traps with attached Go-Pro cameras. *Local ecological knowledge of fishers and divers was used to identify potential reef locations and drive the spatial design* of the multibeam sonar survey in 2020." (quote pg.11 [1]).

[1] https://www.trc.govt.nz/assets/2238-TRC002-FINAL-Offshore-subtidal-rocky-reef-habitats-on-Patea-Bank-South-Taranaki-2.pdf

4. Dr Morrison's research program was mentioned . . .(2021) 18.4 OVERALL PROGRESS IN FISHERIES NEW ZEALAND MARINE BIODIVERSITY RESEARCHhttps://www.mpi.govt.nz/dmsdocument/51703-Chapter-18-Biodiversity
   'Juvenile fish habitat bottlenecks' is currently assessing the restrictions on juvenile fish resulting from degraded biogenic habitats and seeks to promote actions that remove these restrictions *with the ultimate aim of seeing more juvenile fish enter the adult populations* (**MBIE project code C01X1618**).

5. The TRC funded a **211 page report: Offshore Subtidal Rocky Reef Habitats on Pātea Bank 2022**, which (see Contents page) documents:
   a. NIWA's method of the survey work, the results of the NIWA multibeam, DropCamera/CoastCam & fish traps
   b. and **Project Reef's benthic surveys** (2017, 2018, 2020) and **Project Reef fish survey work** (**Baited Underwater Video** 2017, 2018, 2019, 2021) and **Insitu Camera** (2017-2020). Location: 11km offshore, 23m depth.

6. Project Reef has (subsequent to Morrison report) more Insitu Camera footage from 2023 & 2024. This is day and night footage and sound.

7. Project Reef has 10,958 insitu videos spanning 2017-2024.

8. Project Reef has observational 3,047 diver observational videos

9. Project Reef had 2, 208 diver photos: mainly of reef K, some of reef D, some of Papa reef.

10. Project Reef has footage of other reefs not alpha-listed in the Morrison survey – "Snot Rock" and another near-shore reef.

11. Our comments provided links, so that the fish species, flora, fauna and biogenic habitats could be seen via video and photographs.

11) We want to assist the Fast-track panel & showcase our beautiful biodiversity

To assist the panel, we have included some footage of two ESA's for you to review:
Videos of a selection of sponge species at 'The Crack' [Link to Dropbox of sponge species]

YouTube videos of species at 'The Project Reef', including sponges & blue cod (cut from numerous videos taken over the years) https://www.youtube.com/@MarineFrames/videos

Inaturalist photos (public database of species) of Project Reef sponges (421 observations)[99] brown algae (73 observations)[100]

12. "The Crack" – regarded as an ESA

Photographs taken off The Crack video – which can be found - https://www.facebook.com/share/v/16eo7kJDcE/

13. Fish

We have had unusual sightings of 'teenage' year Boarfish. We notify Te Papa's fish experts whenever we see anything we think might be unusual and NIWA's fish scientists.

We also captured footage of Boarfish on our insitu camera.

"Two boarfish species are known from the Taranaki region but they aren't common as far as I'm aware, so it will be interesting to see what you've found."

"Thanks Karen, very cool footage! I've never seen more than a couple together at once. These ones (giant boarfish) don't look full grown – the large ones become more elongated. "

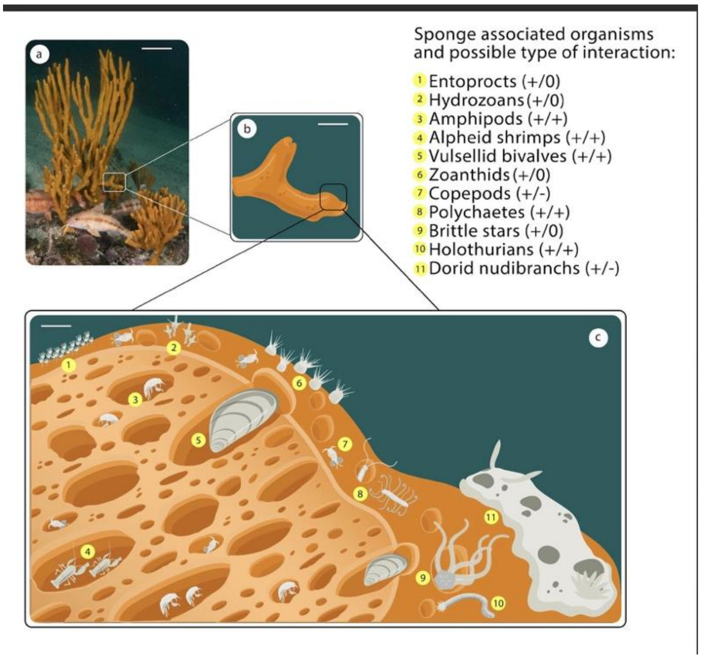
"What fabulous footage!! You can see how easy it is to depopulate an area, with them making very little effort to swim off and sitting broad-side to any spear gun – they're as bad as red moki."

"Looking at the size of them, I would say they were sub-adults rather than juveniles. I think it's newsworthy if only for discovering just how fabulous your reef-project has been in discovering the diversity of species just off-shore."

14. Photographs depicting the special nature and health of sponges found on the offshore reefs. These were collected for Puke Ariki's "Reef Alive" exhibition and were gathered at "the Crack" reef. The Project team took samples and placed them in preservative.

15, As part of the process of gathering sponges for Puke Ariki – it readily became apparent the biodiversity contained within and upon sponges. This piece of sponge was filled with tiny crabs and other organisms . . .providing a food source for fish . . .

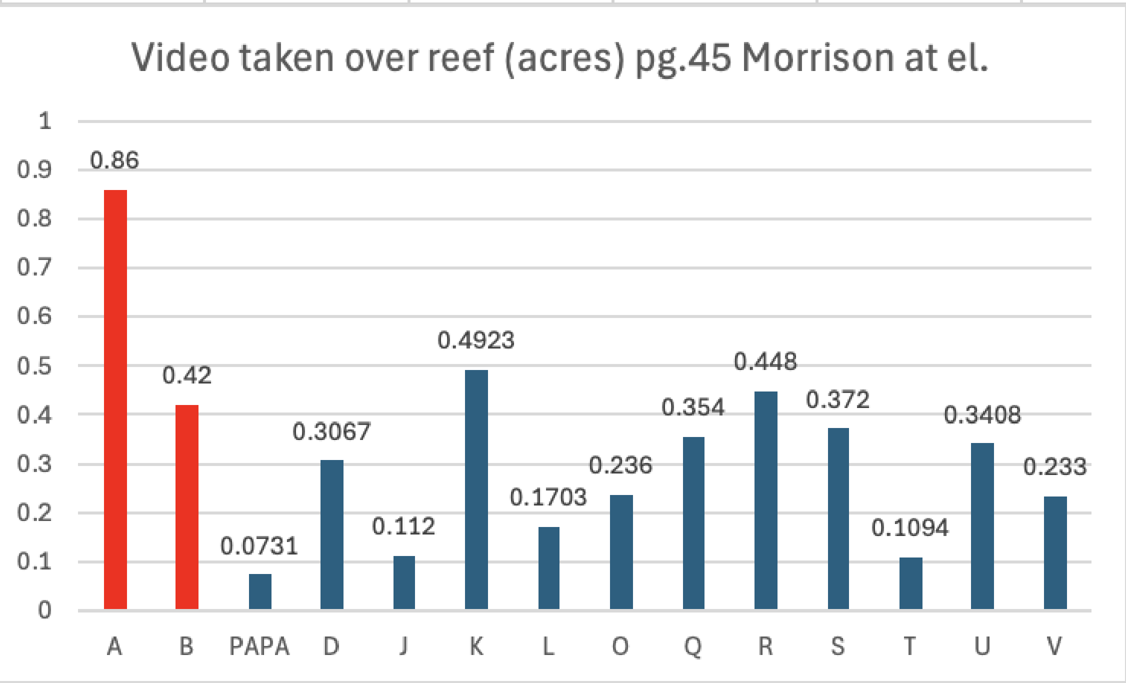
Professor James Bell, a sponge expert at Victoria University – did a talk at Puke Ariki. Part of the talk involved showing the following diagram, which clearly reveals the importance of sponges for the ecosystem

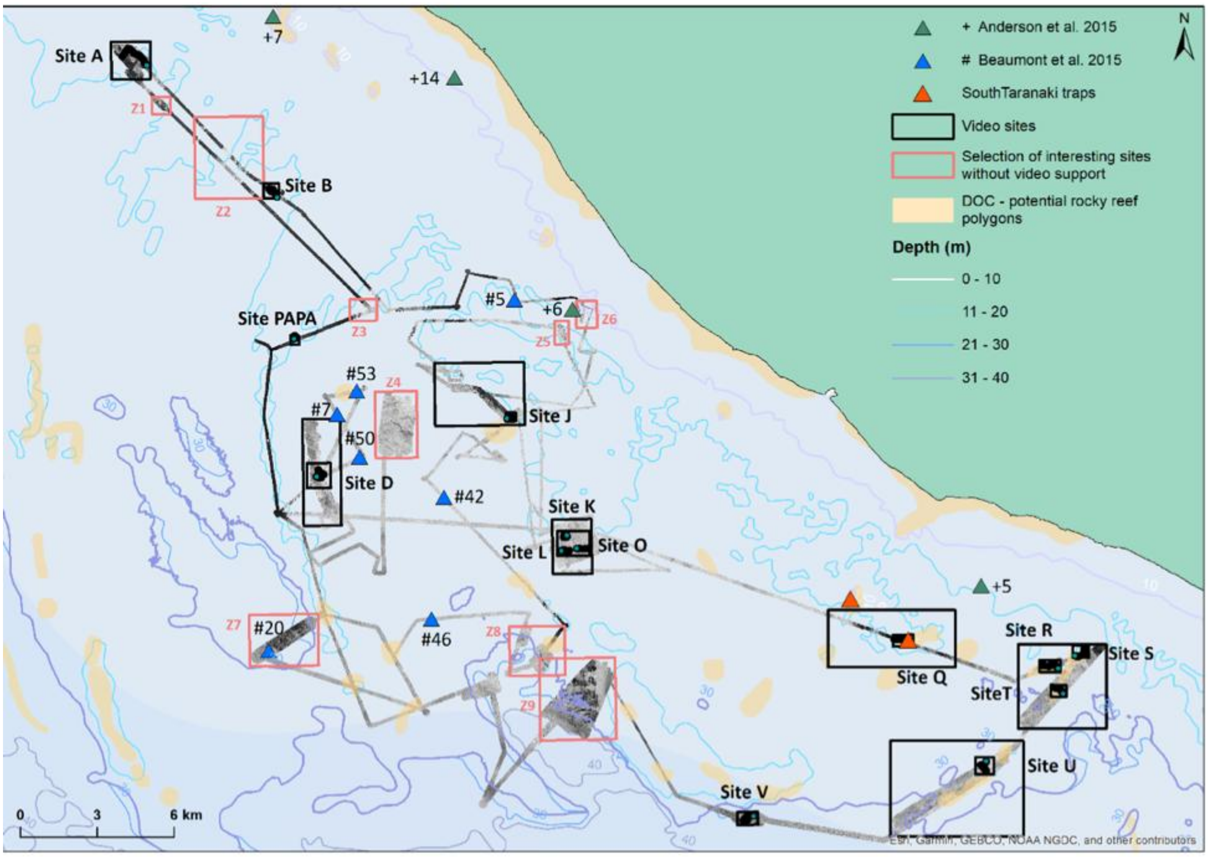


Sponge functional roles in a changing world James J. Bell* **Advances in Marine Biology** Volume 95, 2023, Pages 27-89

Chart of 2020 **Multibeam Track of 250km (61.5km2)** in the Pātea shoals, South Taranaki, with **conservatively 9.3% likely to be reef features** (approx. 1,400 acres).

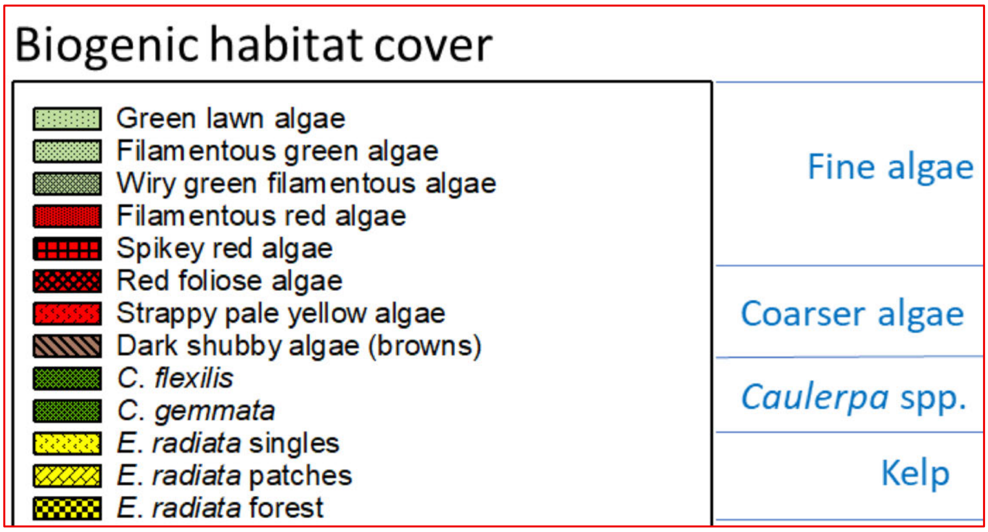
An exceptionally small percentage of reefs were drop-camera surveyed.
The **video track** for the 2021 DropCam footage was a total of 10,350m or **10km**
A:**1.7km**, B:**0.8km** C:**0.3km,** D:**1.0km**, J: **0.3km**, K: **1.3km**, L:**0.3km**, O:**0.5km**, Q:**0.7km**, R:**0.8km**, S:**0.7km**, T: **0.5km**, U:**0.6km**, V:**0.8km**





Map also shared on page 87 of our comments

FLORA: PER MORRISON AT EL.



Extract from page 64 of Morrison at el.

1. The **green lawn algae was distinctive and at times formed significant cover.** This is a new habitat class, not used in other NZ reef surveys.

2. The **yellow-red blade algae** at reef/sand boundary, a preferred blue cod habitat, **was distinctive** also.

3. Across the 14 sites drop-camera/CoastCam revealed **seven obvious biogenic habitat features** (see Table 14 pgs.159-160)

   Ecklonia forest (6 sites, one or more per site. Reefs Q, A, R, O, L, U),

   Caulerpa meadow (3 sites reefs A, S R)

   Macroalgae garden (4 sites: Reefs J, O, U, B)

4. Descriptions:
   wiry green filamentous- species unknown, filamentous green - likely brown algae,
   yellow-red blade, green(brown) shrubby algae – likely *Zonaria* present on reef/soft sediment boundaries, a preferred juvenile blue cod zone*,*
   Cladestephus hirsutus, microzonia, Dictyota, green 'lawn-turf' algae,
   filamentous red algae – likely a range of species,
   spiky red – in association often with sponges, likely many species, red foliose algae/feathery – including *Plocamium,* Carpophyllum maschalocarpum – uncommon and patch and forest scale, Caulerpa geminata – small patches, ***Caulerpa flexilis* – large patches and meadows often dominant when present**, ***Ecklonia*** single plants, patches and forest – **as forests often narrow 5-10m wide on the top of reef ridges, which may extend for kilometres**

5. Below are photographs in Morrison at el. of the biogenic habitat classes.

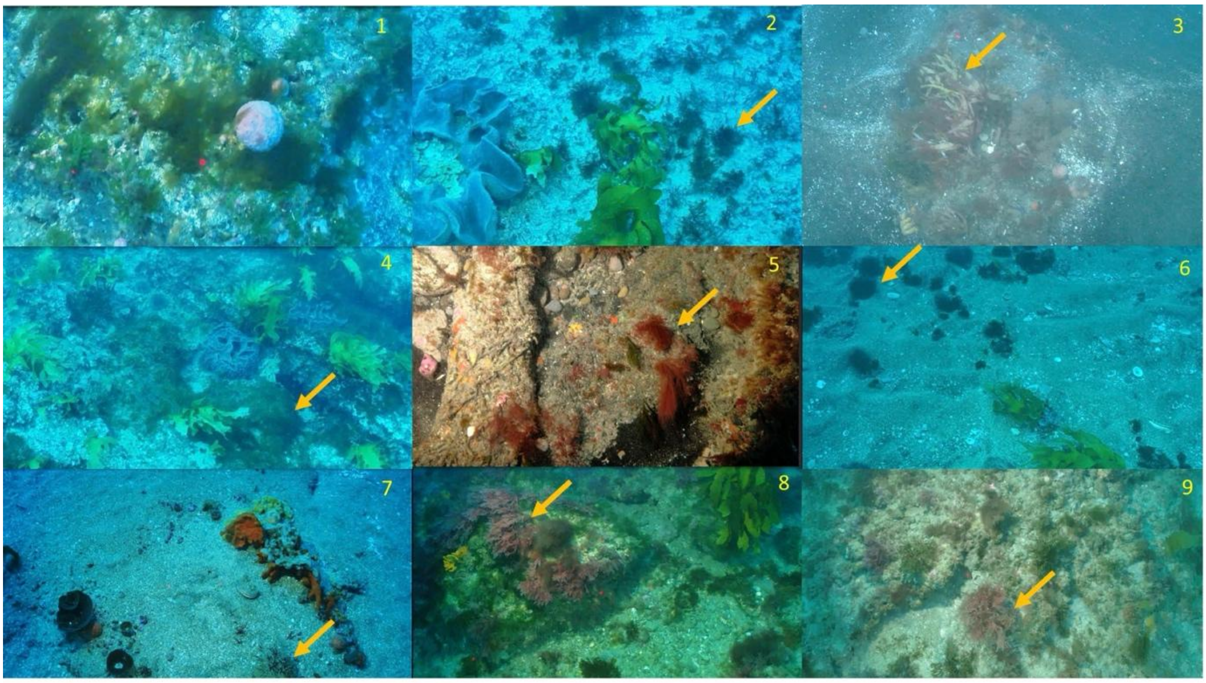


Figure 3-4: Biogenic habitat class examples: 1) filamentous green (brown) algae; 2) dark shrubby algae; 3) yellow-red blade algae; 4) green 'lawn' algae; 5–6) filamentous red algae (image 5 is from the CoastCam still camera); 7) spikey red algae; 8–9) red foliose algae. See Table 5 for habitat descriptions.

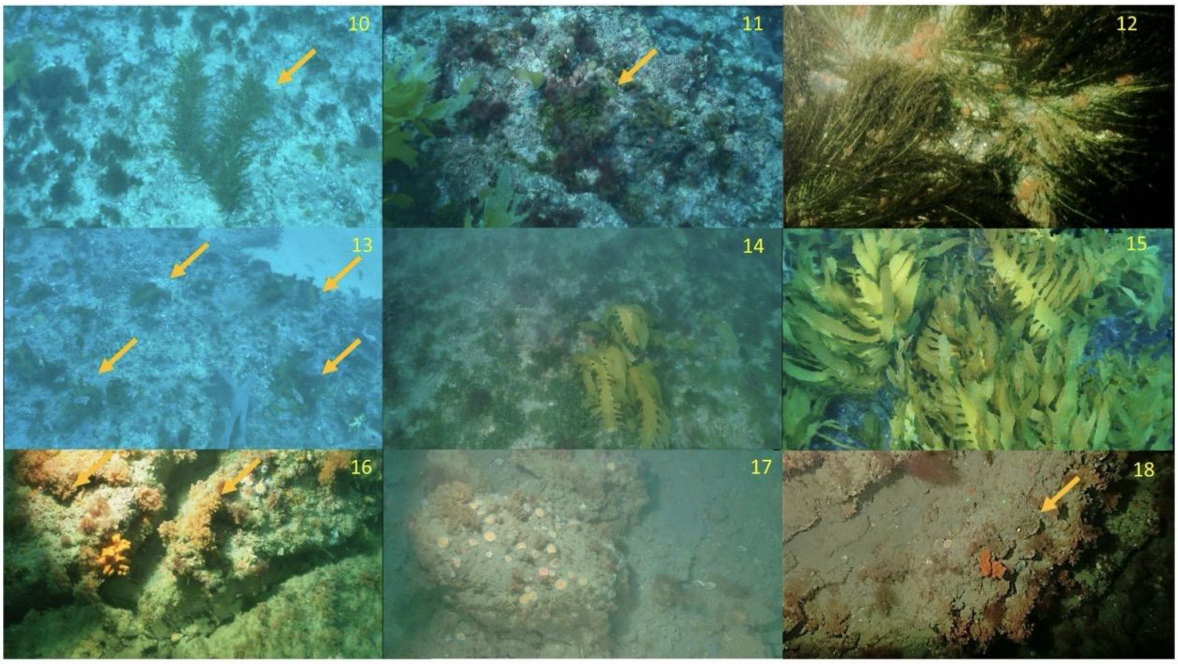
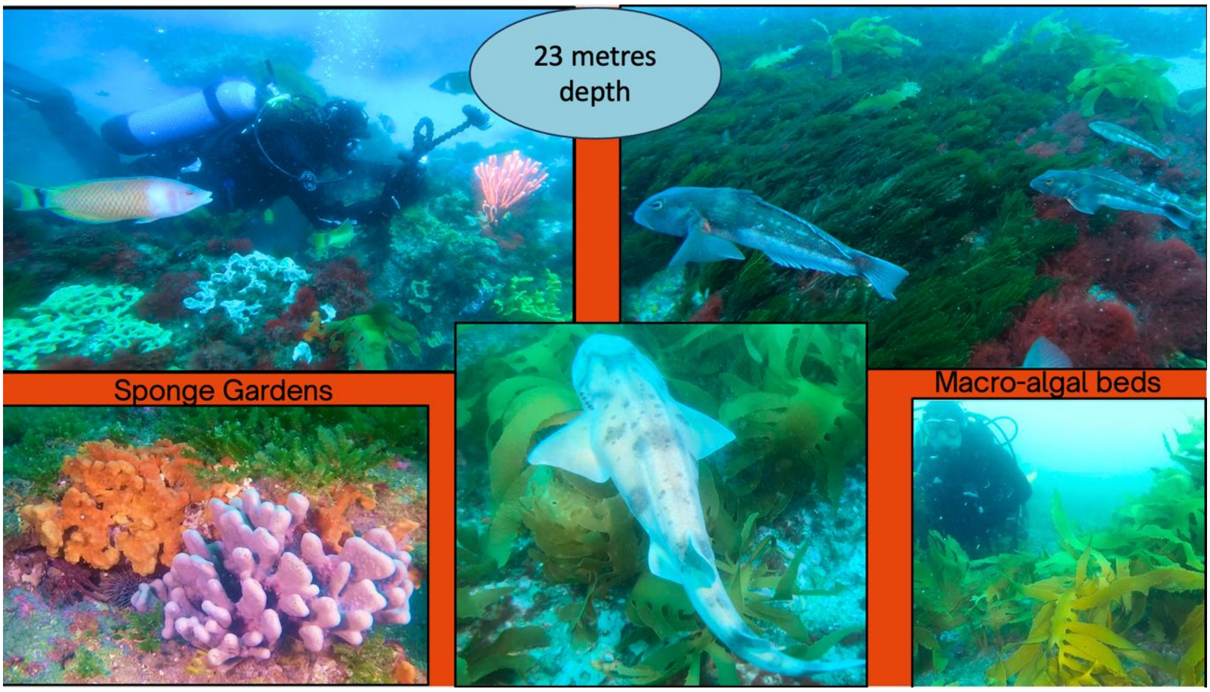
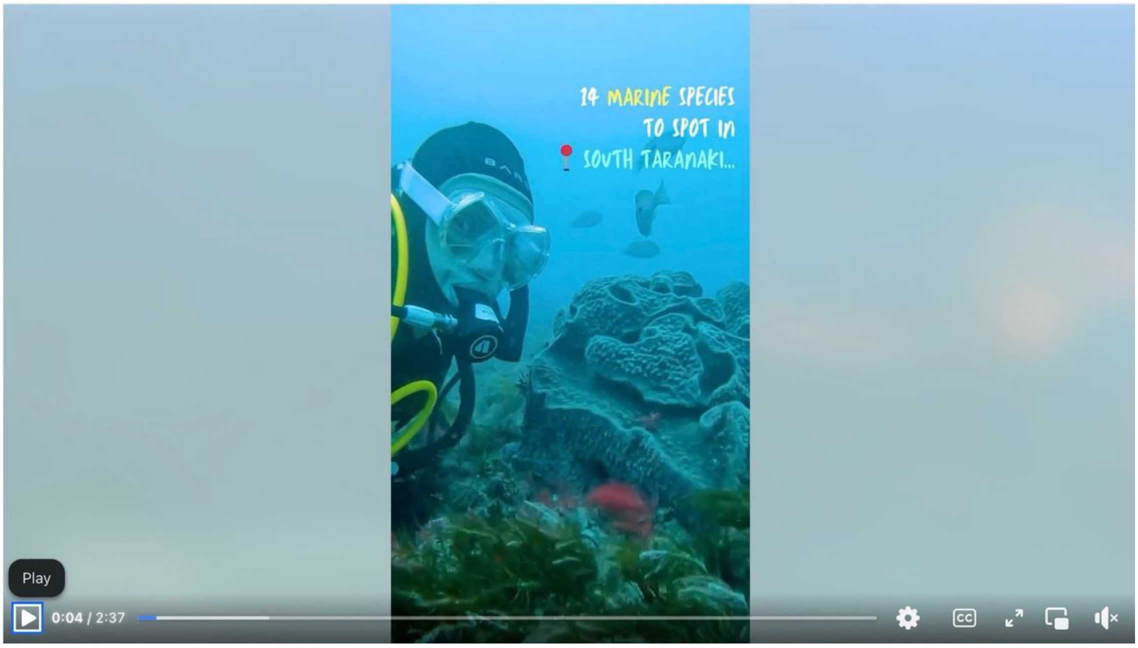


Figure 3-4: continued. Biogenic habitat class examples: 10) *Carpophyllum maschalocarpum*; 11) *Caulerpa geminata*; 12) *Caulerpa flexilis*; 13) *Ecklonia* single plants; 14) *Ecklonia* patch; 15) *Ecklonia* forest; 16) soft bryozoans; 17) Small anemone patch (*Anthothoe albocincta*); 18) calcified bryozoans. See Table 5 for habitat descriptions.

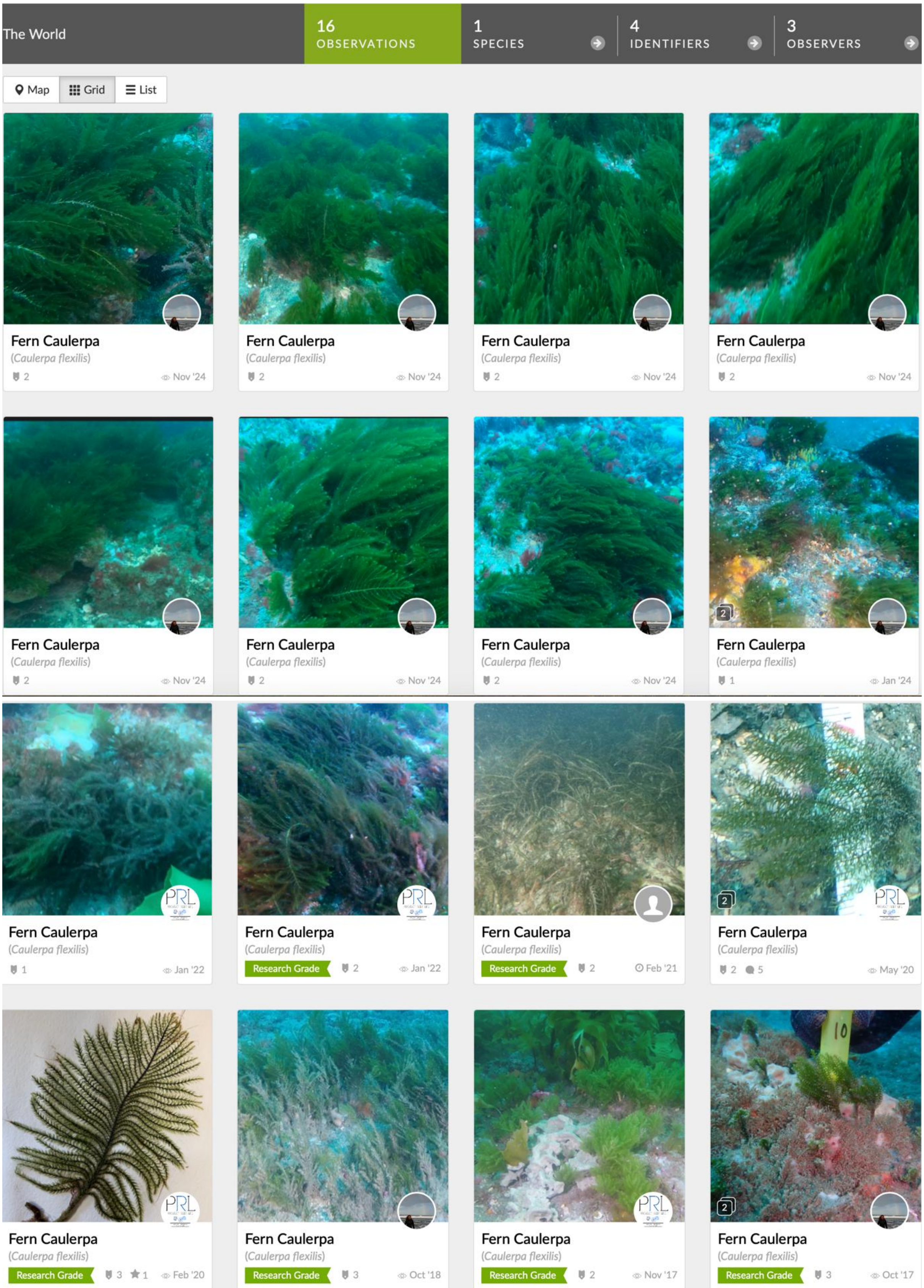
6. Project Reef has added to I-naturalist a number of photos of *Caulerpa flexilis* and *Ecklonia radiata*. We also note that sponge gardens and macroalgal beds are regarded as 'sensitive habitats'.





7. Per Minute 14, In response to providing information on habitats and species Pg. 84 of STUC comments included a link to this Facebook post Link to FB video

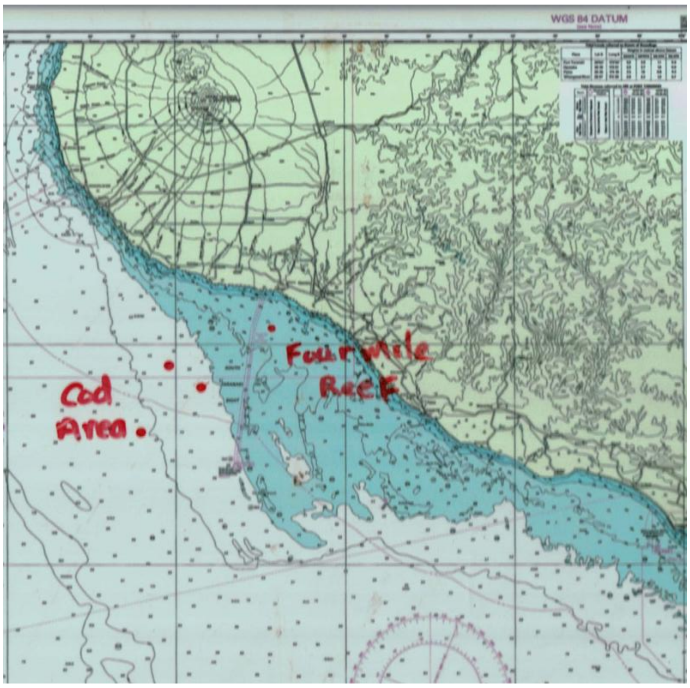
8. Project Reef has added Caulerpa flexilis observations into I-naturalist.



2005 footage (S. Hornby) provided to "Project Reef" - taken at Four-mile Reef shows dense beds of *Caulerpa flexilis*

Below: map of Four-mile reef from Ohawe boat club submission.



Local divers describe this reef:

"Close to 1NM in length" "we have over 40 dive sites"

"**fields of eel weed and chalk kelp**" "**masses of sponges**" "many different nudibranch"

"The islands " loads of individual shell rock formations **2- 3M high filled with holes and swim throughs and crevices** rising from the sandy floor

"Linda" is a mass of over-hanging rocks dropping into shell rock ledges **covered in thick layers of chalk kelp** that you need to push through that hide fish and crayfish, “The Cave “ 3 large holes with over hangs above and dropping 4 meters to the sea floor on a near sheer face, maybe 3 meters deep **but always have crayfish large and small present**, knowing they have clean areas to stay and breed”,

The Plates “ which are 20 shell rock ledges like a large pancake stack that has been pushed over, with **deep crevices that hold crayfish, and many juvenile fish.**

“Mark Oz” is similar with long thin ledges that lead into small caves, that w**e always find eels sitting near where the crayfish hide out** during the day”

“Boulders” is a collection of large rocks, sitting in a pile **where we can see fish and crayfish deep in the gaps** often just out of reach that provide safe locations to hide and stay .

“One of the very special observations when diving this **structure is the lack of tidal effect so the water is generally clean and we can dive most times of the day”.**

https://www.fasttrack.govt.nz/__data/assets/pdf_file/0009/13221/Ohawe-Boat-and-Angling-Club-comments.pdf

9. Morrison at el. has a few photographs of the Project Reef, showing the variety of algae.

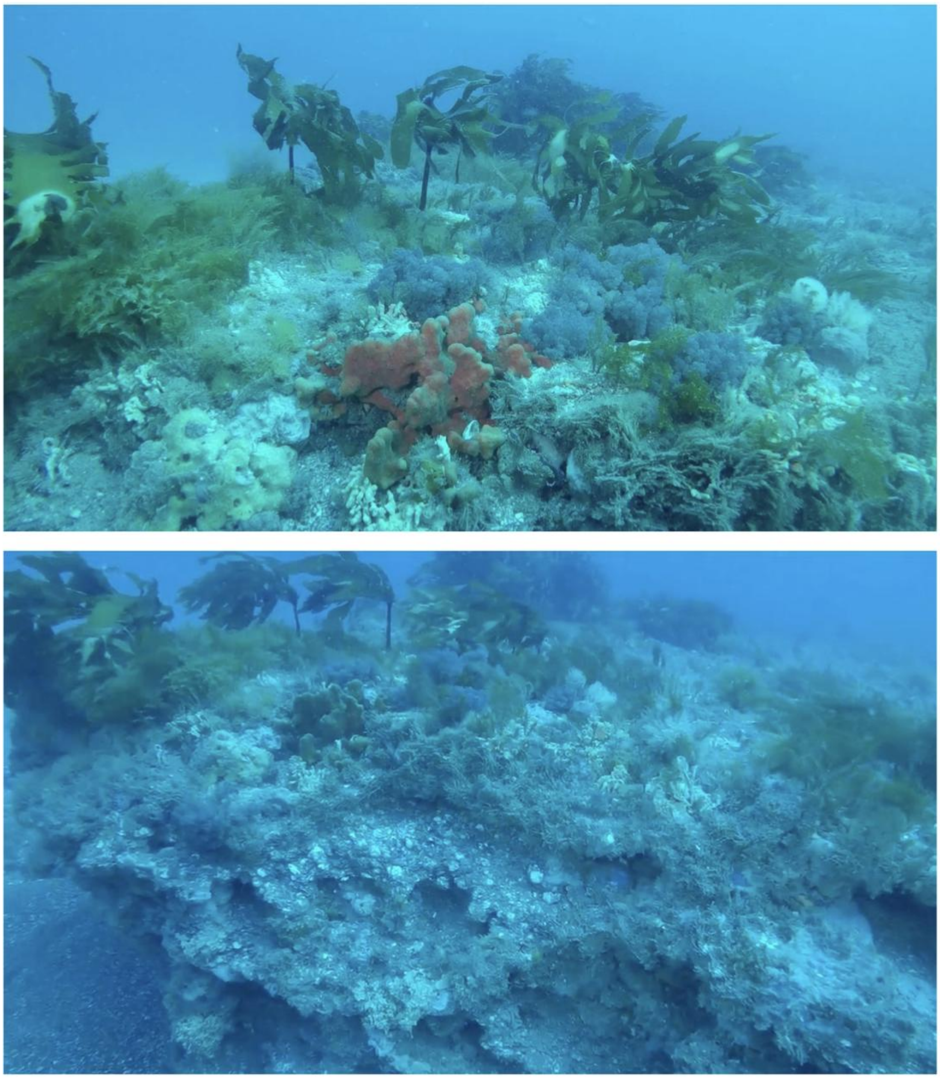
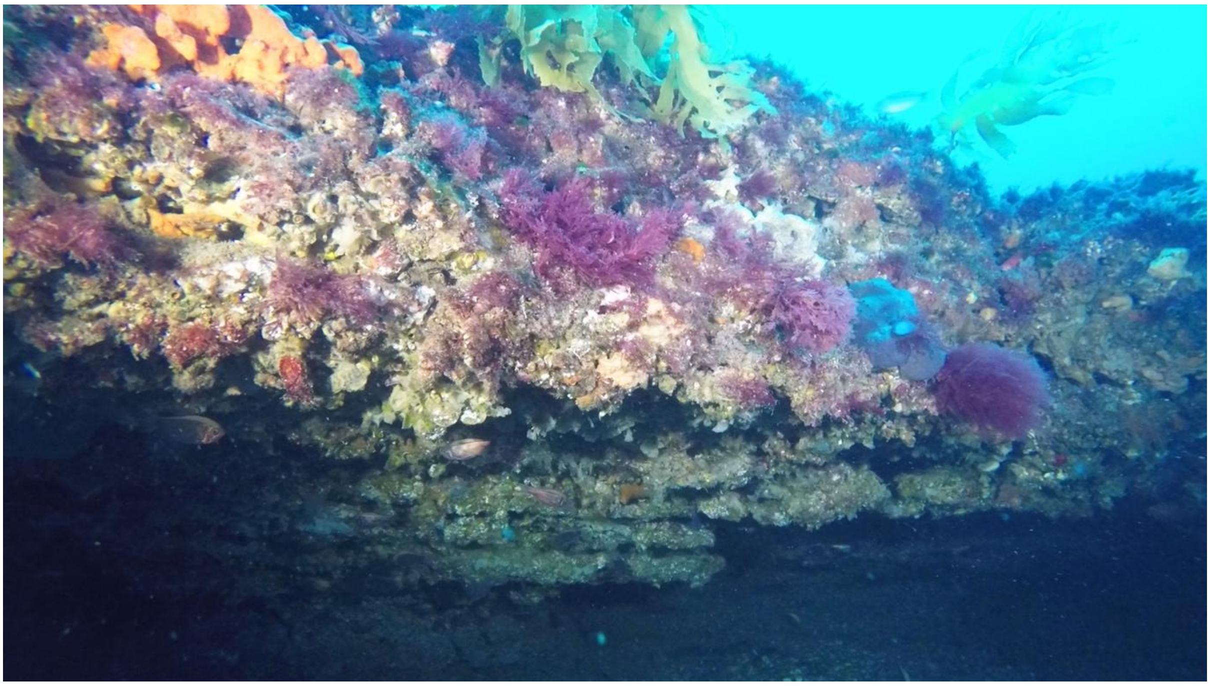


Figure 3-8: Project Reef imagery of the reef Top image), top raised edge of reef terrace with *Ecklonia* patches, soft bryozoans, *C. flexilis*, and various sponge species. Bottom image), the same reef , but taken about 3 metres further back, showing the terrace drop to soft sediment. The reef is formed from rock with a high fossil content, probably limestone.

58 Offshore subtidal rocky reef habitats on Pātea Bank, South Taranaki

10. Photograph showing the top and bottom area of the reef. Note: the blue area is where we are not shining our lights – red light is lost at 4m.



11. Reef shelf, showing the density of coverage on top, and the layering of the substrate

12. While there are kina, they are kept in balance by crayfish and snapper – there are no kina barrens on the offshore reefs.

13. We see lots of butterfly perch at the Project Reef

FAUNA - FISH

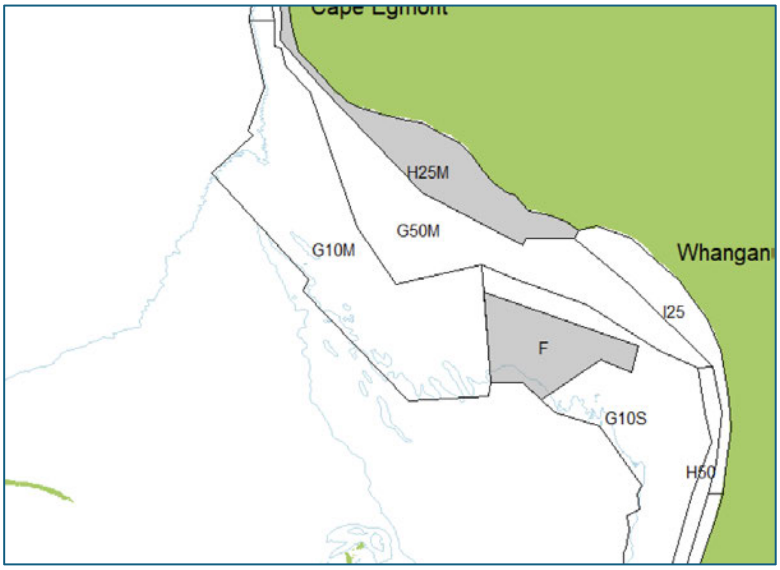
As a Club and running 'Project Reef' we keep abreast of what is happening within the wider commercial fishing areas – keeping in mind that the shallow shelf offshore of South Taranaki might be providing a suitable habitat for sustaining juvenile fish populations.

A recent **Fisheries NZ 2024** report, provides information that corroborates some of the findings of Project Reef, or at least also gives some context to our understanding of the ecosystem. "**Inshore trawl survey off the west coast North Island, October 2022 (KAH2205)".**

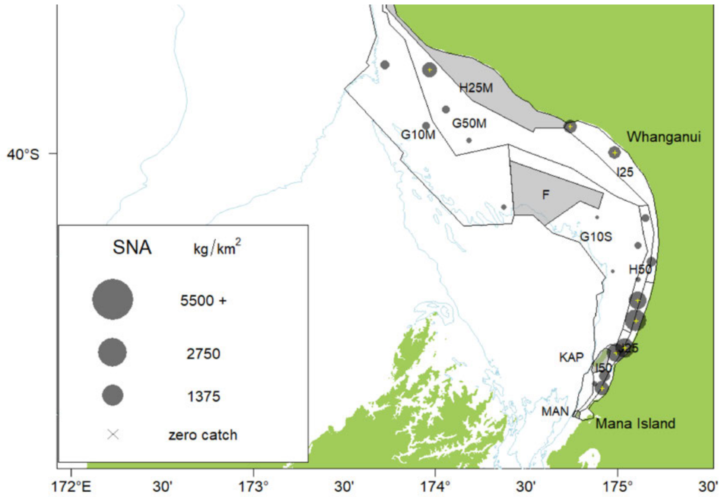
https://www.mpi.govt.nz/dmsdocument/61702/direct

(and put into Dropbox https://www.dropbox.com/scl/fi/f58hmmapzb029tyzgbn4g/2024-April-MPI-report-Inshore-Trawl-Survey-West-Coast-North-Island-October-2022-KAH2205-4446.pdf?rlkey=k4o9qwhosehbu9dsz2cetkckw&st=2kqsg9nu&dl=0

G50M included some of the area of shallow shelf offshore of Pātea and Ōhawe.

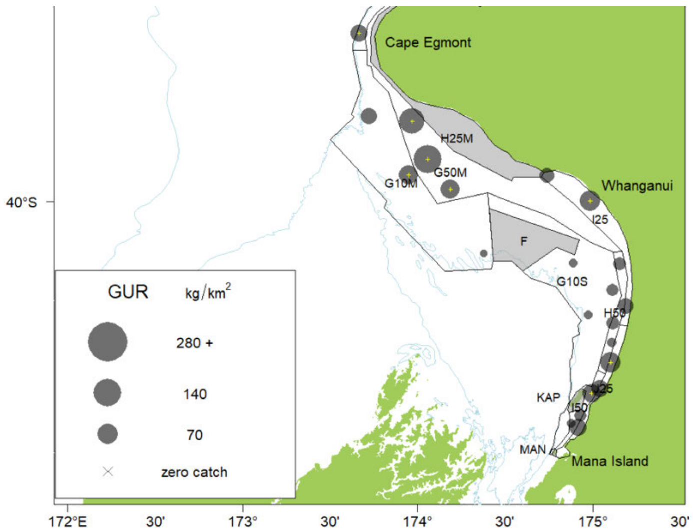


G50M Area (km2) = 462, and depths 25m-50m



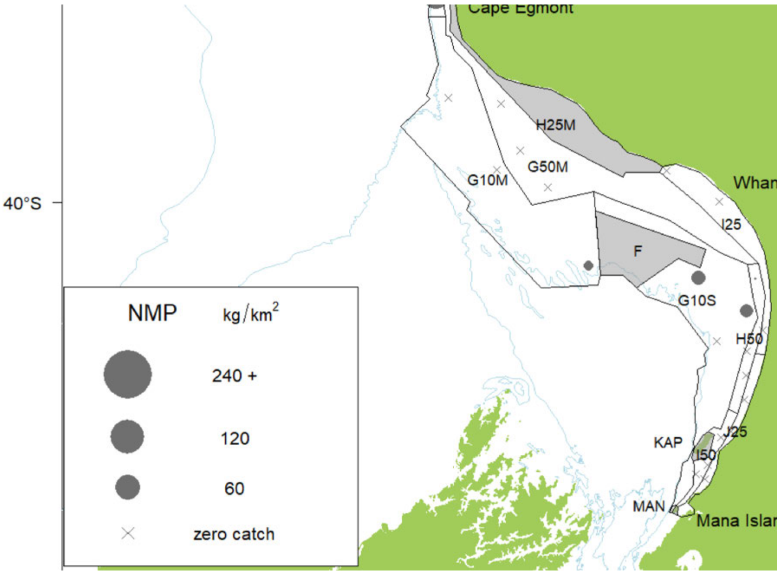
SNAPPER

The 2022 snapper biomass estimate was much reduced compared with the 2020 survey, but had an upper bound estimate close to that of the 2019 survey estimate **Snapper** was the most abundant species, making up 43% of the total catch by weight (Appendix 6). And **was most common in depths less than 100 m.**



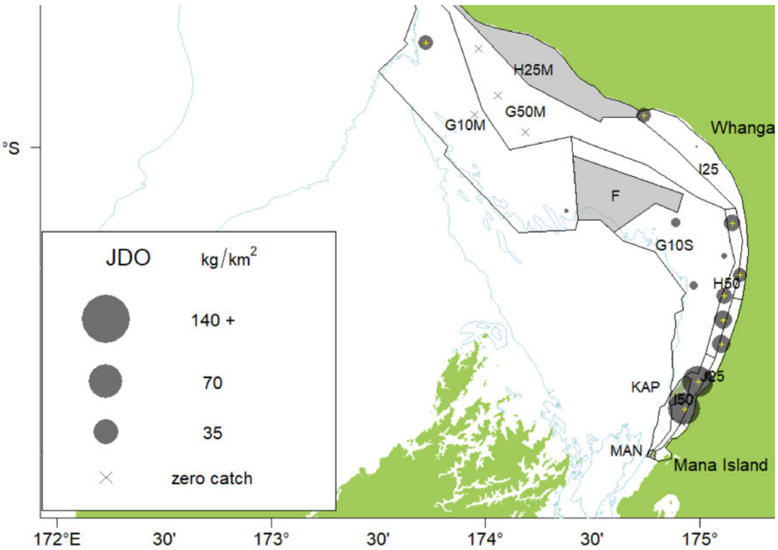
GURNARD

STUC members catch Gurnard on the sand areas.



TARAKIHI

At Project Reef we always see Tarakihi – both diving and captured in our insitu camera footage.



JOHN DORY

We rarely see this fish species.

TREVALLY

It is interesting to see the Fisheries NZ data, and also consider that we also see this fish species at the Project Reef.

It would be interesting also to consider whether the shallow shelf, filled with various reefs might be sustaining this healthy population.

The report states: “The large catches in the South Taranaki Bight produced a tenfold increase in biomass in this time series” pg.49

Trevally and Butterfly perch photographed (K Bone) at the Project Reef

3.7.6 Trevally

Trevally was the fourth most abundant species by weight in the catch, accounting for 6.7% of the total weight and caught in 64% of stations (Appendix 6). Found mainly in shallower stations less than 100 m depth, there was a maximum depth caught of 126 m. The highest catch rates were in G50 and G10M in the South Taranaki Bight, as well as in 50–100 m depths off Ninety Mile Beach (A50M) and the Kaipara Harbour (C50M) (Figure 30). Stratum-level catch rates are given in Appendix 10.

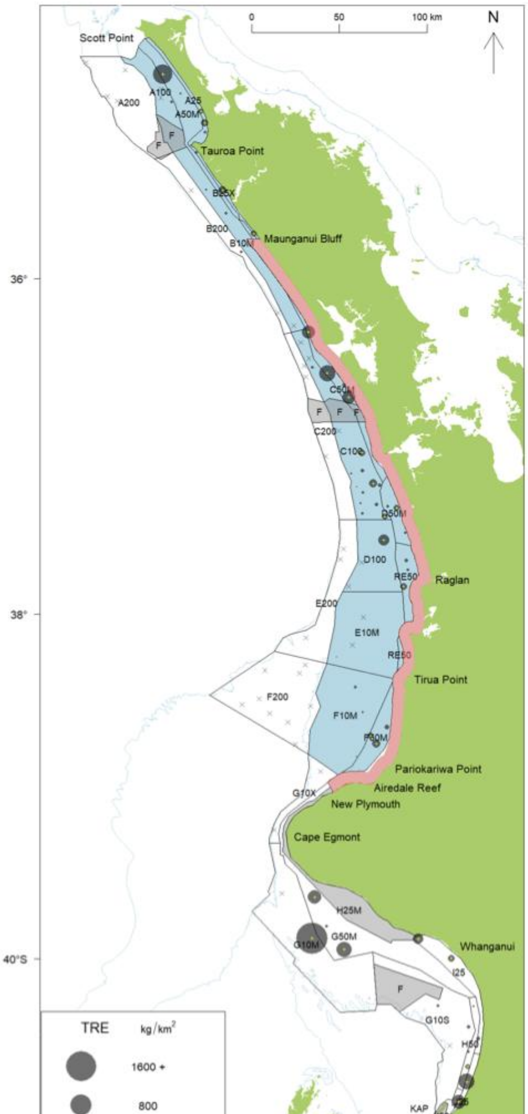
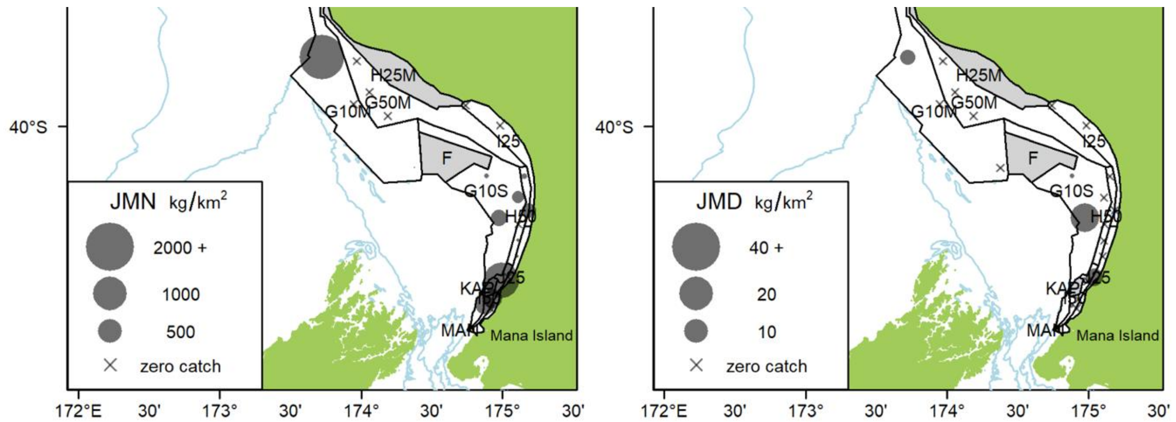
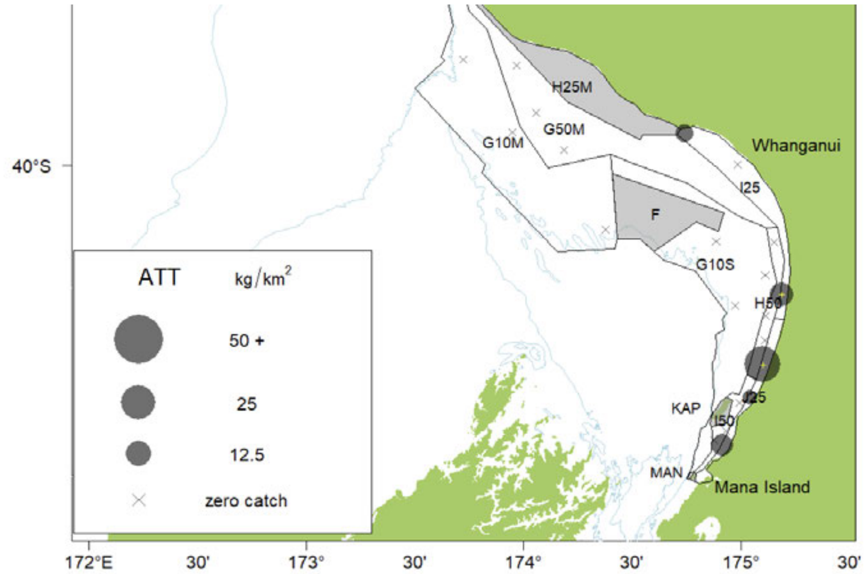


Figure 30: Spatial distribution of catch rates (kg km^{-2}) of trevally in the 2022 west coast North Island surveys, scaled to the largest catch. Core strata are shaded blue, foul and excluded areas shaded grey, and the Māui dolphin trawl exclusion zone is in orange. The depth contours indicate 100 and 200 m.

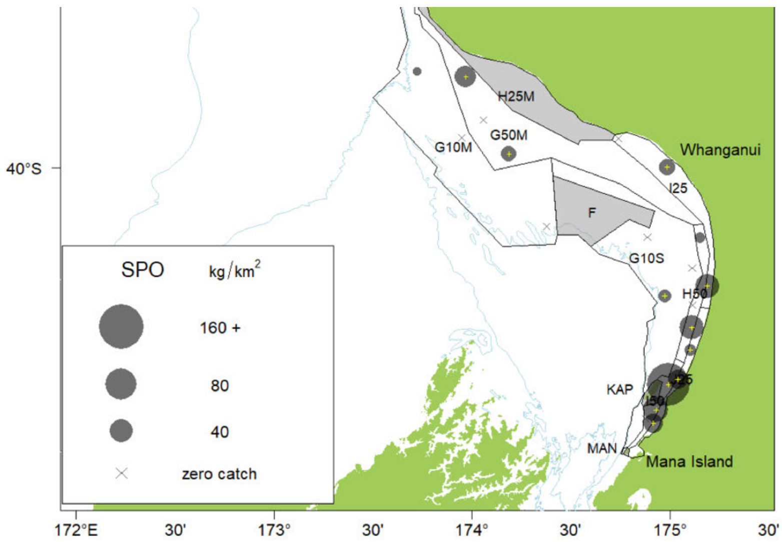


JACK MACKERELL (YELLOW TAIL AND GREENTAIL) pg.53

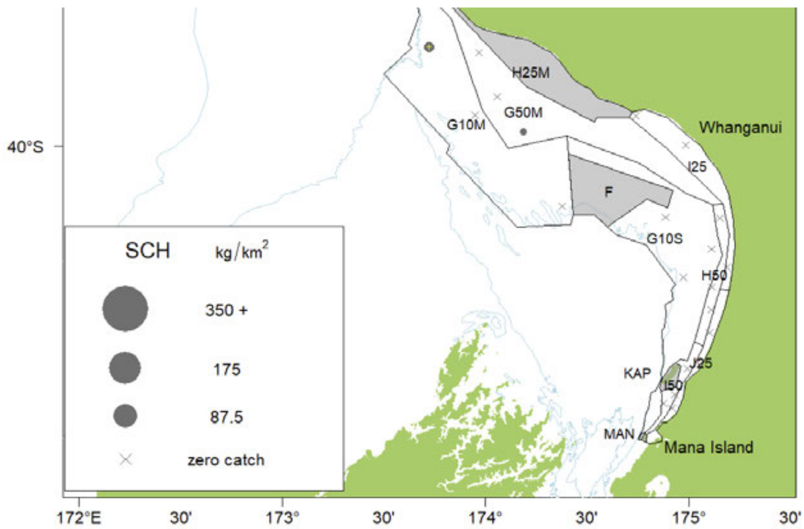


KAHAWHAI

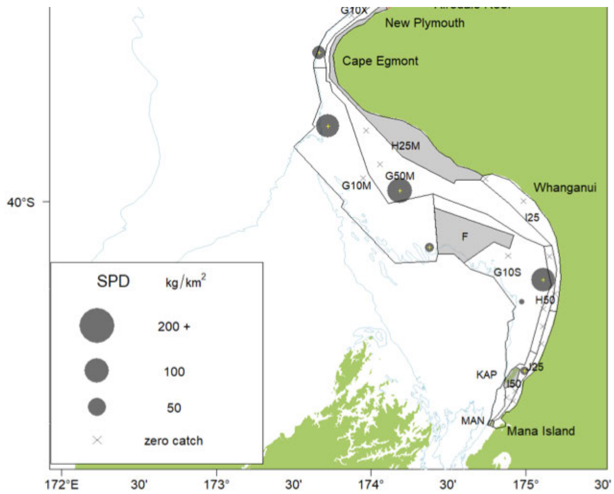
This fish species is regularly caught by fishing on the beach at Ōhawe. You can often see ‘boil ups’ of this fish, with the seagulls and Australasian Gannets coming in for a feed.



RIG



SCHOOL SHARK



SPINY DOGFISH

School shark relative biomass remains close to the series low in 2020, with only 32 individuals caught across the whole survey area.
The trend for **spiny dogfish** biomass was also a decline overall, with the 2022 northern estimate slightly increased compared with 2020, but the 2022 South Taranaki Bight biomass the lowest in that southern series**.**

It is interesting to consider the above comments from the report, **with some local knowledge.** After a community talk, a Pātea local described often seeing sharks. A request for more information led to these details via email:

> *4TH December 2024*
> *Hi Karen, Sharks off Pātea.*
> *Gray **School Shark very plentiful**, Spotted Dog Fish in close, Broad Nose Seven Gill Shark 2-3 m long, Thresher Shark, Carpet Shark small tan colour with plenty of spots on the back.*
> *Have seen large **White Sharks 3-4m long sunbathing in the summer out deep**.*
> *When we were out in **November we were catching good Snapper and sharks together**.*
> *Cheers David..*

Another example of Fisheries information, corroborating fish insights locally

1. We see leather-jackets often at the Project Reef, and the schools can be quite large at times.

2. The offshore fisheries in South Taranaki for Leatherjackets is a significant one

3. This report indicates that algae is an important recruitment habitat for leatherjackets.

https://www.doc.govt.nz/documents/science-and-technical/casn44.pdf

4. We observe leatherjackets feeding on the reef floor, nibbling at what is there.

5. Figure showing predicted catch of leatherjackets:

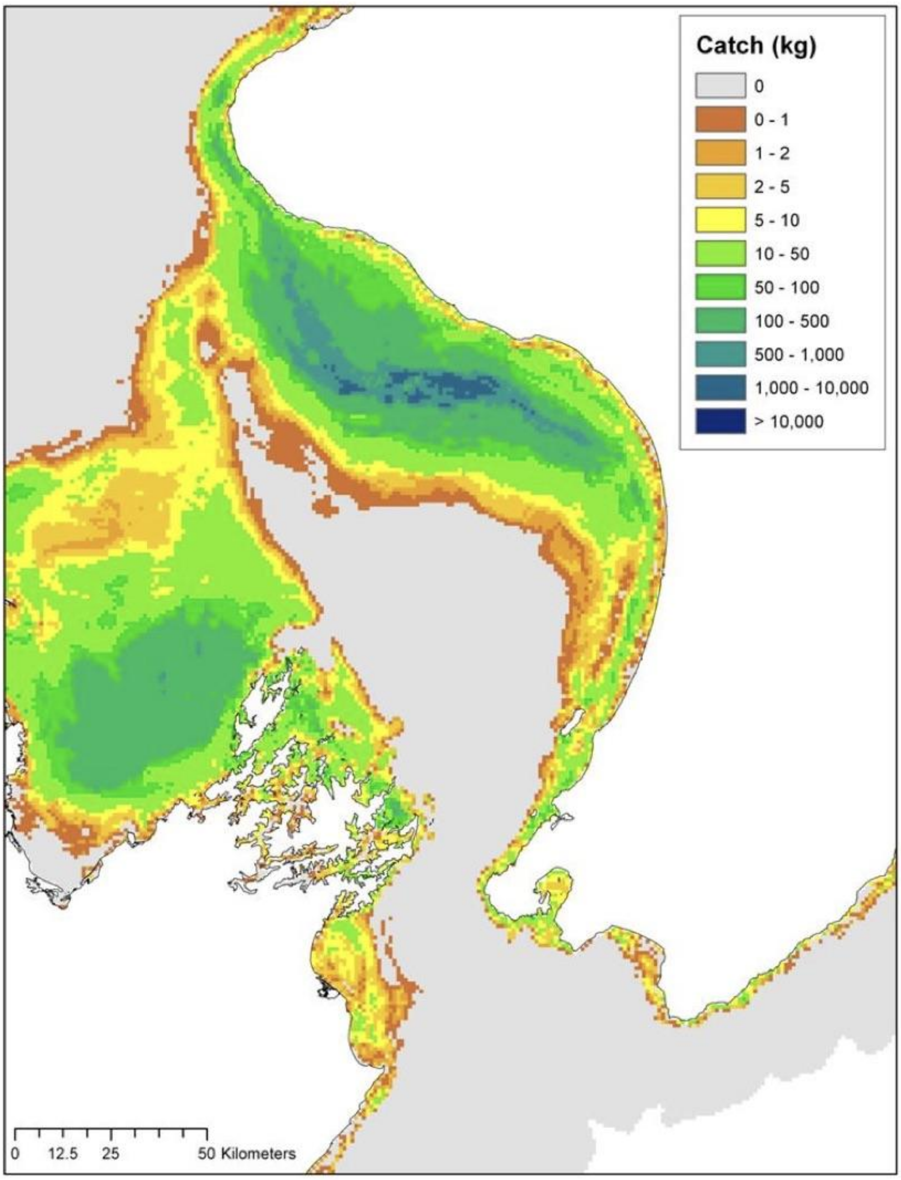


Figure 4-3: Predicted catch (kg) of leatherjacket (*Parika scaber*) in a demersal trawl in the South Taranaki Bight region.

https://www.epa.govt.nz/assets/FileAPI/proposal/EEZ000011/Applicants-proposal-documents-Application-documents/a58380541d/Report-10-NIWA-Fish-and-Fisheries-November-2016.pdf

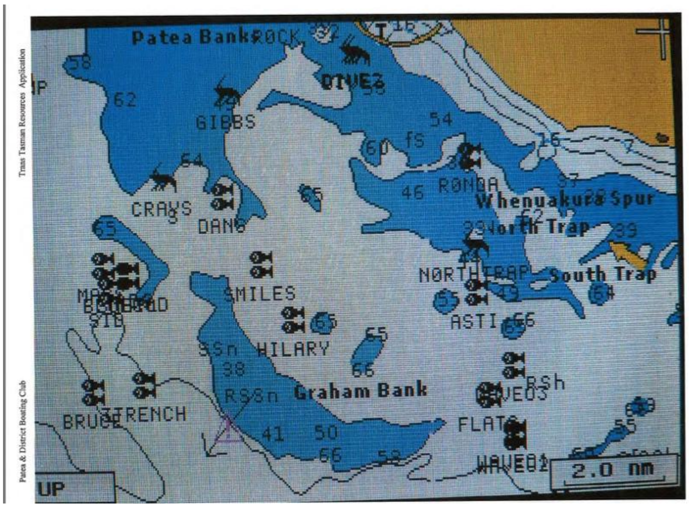
Morrison at el. captured some data on fish abundance and diversity as part of the drop-camera survey work. *"The **associated fish assemblages are abundant,** dominated by* *blue cod, scarlet wrasse, butterfly perch, leatherjackets and tarakihi, with other fisheries species likely to be common (e.g., snapper, trevally, kingfish, and kahawai).”*

Project Reef’s I-naturalist project, called ‘Coastblitz Patea’ has #36 fish species recorded with some #652 photographs loaded.
Link to I-naturalist FISH species.

FISH PLOTTERS

Information shared in the past EPA Hearings have included boat sounder information.

The example below shows how widely fished the shallow shelf its. This is a past STUC Club members details that were shared as part of the Patea Boat Club submission.



MPI survey points:

Below, an internal discussion document shared by Dr Morrison with STUC members when discussing the points where Drop Camera survey work would happen.

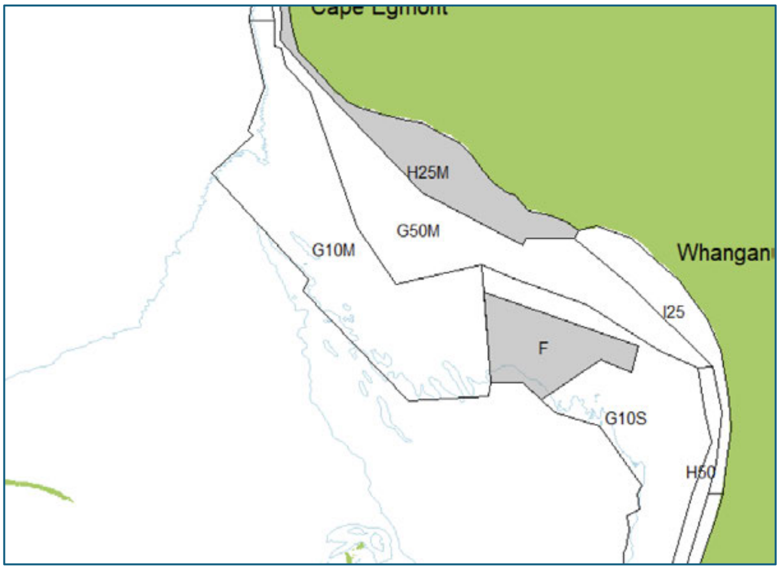
As part of the survey work, species other than fish are gathered – which are sent for identification.
Project Reef is working to see what might have been uploaded to public databases, as a means of growing local knowledge.

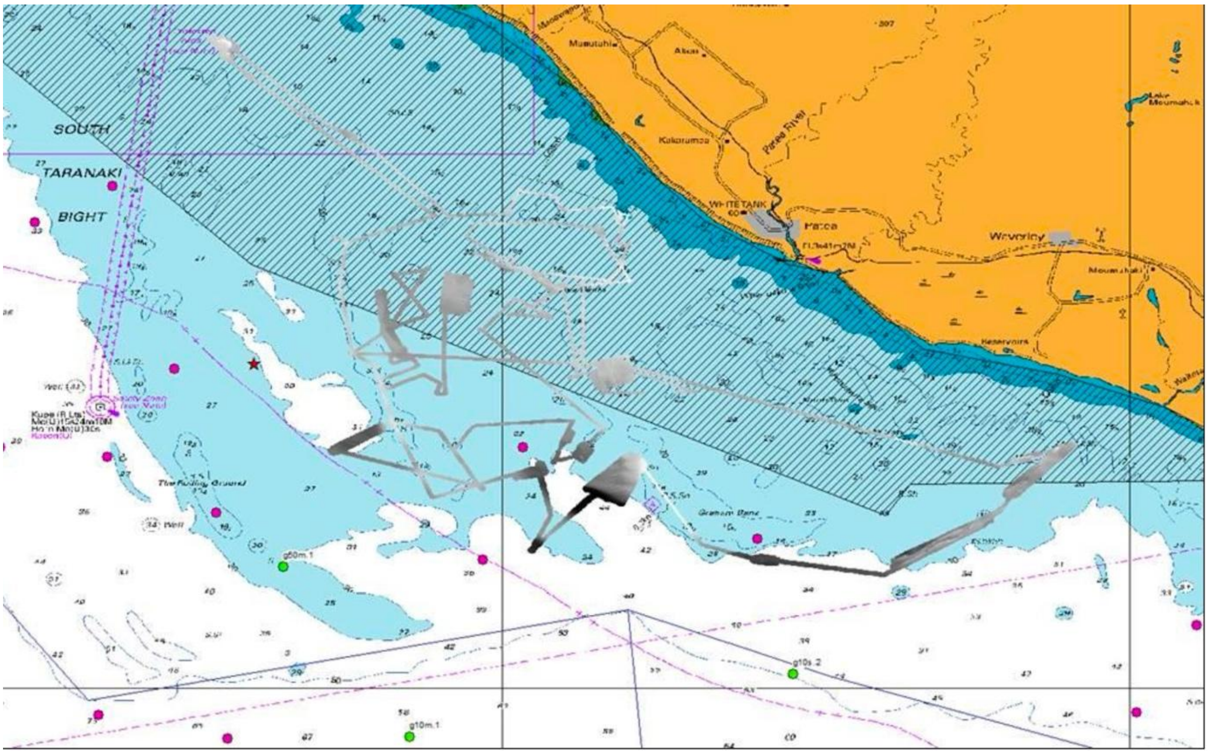
During recent surveys, a number of tows in the deeper strata (> 50 m) in this region have contained **large catches of sponge indicating the presence of sponge-dominated communities** that were not able to be detected on the vessel's sonar, i.e., flat ground that appeared trawlable.

Under FAO Guidelines, such habitats are **considered vulnerable ecosystem components** in need of protection (FAO2008).

As part of the 2022 survey design (Specific Objective 1), **a review of spatial information on sponge bycatch was undertaken for the South Taranaki Bight**, making use of **Fisher-drawn habitat layer from interviews of retired fishers from Jones et al. (2016);**

Some locations of **elevated invertebrate diversity are apparent in G50 and G10M,** some overlapping with areas described by fishers as sponge and a large area of "sponge weed". "Sponge weed" is believed to potentially refer to the previous extent of soft catenicellid bryozoan fields in this area (Jones et al. 2016).




SOUTH
TARANAKI
BIGHT
WHITETANK
Reservoirs
g50m.1
g10s.2
g10m.1

Morrison at el. fish traps:

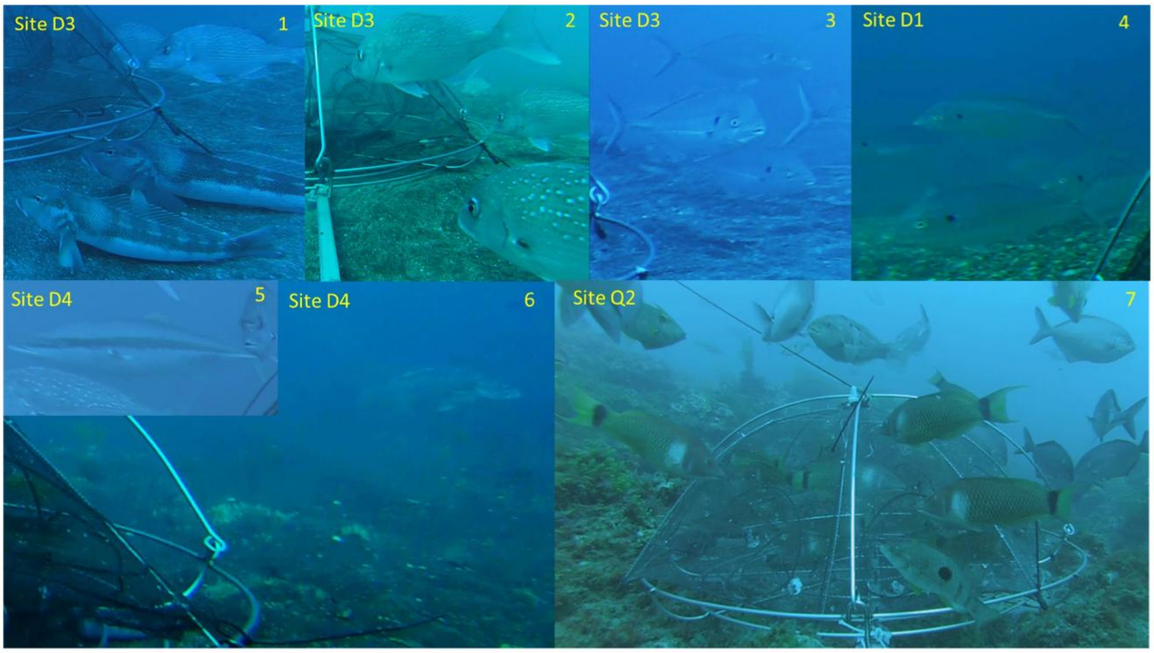
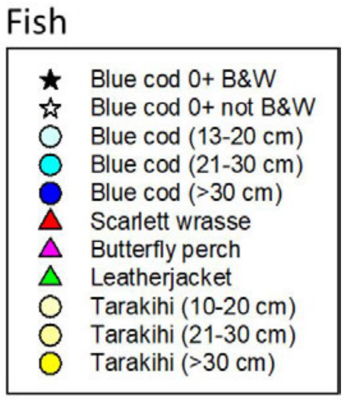


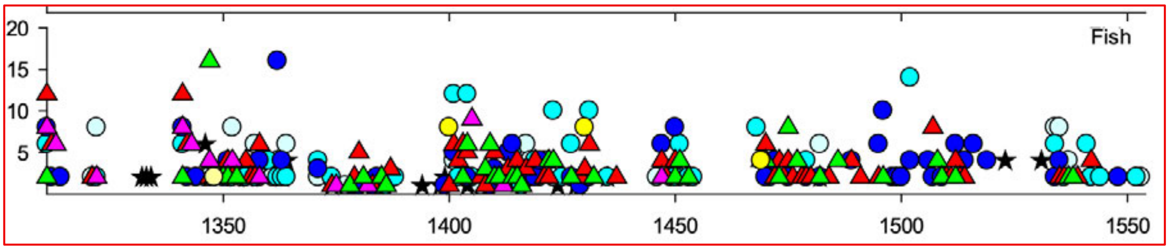
Figure 3-7: Fish species seen in baited fish trap video: 1) snapper and blue cod; 2) snapper; 3–4) trevally (part of wider dispersed schools of 10–20+ individuals); 5) kingfish (~70 cm), 6) blue moki (~60 cm); 7) scarlet wrasse, spotties, sweep, leatherjacket, and blue cod (in trap). Other species seen but not shown here are barracouta, short-tailed stingray, red mullet, porcupine fish, tarakihi, blue moki, and crayfish. Some imagery has been darkened to reduce 'washout' of fish against light background.

Offshore subtidal rocky reef habitats on Pātea Bank, South Taranaki 55

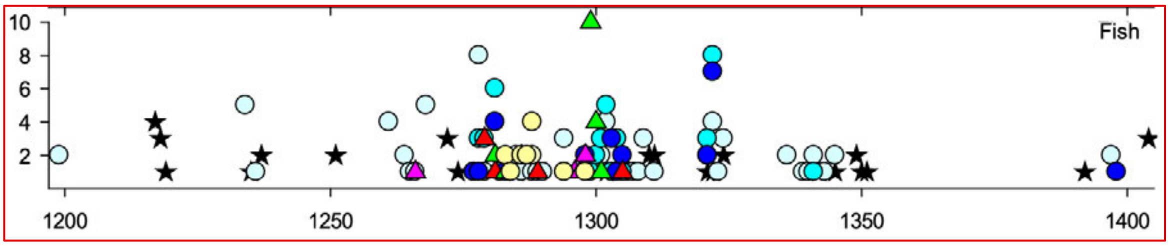


Two separate blocks are shown, and a reef in each one – due to the fact they have been regarded as ESA, ecologically sensitive areas, in past EPA Hearings and in the Supreme Court.

Block 4: Reef K "Project Reef"



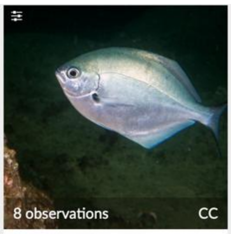
Block 2: Reef D "The Crack"



Other than the Drop-camera work of Morrison, and Project Reef's studies – there has been no other insitu South Taranaki reef fish survey work.
Pages 92 & 93 of our comments highlight TTRL representation of reef fish – which we think has important context that a reader needs to be wary of.

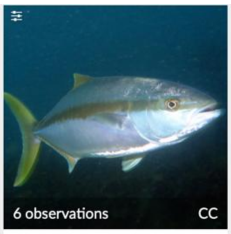
Project Reef records all fish species in I-naturalist:

Southern Conger
(*Conger verreauxi*)

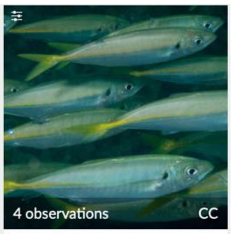


Silver Sweep
(*Scorpis lineolata*)

Bearded Rock Cod
(*Pseudophycis barbata*)



Yellowtail Kingfish
(*Seriola lalandi*)

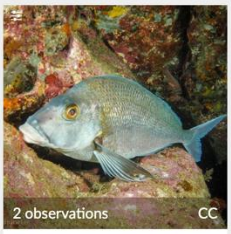


Jack Mackerels
(Genus *Trachurus*)

Giant Boarfish
(*Paristiopterus labiosus*)

Deepwater Burrfish
(*Allomycterus pilatus*)

John Dory
(*Zeus faber*)



Grey Morwong
(*Nemadactylus douglasii*)

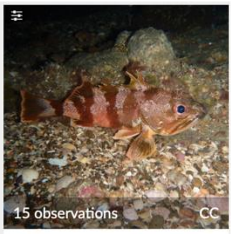
Green-boned Butterfish
(*Odax pullus*)

Magpie Perch
(*Pseudogoniistius nigripes*)

Yellow-and-black Triplefin
(*Forsterygion flavonigrum*)

Goatfish
(*Upeneichthys porosus*)

Oblique-swimming Triplefin
(*Forsterygion maryannae*)



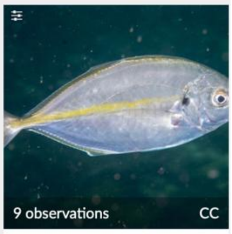
Sea Perch
(*Helicolenus percoides*)

Spectacled Triplefin
(*Ruanoho whero*)

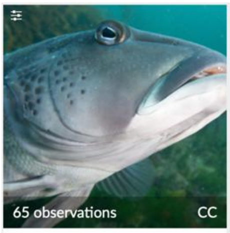
Slender Roughy
(*Optivus elongatus*)

Banded Morwong
(*Chirodactylus spectabilis*)

Spotty
(*Notolabrus celidotus*)



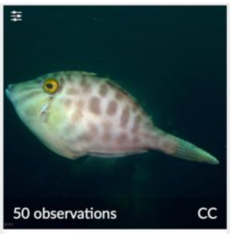
Silver Trevally
(*Pseudocaranx georgianus*)



New Zealand Blue Cod
(*Parapercis colias*)

Scarlet Wrasse
(*Pseudolabrus miles*)

Banded Triplefin
(*Forsterygion malcolmi*)

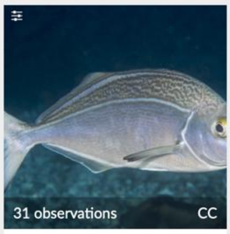


Velvet Leatherjacket
(*Meuschenia scabra*)

Tarakihi
(*Nemadactylus macropterus*)

Blue Moki
(*Latridopsis ciliaris*)

Red Perch
(*Caesioperca lepidoptera*)

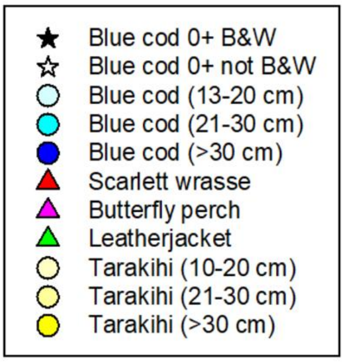


Bastard Trumpeter
(*Latridopsis forsteri*)

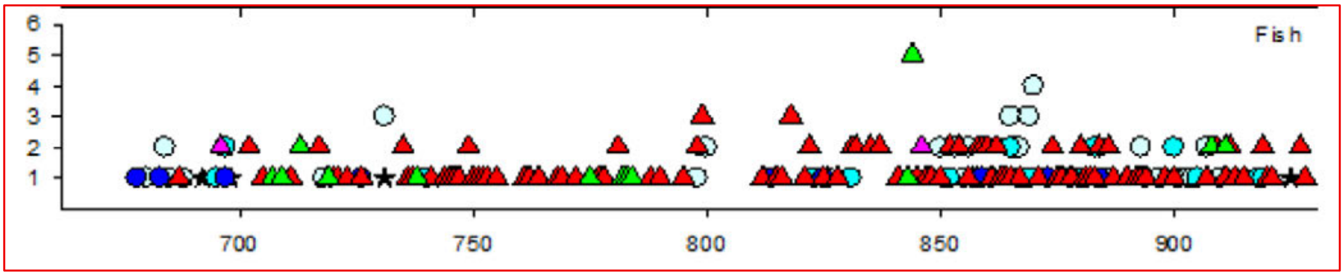
Australasian Snapper
(*Chrysophrys auratus*)

Common Roughy
(*Paratrachichthys trailli*)

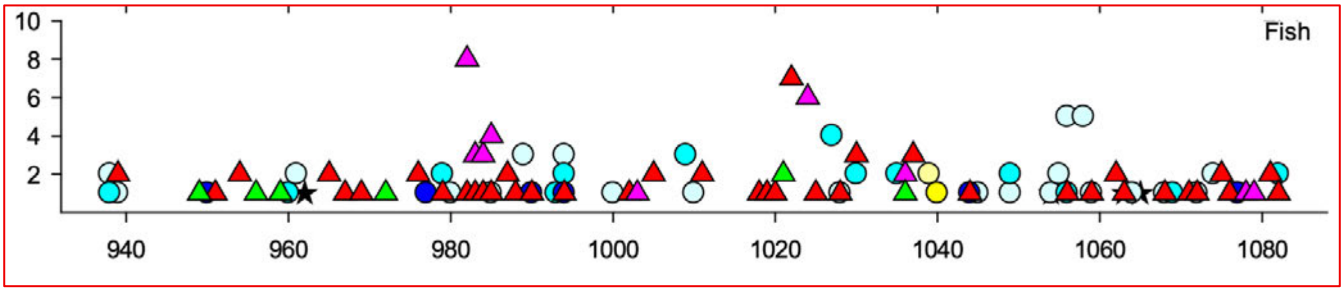
Fish

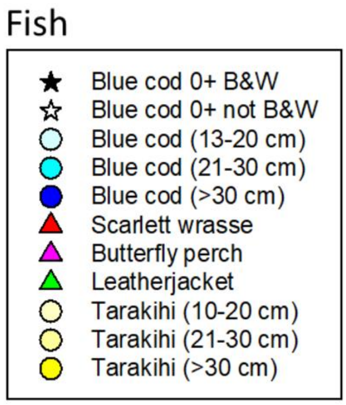


Block 1: Reef A

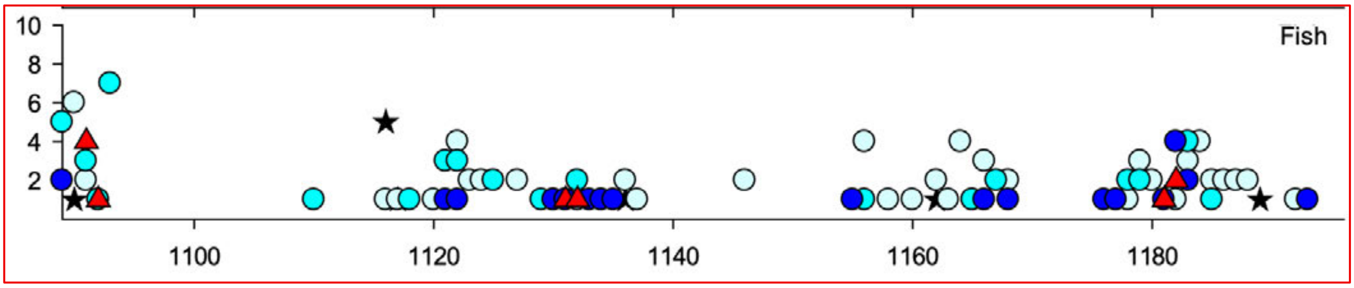


Block 1: Reef B





Block 2: Papa reef



Blue cod dominated this reef (as shown by the various colours of blue circles) and this finding was corroborated by an earlier dive by the Project Reef team. Divers noted the number of younger blue cod at the reef, and the unusual holes in the Papa reef structure – which Morrison at el. suggests (pg.77) could be piddock molluscs. *“The numerous burrows and holes evident in the rock* ***suggest a richer reef infauna****, probably including rock boring bivalves such as piddocks (Family Pholadidae)”*

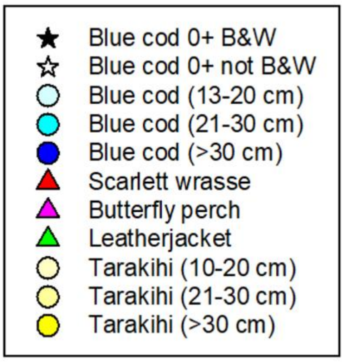
‘Snip’ off footage taken at the Papa Reef February 2021 by Project Reef divers – footage shared with Dr Morrison. . .which led to the Drop camera survey work subsequently being done here.

Kingfish passed by the Papa Reef during our February 2021 dive.

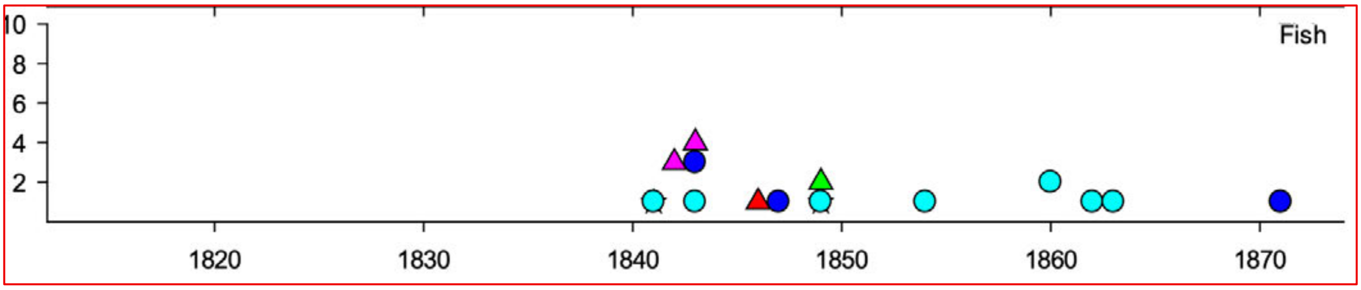
Another point of interest, was a cluster of green-lipped mussels found not far away from the reef. We don’t usually dive away from a reef on the sandy substrates surrounding reefs – this being the one exception.


Project Reef dive, February 2021

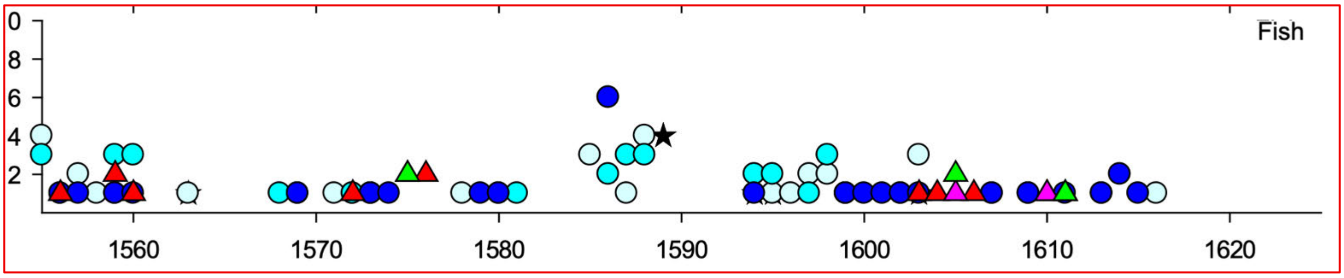
Fish



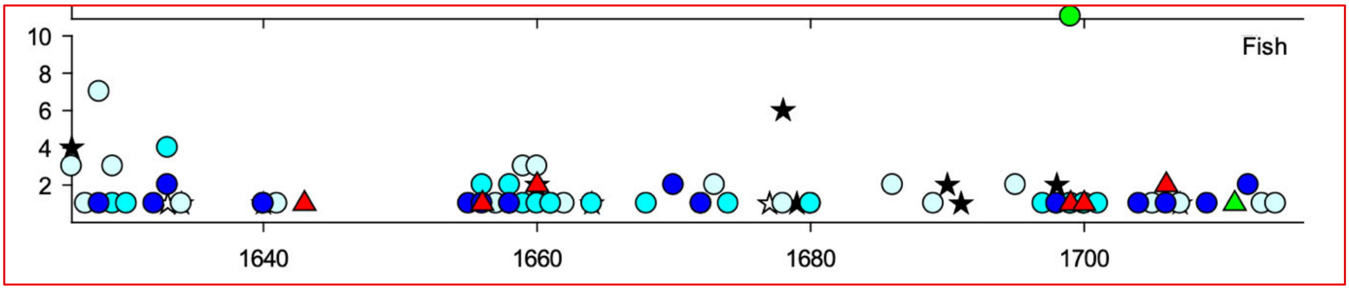
Block 3: Reef J (the only reef surveyed in Block 3)



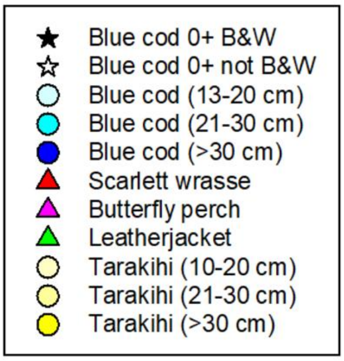
Block 4: (reefs K, L, O) Reef L



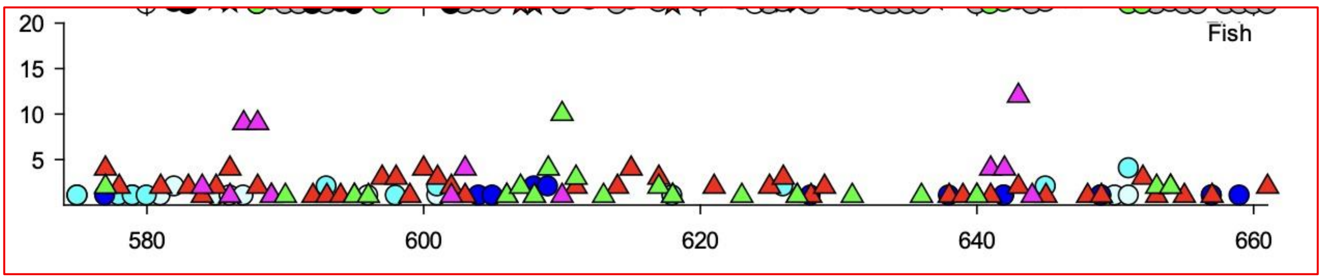
Block 4: (reefs K, L, O) Reef O (pg.110)



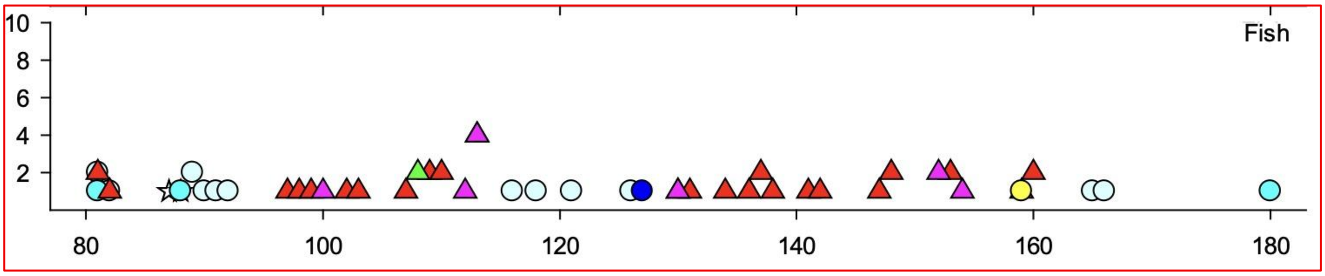
Fish



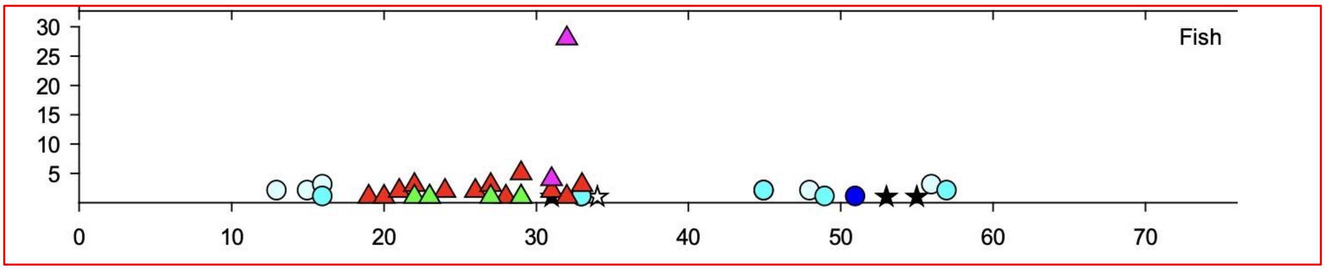
Reef Q



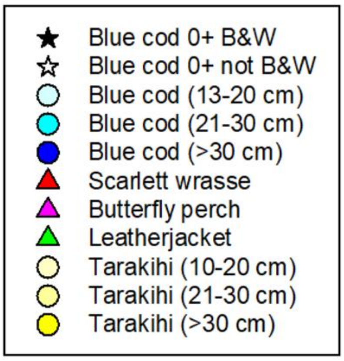
Reef S



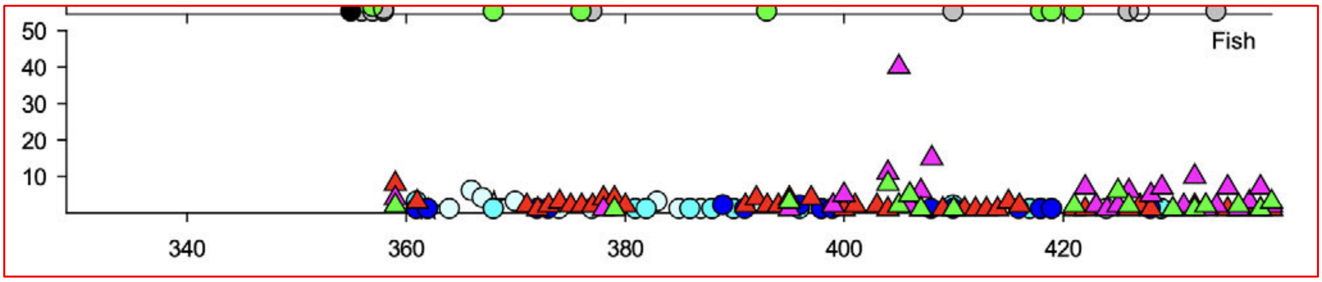
Reef T



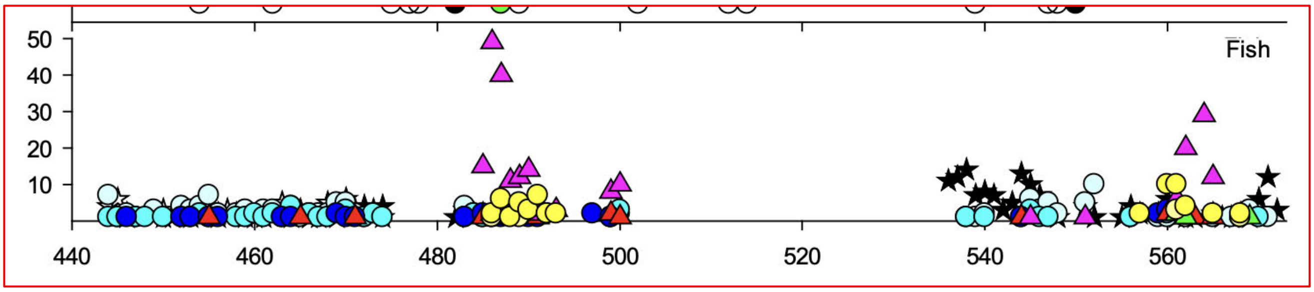
Fish



Reef U



Reef V

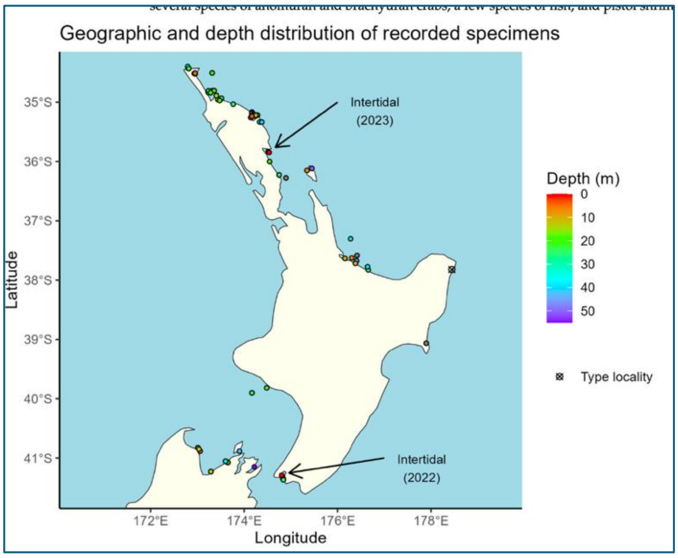


Lancelet

Lancelets (Chordata: Cephalochordata) are filter feeders that burrow into loose sediments. For this reason, **most species need specific sediment profiles and are only found in clean gravel or (coarse) sand**. The New Zealand lancelet *Epigonichthys hectori* (Benham, 1901), in Māori called "puhi", is rarely observed and is the only known cephalochordate species of New Zealand.

The specific habitat requirements are thought to make the **species susceptible to (human-induced) siltation events**

The species appears to be **a rare endemic** that is only recorded from a few coastal areas of the Northern Island – see map on page 2 of the report and shown below:



[Vlaams Instituut voor de Zee](https://www.vliz.be)
https://www.vliz.be › imisdocs › publications
by W de Gier · 2023

NIWA's benthic survey work identified this fish also:

3.3.3.8 Fish and Lancelet species

Fish were not well sampled in core samples, as would be expected, with only three fish captured: 2 tommy fish (*Limnichthys rendahli*) and one opalfish (*H. monopterygius*) (Appendix K2). However, 12 lancelets or puhi, *Epigonichthys hectori* (only species found in New Zealand), were collected from 9 inner shelf sites (Figure 54 and Appendix K2). Lancelets are small (≤ 2 cm TL) transparent fish-like marine chordates that live partially buried in sandy burrows in well irrigated sediments in ~ 30-50 m water depths. They are filter-feeders that use whiskery growths around their mouths to trap food.

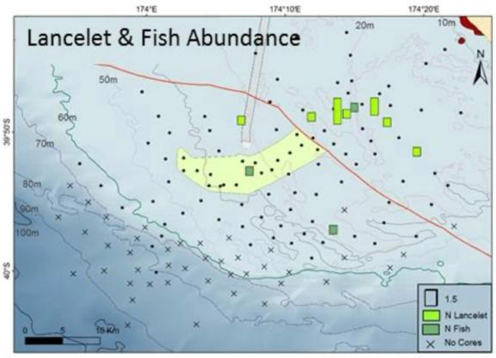


Figure 54: Spatial distribution of lancelet/fish per site for the top vertical section of sediment (0-5 cm, p/664 cm²). Bright green bars represent the mean number of individual lancelet collected, while dark green bars represent the mean number of individual fish collected. Scale bar is provided in the legend of the graph.

3.5.2 In-situ camera

Thirty-two species of fish were recorded in eight deployments of a fixed in-situ video camera were made, with the footage partially reviewed by the Project Reef team (Table 12). Seven of these species were not seen by any of the other sampling methods. These were southern bastard cod (*Pseudophycis barbata*), giant boarfish (*Paristiopterus labiosus*) (Figure 3-9), rock cod (a *Lotella* sp.), lantern fish (Family Myctophidae), slender roughy (*Optivus elongatus*), frostfish (*Lepidopus caudatus*), and piper (*Hyporhamphus ihi*). Other non-fish species recorded were shrimps, crayfish, octopus, a crab, a nudibranch, a sea cucumber, and a New Zealand fur seal (*Arctocephalus forsteri*). There was no obvious relationship between species richness and season (Table 12).

Across the four seasons (over four years), snapper were consistently present across all 8 deployments (two of which were in winter 2020). Blue moki, leatherjackets, scarlet wrasse and southern bastard cod were seen in 7 out of 8 deployments 8% (88%). Leatherjackets were seen in 73% of deployments; giant boarfish, butterfly perch, carpet sharks, common roughy, and oblique triplefins in 63% of deployments; and kingfish and trevally in 50% of deployments. Blue cod were only seen in 38% of deployments. Whether the fish seen were resident on the reef, or more transient seasonal or haphazard visitors, is unknown (though small-bodied species such as triplefins are likely to be resident at a fine scale).

Table 12: Species presence by season, from the Project Reef in-situ camera Number of 20-second video clips reviewed was 3,145. Fish species not seen by any of other methods marked with *.

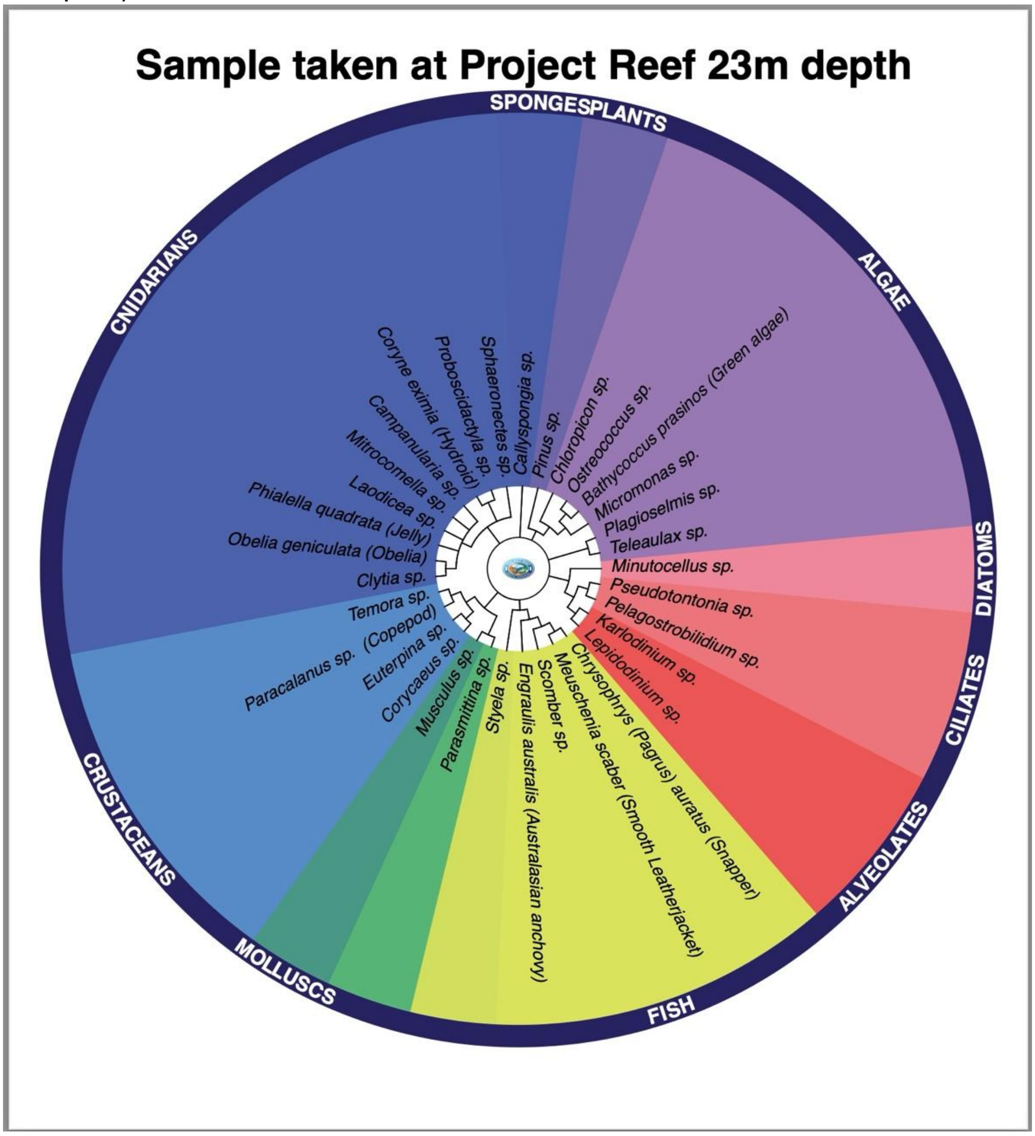
	Month	Nov	Jan	Jan	Feb	Feb	Mar	June	July
	Year	17	20	18	19	20	17	20	20
	Season	Spr	Spr	Sum	Sum	Sum	Aut	Win	Win
	Fish species richness	15	16	8	20	11	11	17	21
% time	Species								
100%	Snapper	1	1	1	1	1	1	1	1
88%	Blue moki	1	1	1	1		1	1	1
	Leatherjackets	1	1	1	1	1	1		1
	Scarlet wrasse	1	1	1		1	1	1	1
	Southern bastard cod	1	1		1	1	1	1	1
75%	Goatfish	1	1		1	1		1	1

	Month	Nov	Jan	Jan	Feb	Feb	Mar	June	July
	Year	17	20	18	19	20	17	20	20
	Season	Spr	Spr	Sum	Sum	Sum	Aut	Win	Win
	Fish species richness	15	16	8	20	11	11	17	21
% time	Species								
63%	Giant boarfish	1			1	1		1	1
	Butterfly perch	1	1		1			1	1
	Carpet shark	1			1	1		1	1
	Common roughy	1	1		1		1	1	
	Oblique triplefin			1	1	1		1	1
	Tarakihi	1	1		1	1		1	
50%	Kingfish	1	1					1	1
	Trevally		1		1		1		1
38%	Black and yellow triplefin	1					1		1
	Blue cod		1			1			1
	Crayfish		1		1			1	
	Eagle ray			1	1	1			
	Rock cod			1	1			1	
	Sea perch	1						1	1
	Shrimps	1						1	1
25%	Conger eel				1		1		
	Copper moki		1					1	
	Eagle ray			1					1
	Lantern fish*						1	1	
	*Octopus**							1	1
	Slender roughy*				1				1
	Spotty	1							1
	Unidentified shark		1						1
13%	Banded triplefin		1						
	Crab				1				
	Frostfish*				1				
	Magpie perch								1
	New Zealand fur seal							1	
	Nudibranch			1					
	Piper*				1				
	Porcupine fish						1		
	Sea cucumber		1						
	Short-tailed ray				1				
	Sweep								1

FAUNA

e-DNA pg. 105

Number of limitations with the data, and with the minimal database to match off to also. E.g. Blue Cod was not a match, as not in the database. (Wilderlab ran the samples)



CRAYFISH

1. Two club members Bruce and Mark – have dived where there has been a migration of crayfish – they were so dense they were crawling over each other. This was around 11km offshore. There was no footage taken.

   3.3.5 Mass Migration
   Mass migration of juvenile or sub-adult red rock lobsters is a well recorded phenomenon around the southern coasts of South Island (Street 1969, McKoy 1983, Booth 1997). During spring and early summer, some immature individuals migrate against the main current flow from the east and south-eastern coasts of South Island around Stewart Island towards Fiordland and southern Westland. The numbers moving varies from year to year (Booth 1997). There is **no evidence for similar large scale mass migrations around any North Island**
   (Annala 1981, Booth 1997)
   South Taranaki Bight Fish and Fisheries PG.27

2. TTRL's information indicates there are patch reefs in 30m-50m depths where large male rock lobsters were sighted.

period females start to accumulate on the deep seaward margin of reefs or move across the adjoining sand flats and form aggregations in deep water where there is a strong current (McKoy & Leachman 1982, MacDiarmid 1991, Kelly et al. 1999). Here their larvae hatch at dawn each day over a period of 3-5 days to begin their long planktonic phase (MacDiarmid 1985).

3.3.3 Feeding

Rock lobsters leave their daytime shelters at dusk to feed upon on a wide range of sedentary prey (see 3.4.2), normally returning prior to dawn (Williams & Dean 1989, MacDiarmid et al. 1991). Nocturnal foraging distances on rocky reefs increase with body size with small juveniles foraging only about 2 m away from dens while larger adults forage up to 24 m (MacDiarmid et al. 1991, Oliver 2007).

Kelly (2001) tracked acoustic tagged large male lobsters in and around the Leigh Marine Reserve and found that they displayed two peaks in activity over the year, one in summer near the start of the new moult cycle, and another in winter following the mating season. These coincide with peaks in feeding activities which immediately follow moulting and mating respectively, when males rarely feed (Kelly & MacDiarmid 2003). During these peaks in feeding activity some males travelled up to 2 km from the deep seaward margin of reefs across adjacent sand flats to feed on bivalves, gastropods and crustaceans at depths of 30-40 m (Kelly & MacDiarmid 2003, Langlois et al. 2005, Langlois et al. 2006 b & c). Here they form large daytime aggregations and forage nocturnally (Kelly et al. 1999). Some females move onto the sandflats during spring to hatch their larvae, forming similar daytime aggregations and may forage during this time. Some females also forage on sandflats during summer (Kelly & MacDiarmid 2003). The mean size of lobsters in offshore aggregations is typically greater than the mean size of reef populations (Kelly et al. 1999) but smaller adults may forage nocturnally on sandflats immediately adjacent to the reef, returning to shelter on the reef by day.

Sightings by TTR field staff of large male rock lobsters offshore on small patch reefs and open sand at depths of 30-50 m are consistent with offshore foraging for shellfish observed by Kelly & MacDiarmid (2003).

3.3.4 Site association

Red rock lobsters may associate with a reef or reefs along one section of coastline for months or years. Freeman et al. (2009) found that nearly all tagged lobsters on reef systems on the east coast of North Island near Gisborne were recaptured over three years on the same reef on which they were originally tagged. Females moved a median distance of less than 50 m between tagging and recapture while males moved a median of 100-200 m (Freeman et al. 2009). In the Leigh Marine Reserve in the Hauraki Gulf, Kelly and MacDiarmid (2003) found that at least 21% of tagged lobsters maintained an association with a single 15 ha reef system for 1-8 years. Site association tended to increase with female size, whereas site association in males was relatively constant until about 1 kg body weight and then markedly increased. About 30% of lobsters tagged by Kelly and MacDiarmid (2003) moved 0.25-6 km from their tagging site but homing behaviour meant that many lobsters eventually returned to their original reef. Kelly (1999) fitted individual large mature red rock lobsters with acoustic tags and tracked their position within the Leigh Marine Reserve and Tawharanui Marine Park in north-east New Zealand at regular intervals for up to one year.

26 South Taranaki Bight Fish and Fisheries

3. A study in Western Australia (Jernakoff et al. 1993) found that the **two major components in the diet of very young Western rock lobsters (juveniles within their first year after settlement) were coralline algae and molluscs.** While the proportions of **coralline algae** and molluscs differed depending on the moult

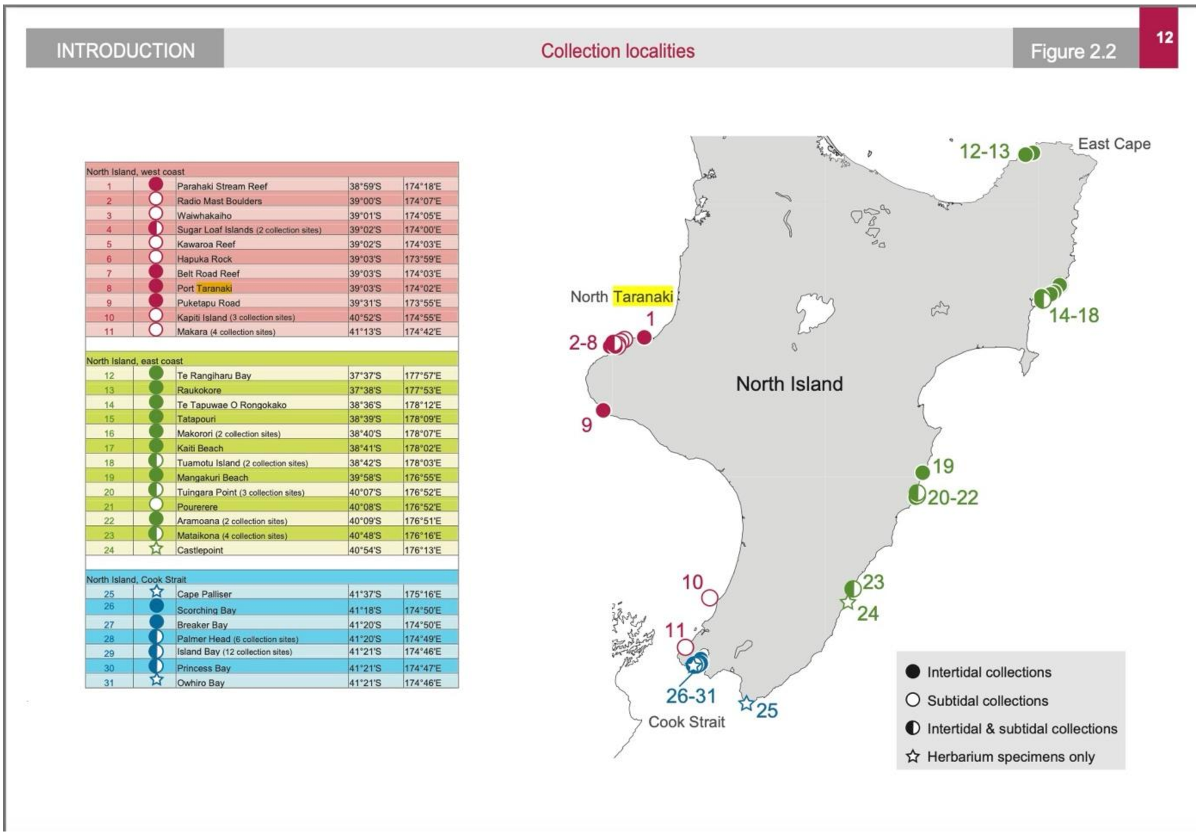
stage (premoult, intermoult, or postmoult), as much as 80% of the food in the foregut of postmoult lobsters was coralline algae.

Corallines act as settlement inducers for paua, corals and kina. For example paua larvae have cilia that enable them to swim through the water column. Seven days after fertilisation they must find a suitable substrate to settle on, before they can metamorphose. **This metamorphosis is controlled by a chemical associated with the surface of non-geniculate coralline red algae.**

(NIWA Information Series No. 57: Coralline algae of central NZ)

https://niwa.co.nz/sites/default/files/import/attachments/CentralNZ_IDCor_NIS57.pdf

4. It seems South Taranaki has been 'missed' for research into this algae. We have documented this algae at the Project Reef, and Morrison at el. also recorded this during the drop-camera survey work.

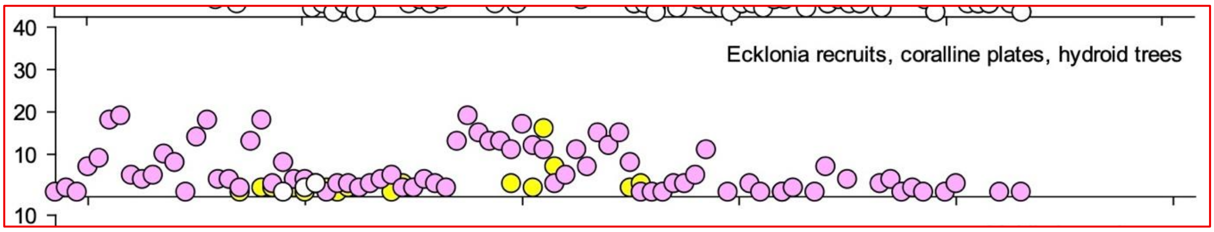

INTRODUCTION | Collection localities | Figure 2.2 | 12

North Island, west coast				
1	●	Parahaki Stream Reef	38°59'S	174°18'E
2	○	Radio Mast Boulders	39°00'S	174°07'E
3	○	Waiwhakaiho	39°01'S	174°05'E
4	◐	Sugar Loaf Islands (2 collection sites)	39°02'S	174°00'E
5	○	Kawaroa Reef	39°02'S	174°03'E
6	○	Hapuka Rock	39°03'S	173°59'E
7	●	Belt Road Reef	39°03'S	174°03'E
8	●	Port Taranaki	39°03'S	174°02'E
9	●	Puketapu Road	39°31'S	173°55'E
10	○	Kapiti Island (3 collection sites)	40°52'S	174°55'E
11	○	Makara (4 collection sites)	41°13'S	174°42'E
North Island, east coast				
12	●	Te Rangiharu Bay	37°37'S	177°57'E
13	●	Raukokore	37°38'S	177°53'E
14	●	Te Tapuwae O Rongokako	38°36'S	178°12'E
15	●	Tatapouri	38°39'S	178°09'E
16	●	Makorori (2 collection sites)	38°40'S	178°07'E
17	●	Kaiti Beach	38°41'S	178°02'E
18	◐	Tuamotu Island (2 collection sites)	38°42'S	178°03'E
19	●	Mangakuri Beach	39°58'S	176°55'E
20	◐	Tuingara Point (3 collection sites)	40°07'S	176°52'E
21	○	Pourerere	40°08'S	176°52'E
22	●	Aramoana (2 collection sites)	40°09'S	176°51'E
23	◐	Mataikona (4 collection sites)	40°48'S	176°16'E
24	☆	Castlepoint	40°54'S	176°13'E
North Island, Cook Strait				
25	☆	Cape Palliser	41°37'S	175°16'E
26	●	Scorching Bay	41°18'S	174°50'E
27	●	Breaker Bay	41°20'S	174°50'E
28	◐	Palmer Head (6 collection sites)	41°20'S	174°49'E
29	◐	Island Bay (12 collection sites)	41°21'S	174°46'E
30	◐	Princess Bay	41°21'S	174°47'E
31	☆	Owhiro Bay	41°21'S	174°46'E

https://www.mpi.govt.nz/dmsdocument/66405/direct

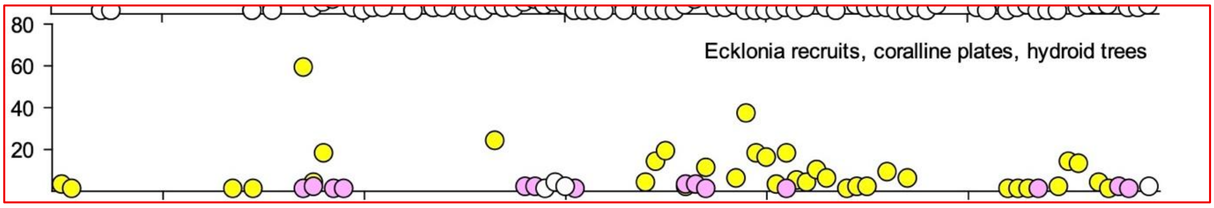
Coralline plates (pink dots) are shown in Morrison at el.
Examples:

Site S, pg.130



Site T, pg.138

Site U, pg. 145



SPONGES

1. 2011 one sponge record for the South Taranaki region (pg. 97 of our comments)

2. 2016: Cawthron Sensitive Habitats report notes our work identifying a dozen sponges species.

> CAWTHRON INSTITUTE | REPORT NO. 2877 AUGUST 2016
>
> no other record matches in the TCMA vicinity (approx. 200 km from TCMA boundary), which is unusual given the ubiquity of sponges. This lack of record matches is likely related to a deficit of sampling/monitoring that is appropriate for detecting sponges in the TCMA, or a lack of possible indicator taxa (89 out of a possible 500), rather than an absence of sponge taxa. Recent work from the National Institute of Water and Atmospheric Research (Michelle Kelly, NIWA), has tentatively identified a dozen different sponge species on a small patch reef approximately 11 km off shore from Patea (pers. comm. Thomas McElroy, 15 July 2016). It is also recognised that other protected areas (e.g. Parininihi Marine Reserve, Sugar Loaf Islands Marine Protected Area, and Tapuae Marine Reserve) in the TCMA are likely to have many sponge species yet to be identified (pers. comm. Emily Roberts, 19 July 2016). Clearly, there are more sponge taxa present in the TCMA than the OBIS database search was able to detect.
>
> Glass-sponge gardens have also been reported by MacDiarmid et al. (2013) to occur in North Taranaki Bight area, at depths of 160–330 m. In this instance they were classified as of 'low species diversity, low morphological diversity, low to medium density, low percentage cover, uniform distribution'. The exact location of the North Taranaki Bight record was not able to be obtained from the report, however they appear to occur at depths near-to or greater-than the TCMA maximum depth (approximately 130 m).
>
> Given the presence of sponge taxa within the TCMA marine protected areas and the reported glass sponge gardens in the offshore vicinity, it is possible that sponge gardens may occur within the TCMA, at volumes[13] and surface areas[14] that meet the EEZ (2012) habitat criteria (listed in Appendix 1).

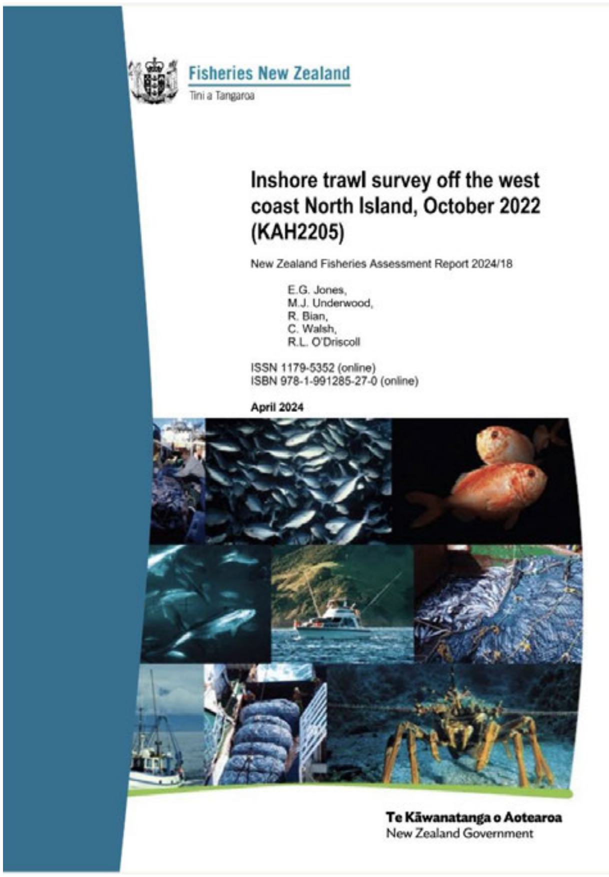
3. We are always interested in the interconnectivity of species. This point is made in Page 64: Fisheries NZ report **Linking marine fisheries species to biogenic habitats Ministry for Primary Industries**

*Overall, it was concluded that **sponge gardens were biodiverse areas, and as such deserved "special consideration in the conservation of rocky-reef***

fishes" *(Gladstone 2007, cited in Morton & Gladstone 2011). An important additional point was that ontogenetic habitat use (****connectivity) had largely been ignored in survey designs for temperate reef fish surveys****, and was probably strongly under- represented in the scientific literature.*

Battershill (1987) suggested the existence of numerous sponge garden snapper nursery habitats in the Hauraki Gulf. Juvenile snapper respond to structural complexity in general, and so this is likely; we suspect that juveniles of other species ***such as trevally may also be found in association with sponges in higher current areas.***

4. The recent trawl survey report contains information on sponges found. We have taken the relevant page, and placed it into a GIS map, so we can see the locations in relation to the mining site and territorial boundary.


Fisheries New Zealand
Tini a Tangaroa

Inshore trawl survey off the west coast North Island, October 2022 (KAH2205)

New Zealand Fisheries Assessment Report 2024/18

E.G. Jones,
M.J. Underwood,
R. Bian,
C. Walsh,
R.L. O'Driscoll

ISSN 1179-5352 (online)
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April 2024

Te Kāwanatanga o Aotearoa
New Zealand Government

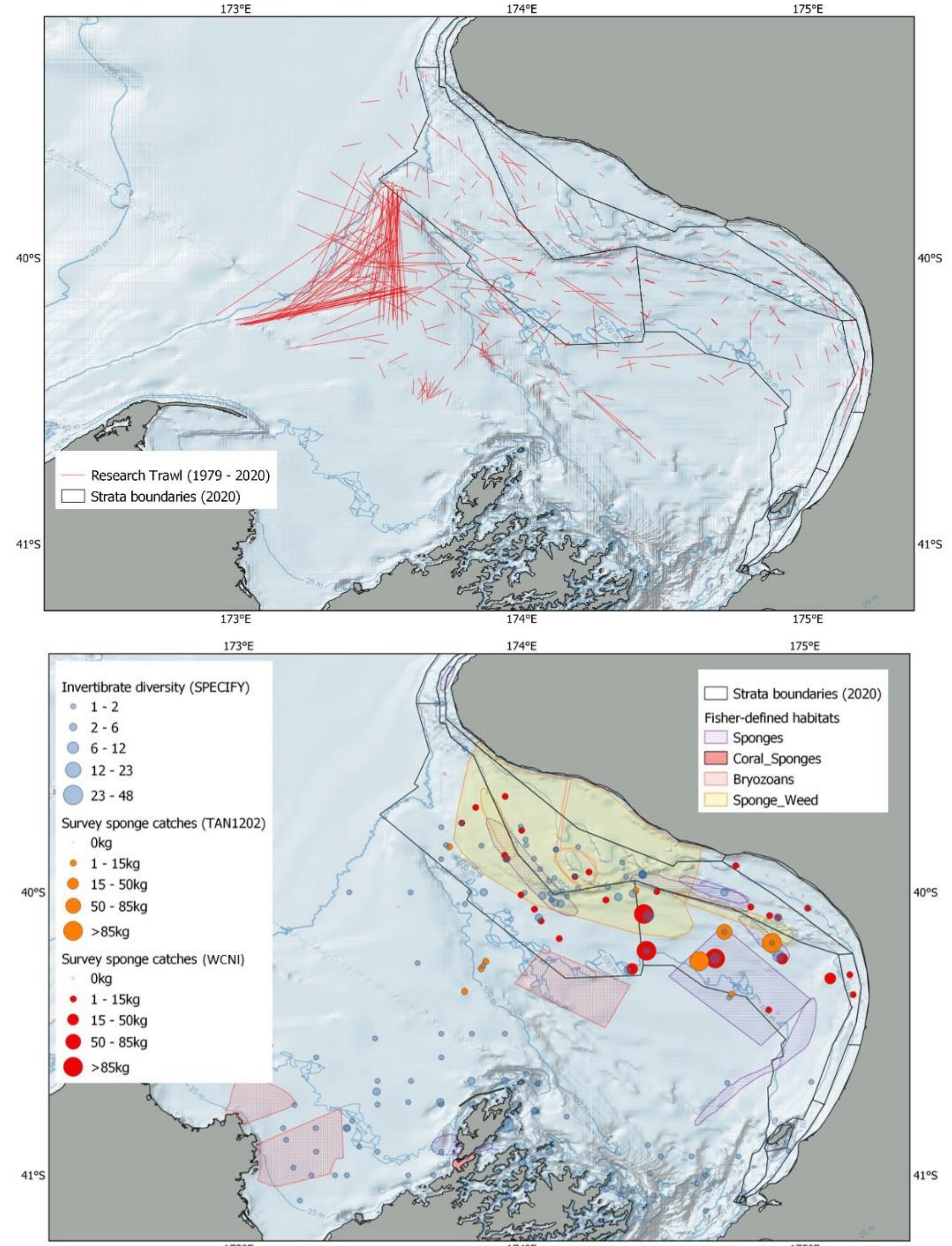
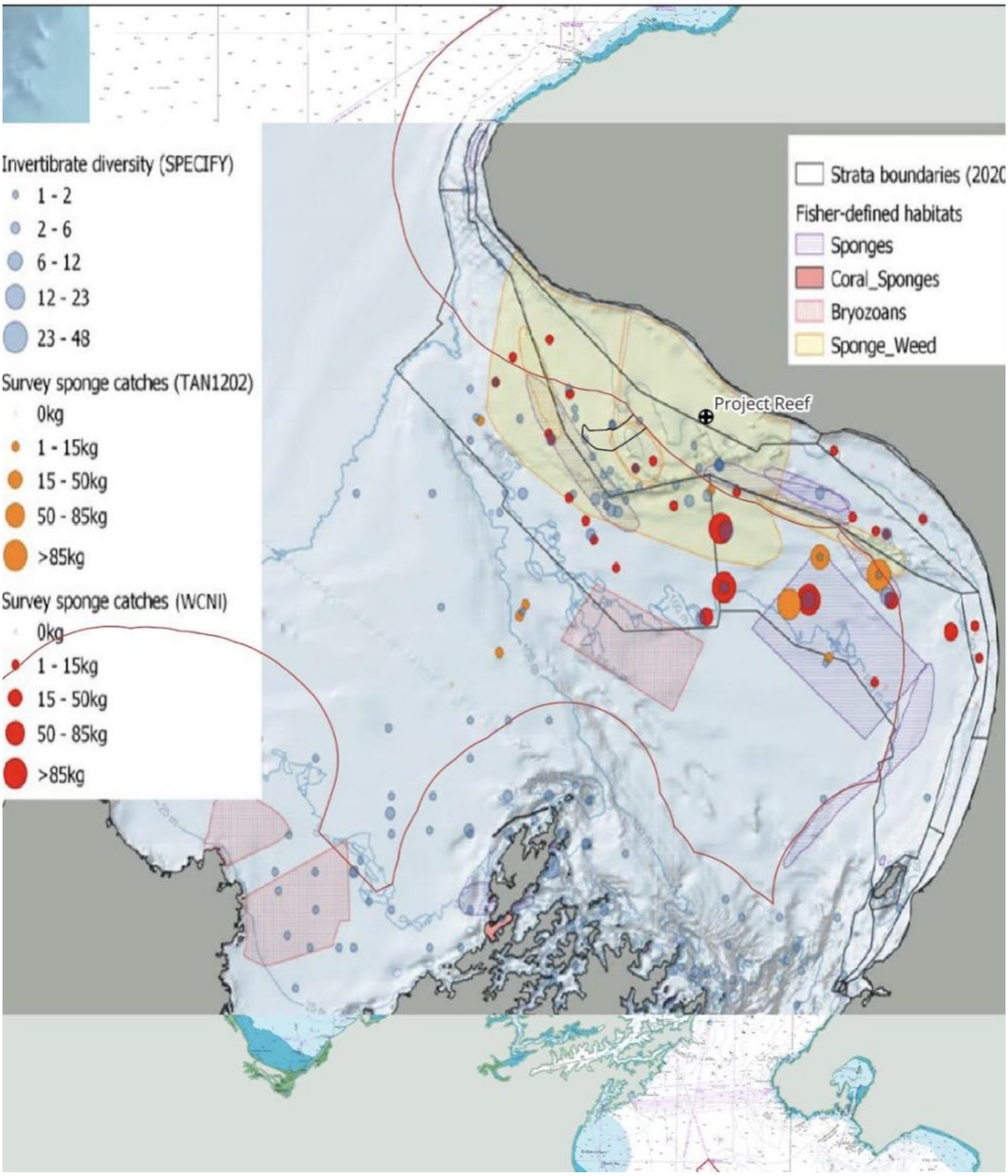


Figure 2: Top: Research trawl footprint in the South Taranaki Bight region from the *trawl* database for 1979–2020. The stratum boundaries of the west coast North Island trawl survey are also shown. Bottom: Location and recorded weight of combined catches of sponges (all codes) from the WCNI survey series, TAN1202, and an invertebrate diversity index generated from the NIWA SPECIFY database.

Inshore-Trawl-Survey-West-Coast-North-Island-October-2022 Sponges



While fisheries want to avoid dredging sponges, ‘Project Reef’ has a different lens – wanting to understand more about the species of Sponges that are found in the STB. Through our work there have been a number of range extensions for species – which are now shown as located offshore of South Taranaki.
This is why we follow the Trawl Survey reports.

Thirteen sponges identified in NIWA’s Benthic survey for the inner shelf (Appendix 1)

23 sponges Project Reef has identified with Dr Michelle Kelly (via samples and photos) and put into the Guide. They include species not identified in the Benthic Survey.

Three species of sponges at Project Reef recorded by divers **were not found In the 2021 drop-camera survey** by NIWA’s Dr Morrison :*Leucettusa lancifera, Stelletta columna, and Chalinulan sp*. (powder soft feathery bush).

DEMOSPONGES

https://www.fasttrack.govt.nz/__data/assets/pdf_file/0015/4272/Report-3-NIWA-Patea-Shoals-Benthic-Ecology-FINAL.pdf

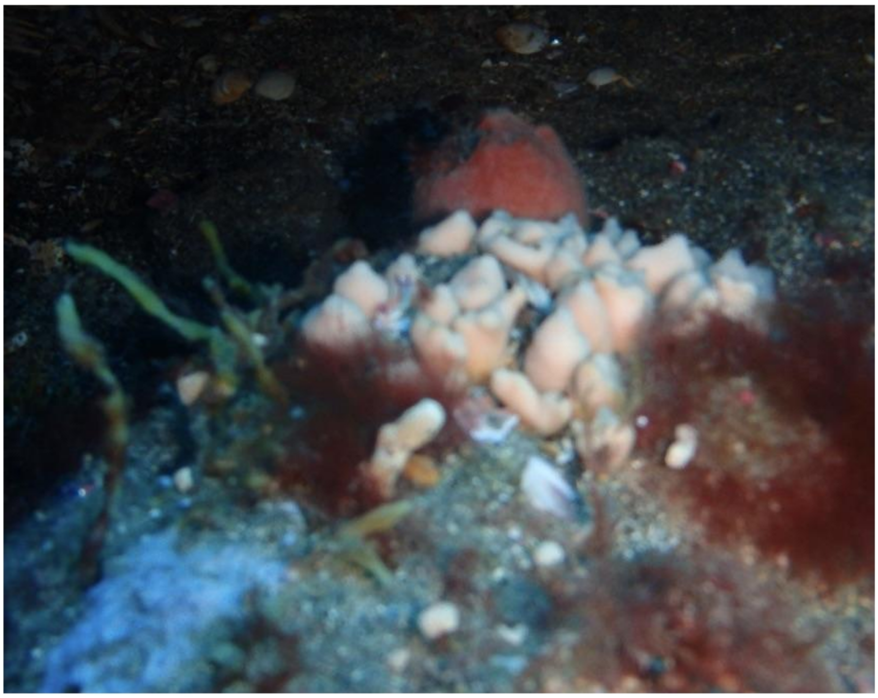
Appendix I Porifera (sponge) species list

Table H1: Species list of sponges collected in the dredges. Abd= Total number of specimens collected; Occur.= number of dredges/sites specimens occurred in. Inner shelf-Offshore values depict mean densities per 250 m^2. *= notable species; *STB =new record for the south Taranaki Bight; *NS=new species.

Type	Species	Abd	Occur.	Inner shelf	Mid north	PPA	Mid south	Offshore
Demospongiae	*Dactylia palmata*	141	20	0.053	0	0	0.176	5.145
Demospongiae	*Stryphnus ariena*	65	4	0	0	0	0	2.513
Demospongiae	*Stelletta purpurea* *	63	7	0.053	0	0	0	2.385
Demospongiae	*Pseudoceratina* sp 1 (*STB)	54	4	0	0	0	0	2.064
Demospongiae	*Tethya amplexa* (*STB)	54	4	0	0	0	0	2.058
Demospongiae	*Pararaphoxya* sp 2 *Raspailia topsenti mimic*	39	4	0	0	0	0	1.500
Demospongiae	*Hymeniacidon hauraki*	22	5	0.211	0	0	0.176	0.462
Demospongiae	*Crella incrustans*	17	15	0.316	0.263	0.158	0.088	0
Demospongiae	*Ircinia* sp 6 (*NS)	15	2	0	0	0	0	0.564
Demospongiae	*Callyspongia* sp 10 *Kenepuru palmate*	11	2	0	0	0	0	0.410
Demospongiae	*Psammopemma* sp 7 (*NS)	8	3	0.421	0	0	0	0
Demospongiae	Dysidea cf n sp 5	7	1	0	0	0	0	0.256
Demospongiae	*Geodia regina*	7	1	0	0	0	0	0.256
Demospongiae	*Mycale Carmia tasmani*	7	6	0	0.263	0.053	0.029	0
Demospongiae	*Stryphnus novaezelandiae*	7	1	0	0	0	0	0.256
Demospongiae	*Xestospongia* sp 6 (*NS)	7	1	0	0	0	0	0.256
Demospongiae	*Chalinidae* sp	6	2	0	0.053	0	0	0.192
Demospongiae	*Chondropsis* sp	5	1	0	0	0	0	0.192
Demospongiae	*Cymbastella* sp 1 (*NS)	5	1	0	0	0	0.147	0
Demospongiae	*Iophon minor*	5	4	0.053	0	0.053	0.088	0
Demospongiae	*Neopetrosia* sp 11 (*NS)	5	1	0	0	0	0	0.192
Demospongiae	*Stellata conulosa* (*STB)	5	1	0	0	0	0	0.192
Demospongiae	*Adocia* sp 1	4	1	0	0	0	0	0.154
Demospongiae	Axinella sp	4	2	0	0.105	0	0.059	0
Demospongiae	*Aaptos tentum*	3	2	0.053	0	0	0.059	0
Demospongiae	*Dictyodendrilla* n sp 3 (*NS)	3	1	0.158	0	0	0	0
Demospongiae	*Homaxinella* sp	3	2	0	0.158	0	0	0
Demospongiae	*Hymeniacidon* sp undet	3	2	0	0.105	0.053	0	0
Demospongiae	*Iophon proximum*	3	1	0.158	0	0	0	0
Demospongiae	*Callyspongia diffusa*	2	2	0.053	0.053	0	0	0
Demospongiae	Dysidea sp	2	2	0	0	0.053	0	0.038
Demospongiae	*Haliclona* sp	2	2	0.053	0.053	0	0	0
Demospongiae	*Higginsia* sp (*STB)	2	1	0	0	0	0.059	0
Demospongiae	*Psammopemma* sp	2	1	0	0	0	0	0.077
Calcarea	*Leucosolenia cf discoveryi*	1	1	0	0.053	0	0	0
Demospongiae	*Biemna rufescens*	1	1	0.053	0	0	0	0
Demospongiae	*Callyspongia* sp 12	1	1	0	0	0	0.029	0
Demospongiae	*Callyspongiidae* sp	1	1	0	0.053	0	0	0
Demospongiae	*Halichondria* n sp 7 (*NS)	1	1	0	0	0	0	0.038
Demospongiae	*Polymastia echinus*	1	1	0	0	0	0.029	0
Demospongiae	*Polymastia lorum* (*STB)	1	1	0	0	0	0	0.038
Demospongiae	*Polymastia tapetum*	1	1	0	0	0	0.029	0
Demospongiae	*Pseudosuberites* sp	1	1	0	0	0.053	0	0
Demospongiae	*Raspailia Clathriodendron arbuscula*	1	1	0	0	0	0.029	0
Demospongiae	*Tethya berguistae*	1	1	0.053	0	0	0	0

Leucettusa lancifera Dendy, 1924

(Porifera, Calcarea, Clathrinida, Leucaltidae)

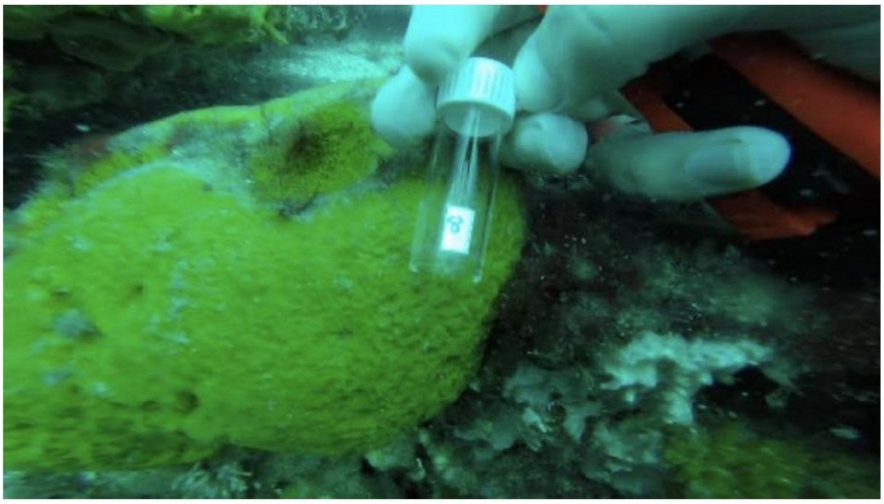


Ecionemia alata (Dendy, 1924)

(Porifera, Tetractinellida, Ancorinidae)

Stelletta columna Dendy, 1924

(Porifera, Tetractinellida, Ancorinidae)



Stelletta conulosa Dendy, 1924

(Porifera, Tetractinellida, Ancorinidae)

P2140507

Most likely *Stryphnus ariena* Kelly & Sim-Smith, 2012

Tethya bergquistae Hooper & Wiedenmayer, 1994

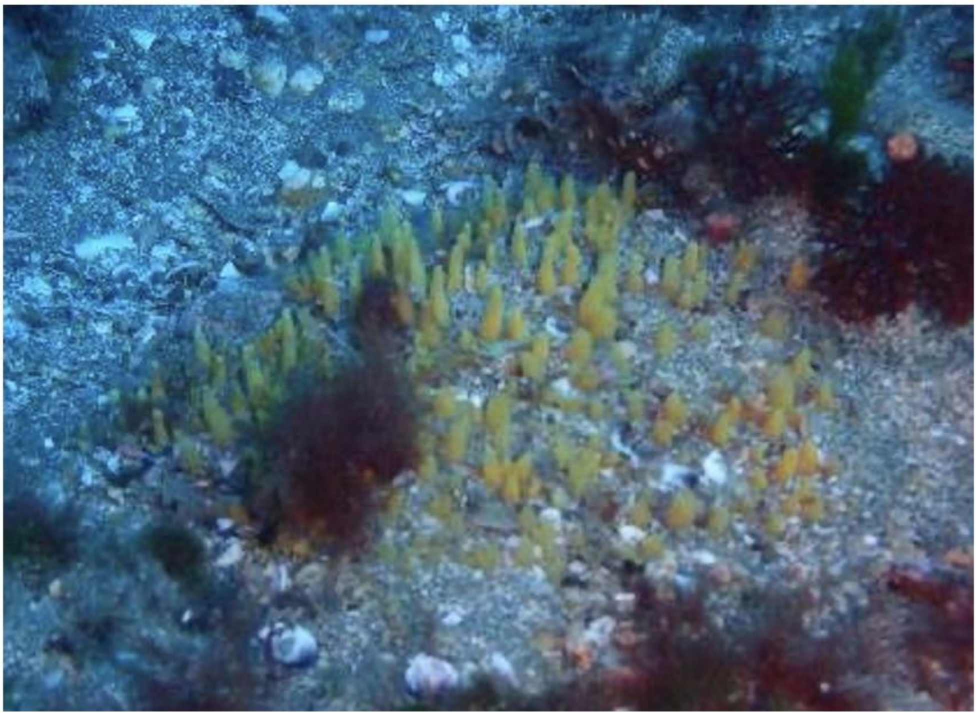
(Porifera, Tethyida, Tethyiidae)

Halichondria cf *moorei*

(Porifera, Suberitida, Halichondriidae)

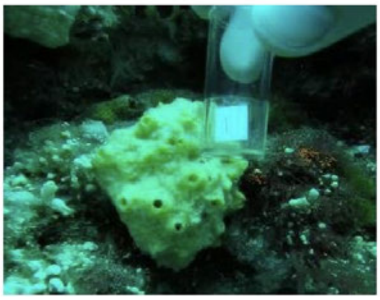
Ciocalypta polymastia (Lendenfeld, 1888)

(Porifera, Suberitida, Halichondriidae)



Iophon "proximum" (Ridley, 1881) sensu Bergquist & Fror (1988)

(Porifera, Poecilosclerida, Acarnidae)



Iophon minor (Brondsted, 1924)

(Porifera, Poecilosclerida, Acarnidae)

Raspailia topsenti Dendy, 1924

(Porifera, Axinellida, Raspailiidae)

Axinella n. sp. (orange ribbed fan)

(Porifera, Axinellida, Axinellidae)

NIWA 93014

Cymbastela lamellata (Bergquist, 1970)

(Porifera, Axinellida, Axinellidae)

Desmacidon mamillatum Bergquist & Fromont, 1988
(Porifera, Poecilosclerida, Desmacididae)

Crella incrustans (Carter, 1885)
(Porifera, Poecilosclerida, Crellidae)

Dactylia varia (Gray, 1843)
(Porifera, Haplosclerida, Callyspongiidae)

Callyspongia cf *ramosa* (Gray, 1843)
(Porifera, Haplosclerida, Callyspongiidae)

Callyspongia cf *stellata* Bergquist & Warne, 1980
(Porifera, Haplosclerida, Callyspongiidae)

Neopetrosia sp. *indet?*
(Porifera, Haplosclerida, Petrosiidae)

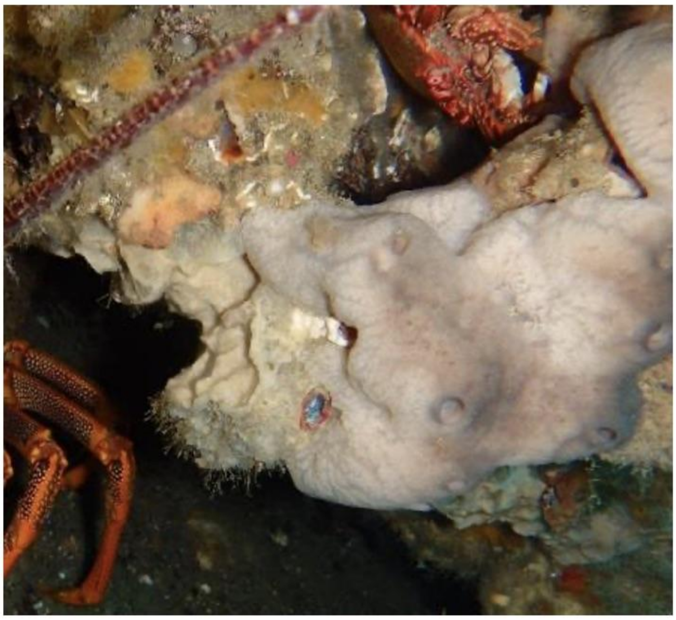
Aaptos globosa Kelly-Borges & Bergquist, 1994
(Porifera, Suberitida, Suberitidae)

Polymastia cf *massalis* Carter, 1886
(Porifera, Polymastiida, Polymastiidae)

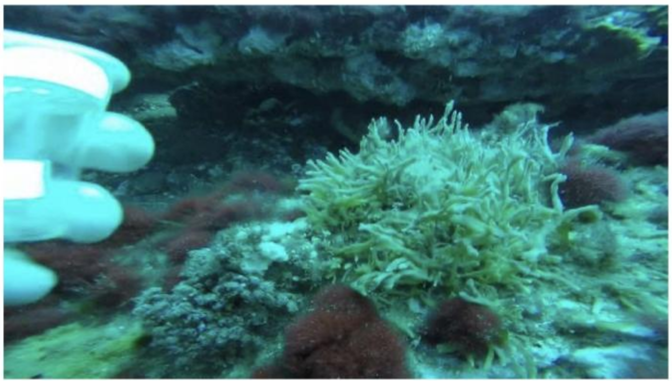
Psammoclema sp. or *Chondropsis* sp.
(Porifera, Poecilosclerida, Chondropsiidae)

Darwinella oxeata Bergquist, 1961
(Porifera, Dendroceratida, Darwinellidae)

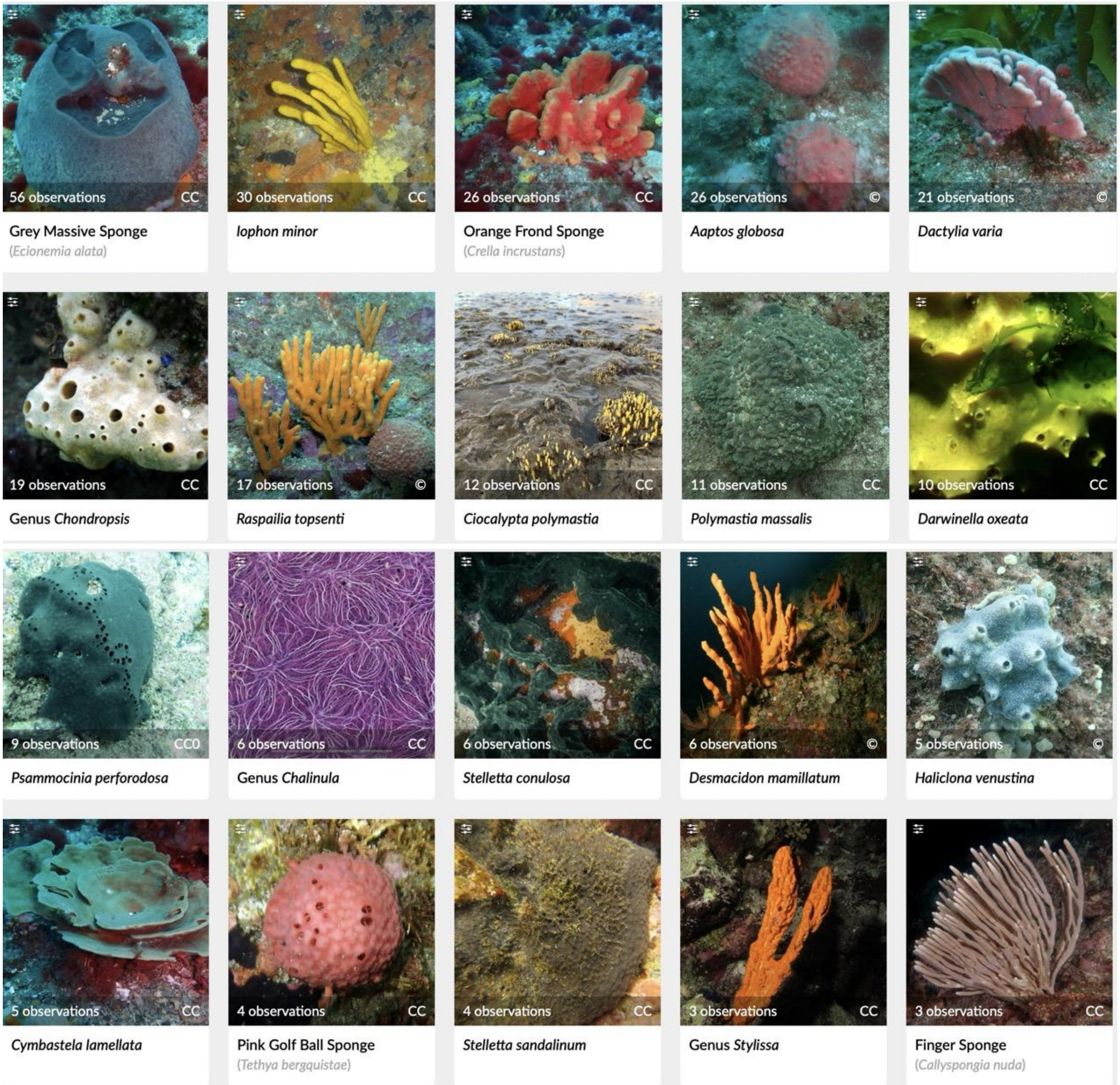
Spongia sp.
(Porifera, Dictyoceratida, Spongiidae)

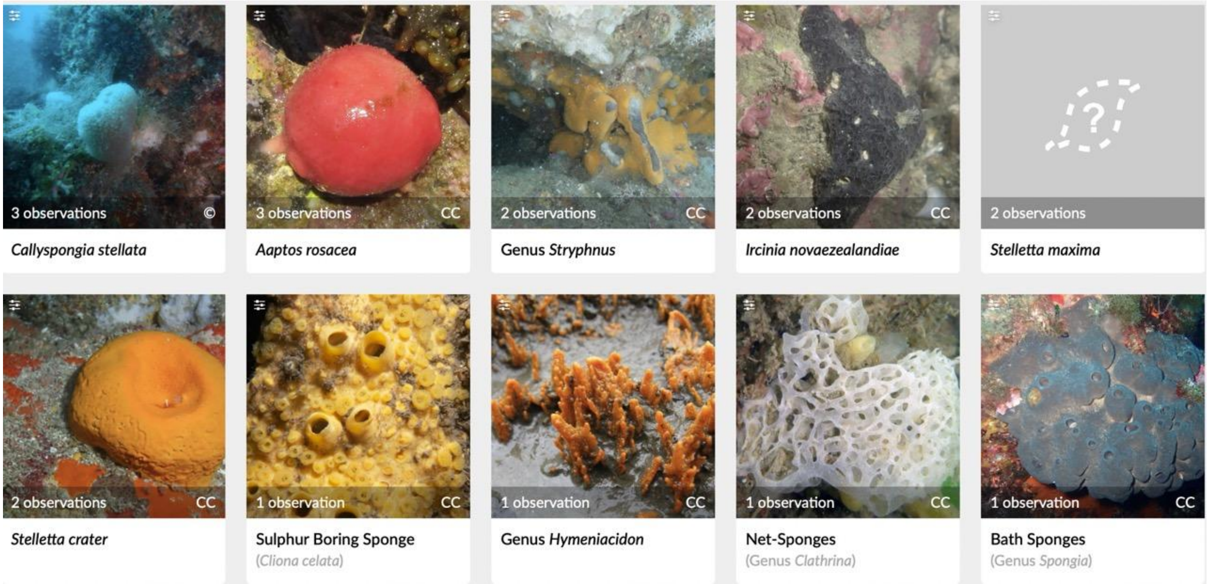


Chalinula n. sp. (powder soft feathery bush)
(Porifera, Haplosclerida, Chalinidae)



I-naturalist recorded species - #421 observations, #41 species – 'Coastblitz Patea'




3 observations
©
Callyspongia stellata
3 observations
CC
Aaptos rosacea
2 observations
CC
Genus Stryphnus
2 observations
CC
Ircinia novaezealandiae
2 observations
Stelletta maxima
2 observations
CC
Stelletta crater
1 observation
CC
Sulphur Boring Sponge
(Cliona celata)
1 observation
CC
Genus Hymeniacidon
1 observation
CC
Net-Sponges
(Genus Clathrina)
1 observation
CC
Bath Sponges
(Genus Spongia)

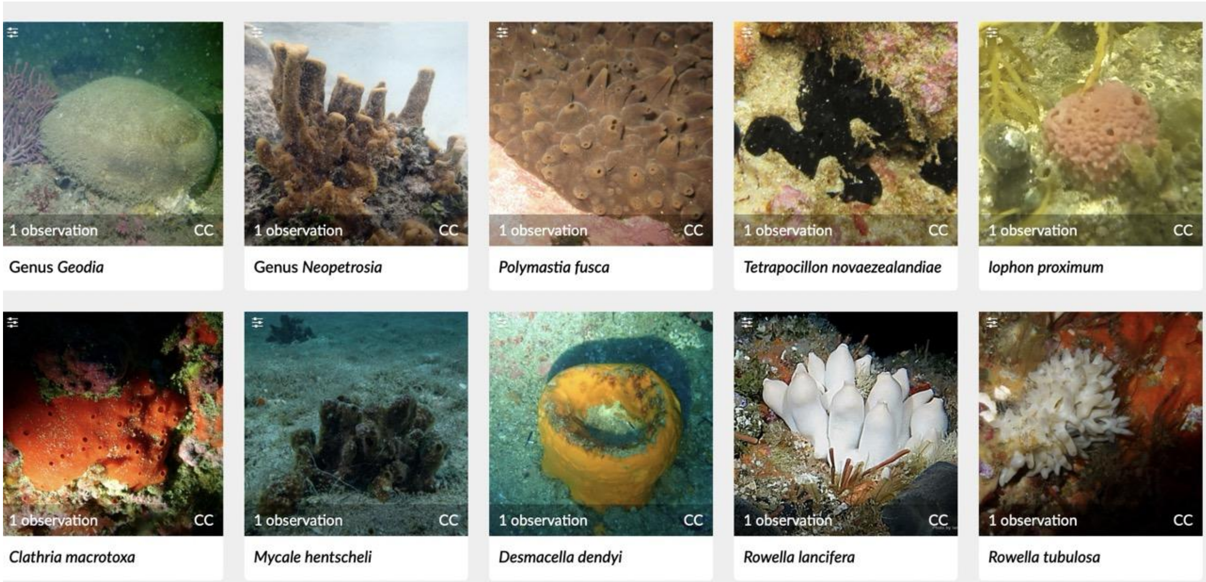
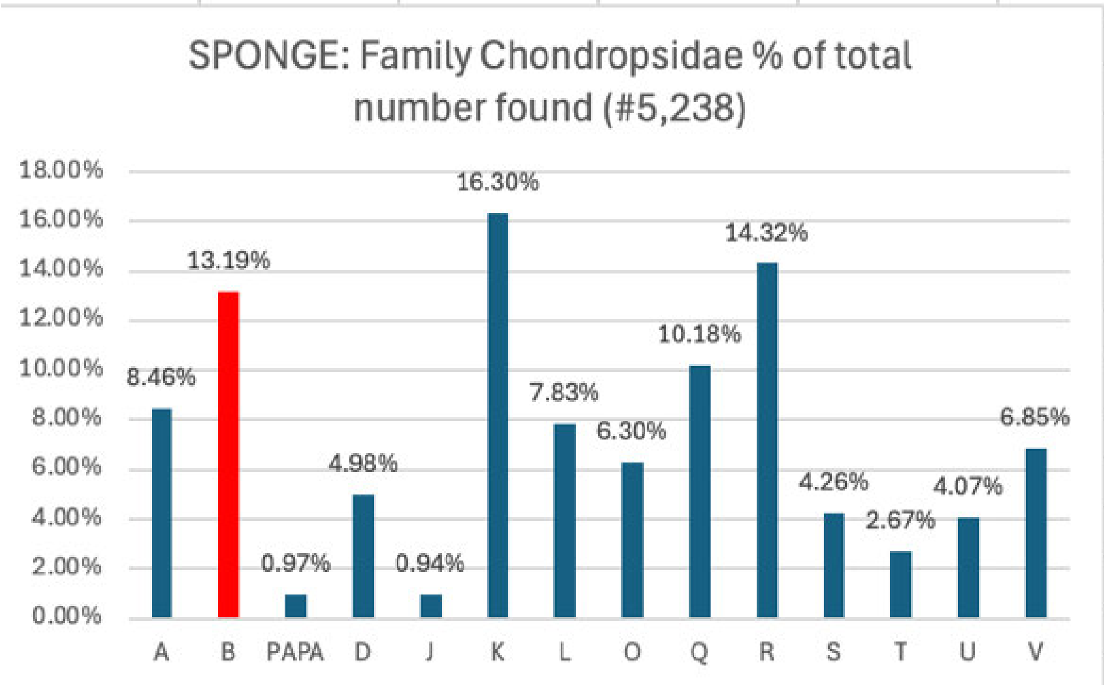

1 observation
CC
Genus Geodia
1 observation
CC
Genus Neopetrosia
1 observation
CC
Polymastia fusca
1 observation
CC
Tetrapocillon novaezealandiae
1 observation
CC
Iophon proximum
1 observation
CC
Clathria macrotoxa
1 observation
CC
Mycale hentscheli
1 observation
CC
Desmacella dendyi
1 observation
CC
Rowella lancifera
1 observation
CC
Rowella tubulosa

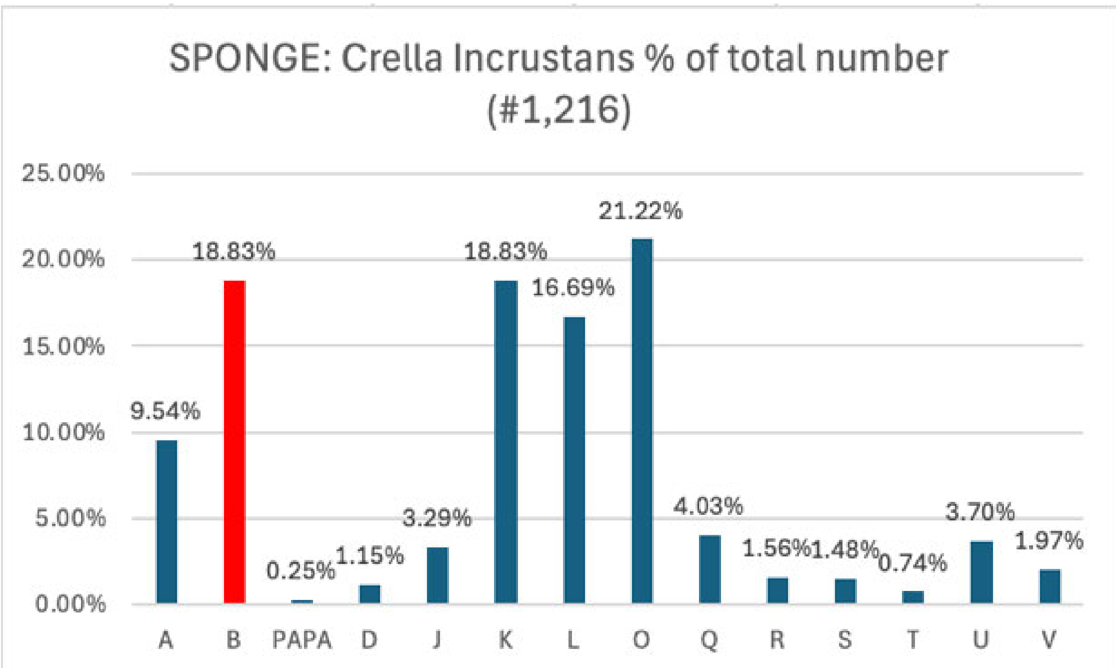
Table 7: Summary of taxa identities and number of individuals recorded from CoastCam video footage at each site. Area of reef present estimated as the summed area of all video segments containing one or more rock-based geomorphology classes. Includes soft sediment where present in those video segments with rock elements. *, species sampled/photographed by Project Reef divers at site K (Project Reef), and identified by M. Kelly, sponge taxonomist, NIWA; but not seen in the CoastCam survey of site K. Additional species confirmed from the Project Reef are *Leucettusa lancifera*, *Stelletta columna*, and *Chalinulan* sp. (powder soft feathery bush)(Porifera, Haplosclerida, Chalinidae). Species occasionally seen by CoastCam when very close/on the seafloor included an anemone (white tentacles, purple body, Family Actiniidae), small white (*Cryptolaria* sp.) or golden (Sertulariidae) hydroids, the bryozoans *Diaperoecia purpurascens*, *Celleporina grandis*, and *Celleporaria agglutinans*, and the green top shell *Coelotrochus viridis*.

		Area of reef present (m^2)		3,486	1,715	296	1,241	453	1,993	689	955	1,452	1,813	1,505	443	1,379	943
																	Site
Taxa group	Description	Taxonomic name	Total	A	B	Papa	D	J	K	L	O	Q	R	S	T	U	V
Sponge	Low flowing encrusting	Family Chondropsidae (Psammoclema sp. indet or *Chondrosia* sp. indet.) species 2	5258	443	691	51	261	49	854	410	330	533	750	223	140	213	359
Sponge	Yellow broken ridge form	*Crella incrustans* (Carter, 1885)*	1216	116	229	3	14	40	229	203	258	49	19	18	9	45	24
Sponge	Grey cone	*Stelletta conulosa*	890	37	116	-	-	10	174	66	74	154	111	32	25	74	27
Sponge	Orange/grey multi-stalk	*Raspailia topsenti*/*Axinella* sp. indet.	397	156	22	-	18	13	13	3	2	28	60	70	14	4	7
Sponge	Yellow foamy low sponge	*Darwinella oxeata* Bergquist, 1961*	388	43	17	7	44	8	7	11	10	41	54	88	13	14	39
Sponge	Massive colonies	*Ecionemia alata* (Dendy, 1924)	366	21	81	-	-	6	25	10	8	141	39	15	8	12	6
Sponge	Pale pink ball	*Aaptos globosa**	308	6	55	-	-	25	162	24	7	-	11	22	20	-	1
Sponge	Orange/yellow/grey ball	*Tedania* sp. indet.?*	228	9	22	1	-	-	39	1	7	4	7	21	1	-	116
Sponge	Bright yellow combs	*Ciocalypta polymastia**	226	80	14	-	22	3	40	20	20	1	1	3	-	4	21
Sponge	Slender purple finger	*Callyspongia ramosa* (*Callyspongia nuda*)	204	-	6	-	-	-	6	2	21	-	8	6	4	26	125
Sponge	Pale orange/pink ball	*Tethya bergquistae**	188	44	28	1	-	6	29	1	1	2	47	25	6	-	4
Sponge	Bright yellow flanges	*Raspailia topsenti**	185	55	24	1	2	5	5	3	3	2	36	40	7	5	2
Sponge	Thick purple finger	*Dactylia varia*	183	23	14	-	8	2	12	-	25	-	14	23	13	-	51
Sponge	Yellow, rock-boring	Unid. Sp., order Haplosclerida/Poecilosclerida*	181	5	4	3	63	4	6	5	8	3	1	69	3	5	6
Sponge	Dark grey spiral cup	*Cymbastela lamellata*	179	1	-	-	-	-	-*	-	-	-	-	-	-	-	178
Sponge	Orange top, oblong dull	Unid. Sp., order Poecilosclerida*, encrusting	155	-	-	-	-	-	-	4	7	-	-	141	3	-	-
Sponge	Orange fluffy mound	*Stylissa* sp. indet.	150	6	-	-	-	-	2	2	-	-	101	18	11	3	7
Sponge	Grey/white smooth foamy	Family Irciniidae (*Psammocinia* sp. indet.)*	127	23	3	1	5	-	3	2	1	8	43	26	3	2	7

		Area of reef present (m^2)		3,486	1,715	296	1,241	453	1,993	689	955	1,452	1,813	1,505	443	1,379	943
																	Site
Taxa group	Description	Taxonomic name	Total	A	B	Papa	D	J	K	L	O	Q	R	S	T	U	V
Sponge	Dirty yellow encrusting	Family Halichondriidae, genus & sp. unid.*	107	-	-	-	-	-	-	-	-	4	102	1	-	-	-
Sponge	Reddish-pink/grey ball	*Aaptos rosacea*	45	-	-	-	-	-	-	-	-	-	-	39	5	-	1
Sponge	Grey branching finger	Order Axinellida genus and species indet.	35	-	4	-	1	-	-	-	1	-	5	11	2	-	11
Sponge	Bright yellow cone	*Stelletta crater* (Dendy, 1924)	33	1	15	-	-	-	9	1	3	-	2	1	-	1	-
Sponge	Pink-orange lumpy ball	*Tethya fastigata**	32	3	2	-	-	1	1	7	-	1	4	9	3	-	2
Sponge	Grey fuzzy football	*Polymastia* cf *massalis*	31	1	2	-	-	-	1	-	-	7	4	2	-	2	12
Sponge	White udon noodles	*Polymastia echinus**	19	3	-	-	11	1	-	1	-	-	3	-	1	-	-
Sponge	Grey-dirty tan ridge form	*Stryphnus ariena**	15	11	-	-	-	-	1	2	-	-	-	1	-	-	-
Sponge	Yellow foamy with holes	*Iophon minor**	14	1	5	-	-	-	4	-	1	3	-	-	-	-	-
Sponge	Yellow branching	Family Axinellidae genus and species indet.?*	13	-	-	-	-	-	-	-	-	-	9	3	1	-	-
Sponge	Low mound	*Biemna rufescens** (base colour, no maroon)	10	-	2	-	-	-	-	-	-	3	3	1	1	-	-
Sponge	Broken flange sphere	*Desmacidon mammilatum*	9	-	-	-	1	-	1	-	1	1	3	1	-	-	1
Sponge	Low mound	Family Chondropsidae (*Psammoclema* sp.*)	8	-	1	-	-	-	-	-	1	4	-	2	-	-	-
Sponge	Grey-white rough foamy	Family Irciniidae (*Psammocinia* sp. indet.), Family Chondropsidae (*Psammoclema* sp. indet or *Chondrosia* sp. indet.) species 1	7	1	4	-	-	1	-	-	-	2	-	-	-	-	-
Sponge	White pod cluster	Class Calcarea, possibly *Leucetta* sp. 2*	5	1	4	-	-	-	-	-	-	-	-	-	-	-	-
Sponge	Pink low ridges	*Haliclona venustina** or *Haliclona caminata**	3	-	-	-	-	-	-*	-	-	-	3	-	-	-	-
Sponge	Yellow half-buried tubers	Order Axinellidae genus & species indet.*	2	1	-	-	-	-	-	-	-	1	-	-	-	-	-
Sponge	Grey, white oblong	Family Dysideidae, possibly *Dysidea* sp. indet. (rough surface) of class Calcarea (*Leucetta* sp. 1).	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Sponge	Grey brain-like mound	*Polymastia* sp. indet.*	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Sponge	Dull round, algae epibionts	Family Halichondriidae genus & species unid.*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Sponge	Dull yellow smooth	*Iophon proximum**	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Coralline	Coralline algae plate		1297	142	27	-	1	7	67	75	118	7	258	537	41	24	-

Morrison at el. Two of the most commonly seen sponges in the drop-camera survey. We have placed into a table to show where most of the sponges (of these two species) were seen.



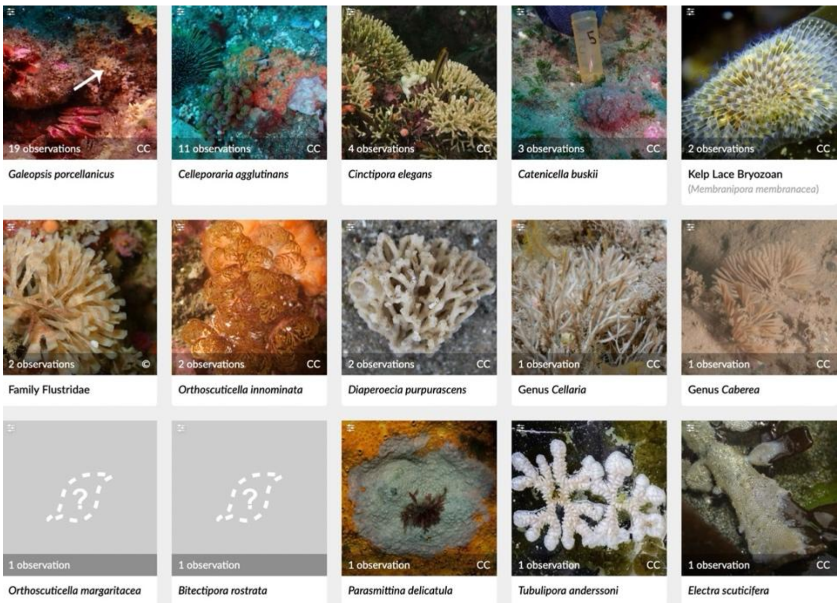


BRYOZOANS

We find bryozoans (an animal – colony of) on the Project Reef & record them in I-naturalist.

Taylor (2000) suggested that two key factors were associated with the successful colonisation of areas by bryozoans: **suitable hard substrates such as rocks and shells; and a sufficient phytoplankton food supply.**

66 · Linking marine fisheries species to biogenic habitats Ministry for Primary Industries AEBR 130



Molluscs

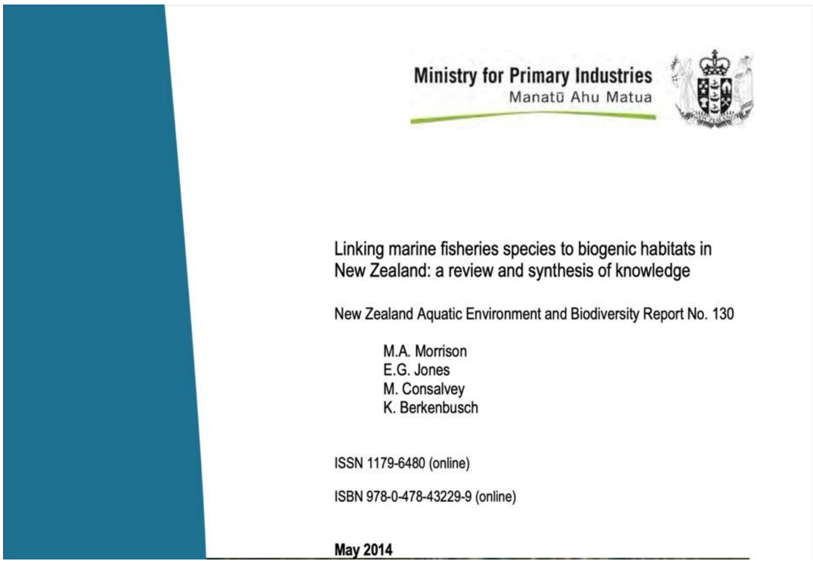
Pg.58 · Linking marine fisheries species to biogenic habitats Ministry for Primary Industries 2014 report

A range of infaunal (living in sediment) bivalve species occur in New Zealand's coastal zone at sufficiently high densities to dominate the seafloor, both as dense beds, and as dead shell surface deposits

At these densities, they act as key species, providing functions including bentho-pelagic coupling, nutrient transfer, phytoplankton abundance regulation, carbon sequestration, and food provision.

In deeper coastal areas, other bed forming bivalve species appear such as ***Tawera spissa*** **(morning glory shell).**

A larger infaunal bivalve in shallow coastal areas is the dog cockle **Tucetona laticostata**, which forms extensive beds with shell drifts at some locations where current speeds are high and the bottom sediments coarse (there is also a smaller bodied, less 'massive-shelled' species, **Glycymeris modesta).**


Ministry for Primary Industries
Manatū Ahu Matua

Linking marine fisheries species to biogenic habitats in New Zealand: a review and synthesis of knowledge

New Zealand Aquatic Environment and Biodiversity Report No. 130

M.A. Morrison
E.G. Jones
M. Consalvey
K. Berkenbusch

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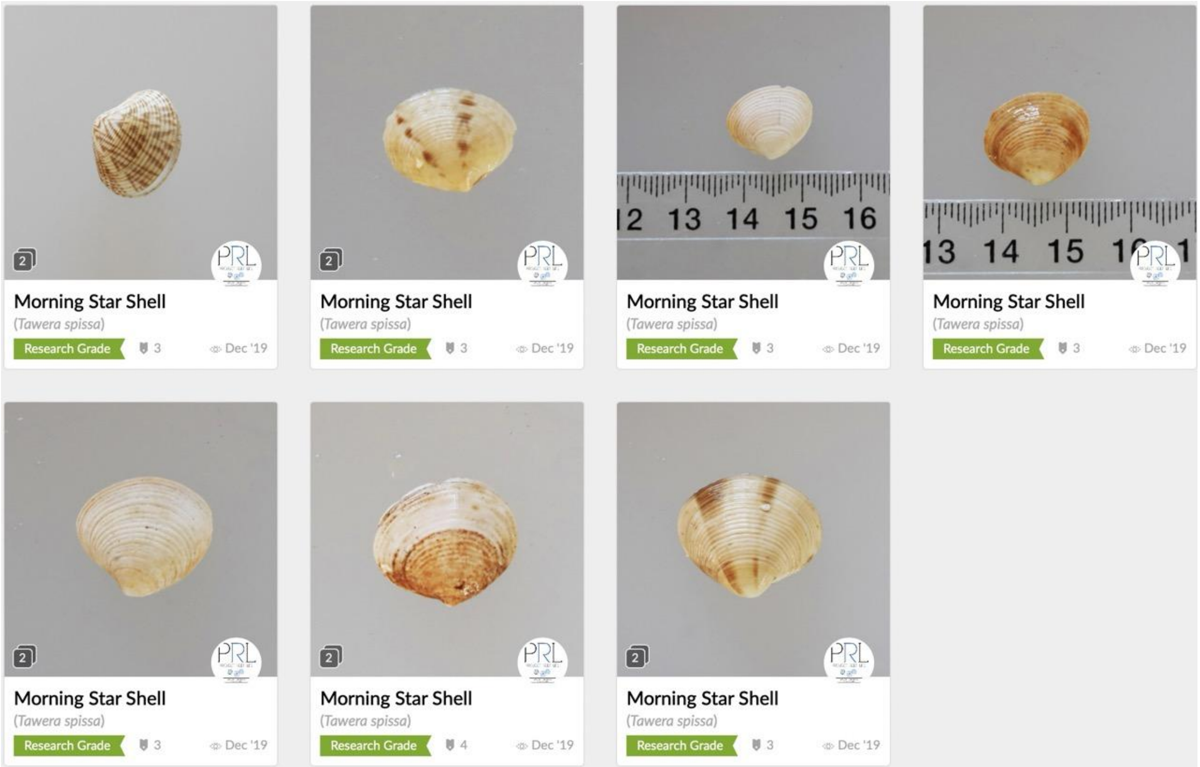
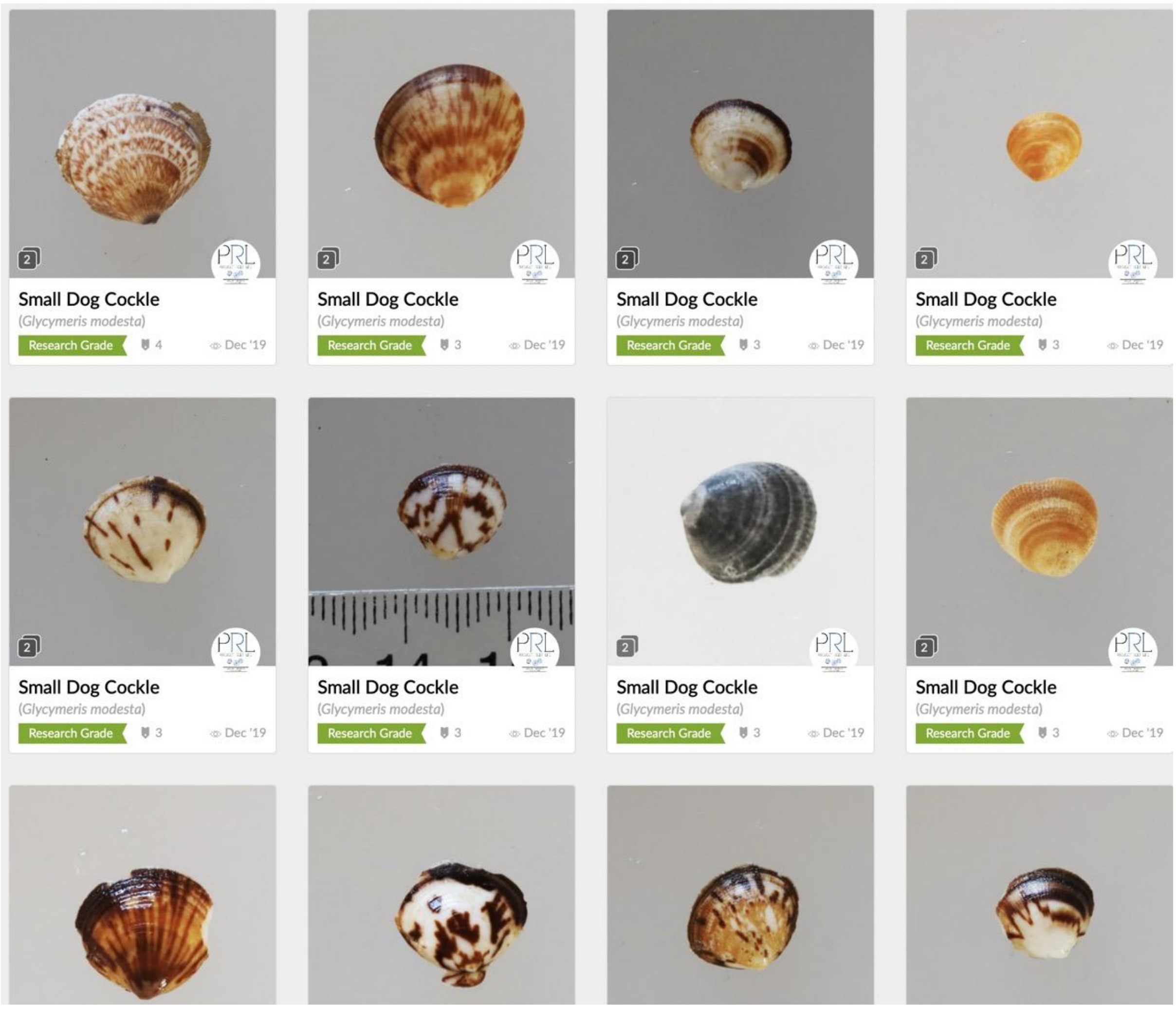
May 2014

https://fs.fish.govt.nz/Doc/23651/AEBR_130_2514_HAB2007-01%20(obj%201,%202,%20RR3).pdf.ashx


Morning Star Shell
(Tawera spissa)
Research Grade 3 Dec '19
Morning Star Shell
(Tawera spissa)
Research Grade 3 Dec '19
12 13 14 15 16
Morning Star Shell
(Tawera spissa)
Research Grade 3 Dec '19
13 14 15
Morning Star Shell
(Tawera spissa)
Research Grade 3 Dec '19
Morning Star Shell
(Tawera spissa)
Research Grade 3 Dec '19
Morning Star Shell
(Tawera spissa)
Research Grade 4 Dec '19
Morning Star Shell
(Tawera spissa)
Research Grade 3 Dec '19


Small Dog Cockle
(Glycymeris modesta)
Research Grade 4 Dec '19
Small Dog Cockle
(Glycymeris modesta)
Research Grade 3 Dec '19
Small Dog Cockle
(Glycymeris modesta)
Research Grade 3 Dec '19
Small Dog Cockle
(Glycymeris modesta)
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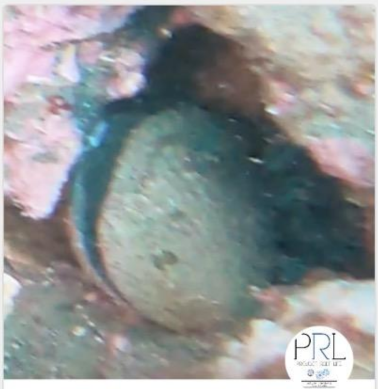
Small Dog Cockle
(Glycymeris modesta)
Research Grade 3 Dec '19
Small Dog Cockle
(Glycymeris modesta)
Research Grade 3 Dec '19
Small Dog Cockle
(Glycymeris modesta)
Research Grade 3 Dec '19

Large Dog Cockle
(Tucetona laticostata)
Research Grade 3 Jan '22



Large Dog Cockle
(Tucetona laticostata)
Research Grade 3 Jan '22

Large Dog Cockle
(Tucetona laticostata)
2 Feb '21

Page 64 Morrison at el.

BIOGENIC HABITAT

1. There is also empirical evidence that a number of demersal fish species are strongly associated with biogenic habitats during their juvenile life phases (e.g. snapper, trevally, blue cod, tarakihi, leatherjackets), with these habitats likely to be providing advantages in terms of growth and/or survival of these juvenile phases

   Ministry for Primary Industries Linking marine fisheries species to biogenic habitats· page 3

2. Corroboration of Local Knowledge: Dr Morrison/NIWA's survey and results - corroborates local knowledge, where divers describe each reef as having **very different characteristics**, from pinnacles, caves, slabs etc. and **the divers also describe different associated coverages of animal and plant life.**

3. Dr Morrison's report Pages 28 & 29 show photos of different 'reefs' taken by NIWA's drop-camera. **Most reefs are hard sandstone/limestone.** The exceptions were reefs 'Papa' and 'D' (mudstone). Another exception was the deepest reef studied 30m-33m depth, Reef 'V', which was a breccia substrate.

4. Morrison at el. describes the features on the *seafloor* as per below, and we have highlighted in bold those reef features which our divers have predominantly taken footage of

1. sand, gravel and **shells** – K/Project Reef was notable for shells

2. bare grey **river stones** (#1 photo, pg.28)
3. irregular cobbles (#2 photo, page 28)
4. tell – flat rock almost covered with sediment (#3 photo, page 28)
5. recently exposed papa rock. (#4 photo, page 28)
6. boulder on sand – without overhangs or ledges (#5 photo, page 28)

7. **flat basement such as stepped flat terraces, walls/scarps, and can be sloping, (#6 photo, page 28)**

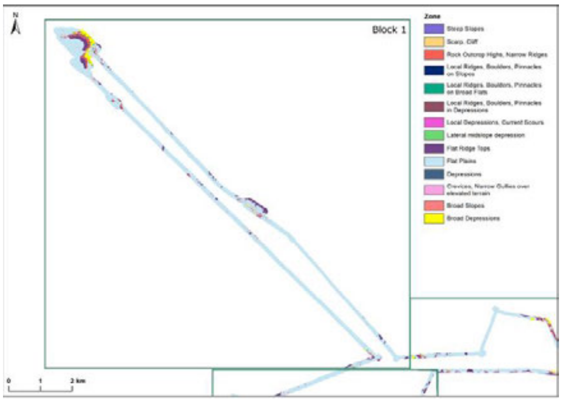
8. **low patch reef, generally less than 5m in width (#7 photo, page 28)**
9. **low broken rock of more than 5 metres – often long expanses** (#10, #11, page 29)

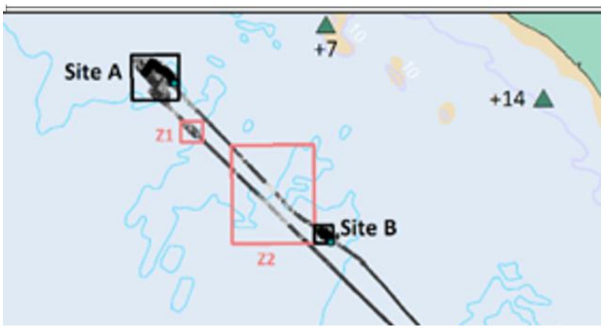
10. **high broken rock around 1-2metres with walls, channels, knobs and outcrops at many metre scales (#8 photo, page 28)**
11. pillow ridges – low 20-30cm rows of pillowed rock always associated with C.flexillis cover e.g. R and S. *"These have not been seen elsewhere" pg.7*
12. **fallen mudstone slabs adjacent to scarp faces,**
13. narrow rock fingers and gutters aligned in the same direction found in site Q

The NIWA surveyed reefs for TTR were identified by Morrison in his report.
They were nearly all the category 8 above 'low patch reefs'.

https://www.epa.govt.nz/assets/FileAPI/proposal/EEZ000004/Hearings/4ad3a33a20/EEZ000004-07-Dr-Tara-Anderson-Benthic-Ecology-Evidence-01-04-2014-v4.pdf

BLOCK 1: #**123.7 acres** (500,572m2) of reef (BTM modelling) pg.24
Only around 1% (0.86 acres & 0.42acres) of the potential reef structures in this area, was drop-camera videoed by CoastCam.





Site A
13.9m-24.8m depth pg.65
105 acres of BTM **likely reef** (425,000 m2 polygon) pg.65
0.86 acres of reef footage (3,486m2) pg.45
% biogenic habitat: 23.4%

Site B
21.2m-25.9m depth pg.71
52.38 acres of BTM likely reef (211,957 m2 polygon) pg.71
0.42 acres of reef footage (1,715m2) pg.45
% biogenic habitat 37.15%

Potential reefs of interest for Dr Morrison:
(currently no drop-camera video of, but based on bathymetry and backscatter)
Pink box: Z1 '**likely sandstone reefs with ridges**'
Pink box: Z2: '**extensive low rock/reef fields** interspersed with sandflats and **interesting channel feature** in the north '
(pg.202 & pg.203 Morrison at el.)

Should the experts **wonder at the two triangles 7 & 14 shown** in the Morrison map above - these are the location of two of NIWA's random sample points for their 'nearshore survey' which were reefs.

*“Site 7 traversed the NW side of the largest of the rocky outcrops (approx. 3.8 x 0.8 km, **2.45 km2**), which from the video footage and map layer appears to be an extensive consolidated reef.”*[2]

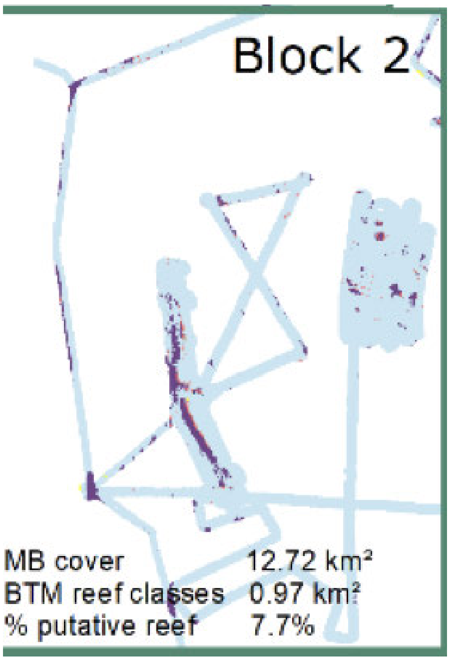
Visuals of reef 7 can be found:

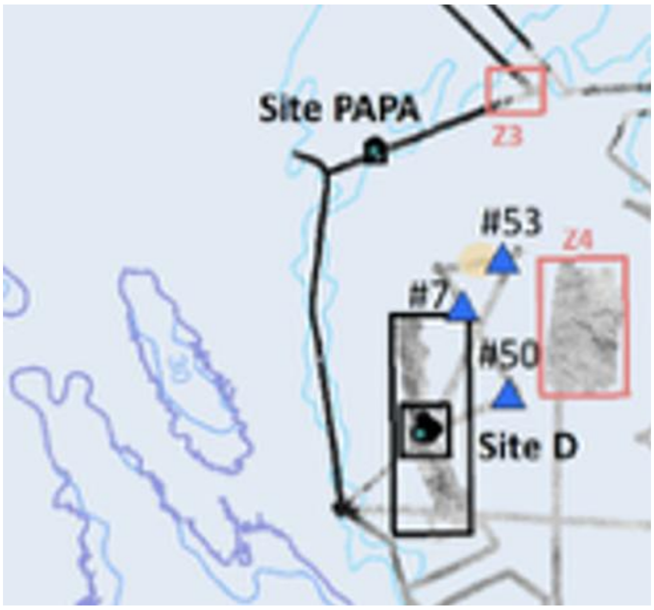
https://www.epa.govt.nz/assets/FileAPI/proposal/EEZ000004/Hearings/4ad3a33a20/EEZ000004-07-Dr-Tara-Anderson-Benthic-Ecology-Evidence-01-04-2014-v4.pdf

[2] https://www.fasttrack.govt.nz/__data/assets/pdf_file/0014/4271/Report-2-NIWA-Benthic-Habitats-Report-FINAL.pdf

BLOCK 2: #**240.7 acres** (973,833m2) of reef (BTM modelling) pg.24
An exceptionally small area (0.37 acres of 240.7 acres) of the potential reef structures in this area, was drop-camera videoed by CoastCam.

7.7% of the multibeam mapping swathe for Block 2 is predicted to be reef



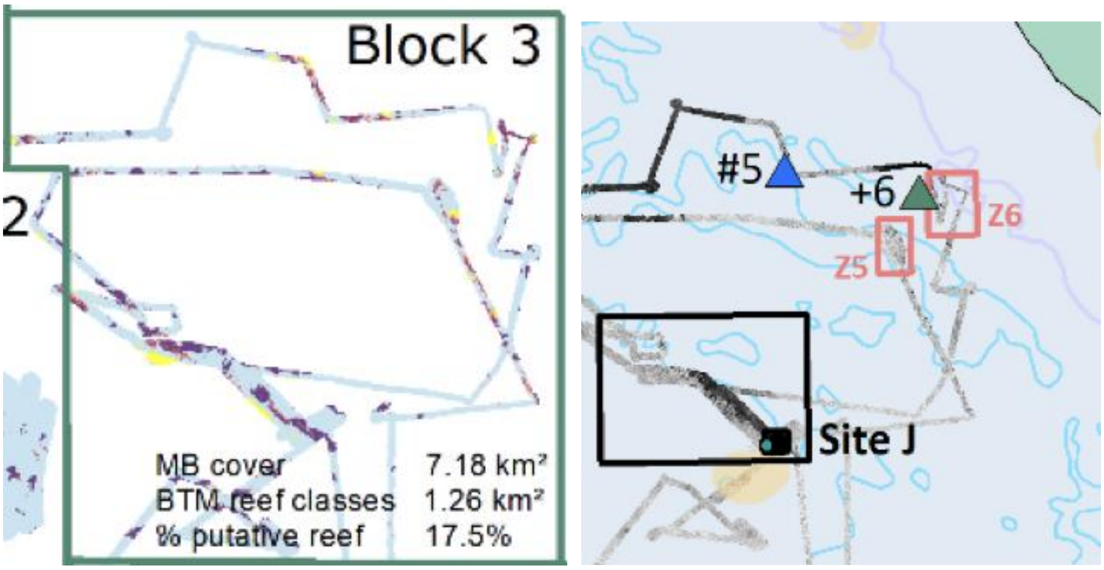


Papa Reef
21.7m-23.5m depth pg.77
Outside BTM likely reef – only ground-truthed in 2021
0.07 acres of reef footage (296m2)
% biogenic habitat 0.02%

Site D
22.3m-28m depth pg.82
98.79 acres+ of BTM **likely reef** (399,750 m2 polygon – *excluding* the western structure) pg.82
0.30acres of reef footage (1,241m2) pg.45
% biogenic habitat

Potential reefs of interest for Dr Morrison:
(currently no drop-camera video but based on bathymetry and backscatter)
Pink box: Z3 ''Likely to be a sandstone reef ridge feature pg.204
Pink box: Z4: "Likely to be a mixed reef outcrop and cobbles complex, with knolls pg.205

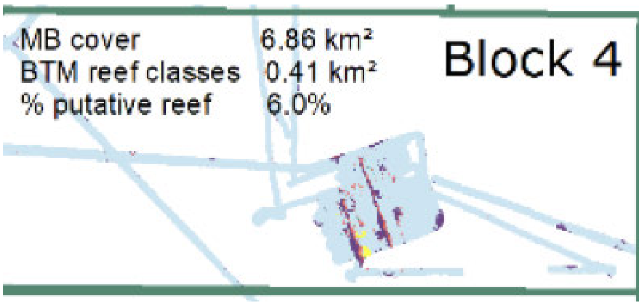
BLOCK 3: #311.28 acres (1,259,662 m2) of reef (BTM modelling) pg. 24
An exceptionally small area 0.1 acres of 311 acres of potential reef, was drop camera videoed.
17.5% of the multibeam mapping swathe for Block 3 is predicted to be reef.



Site J
18.4m-24.1m depth, pg.89
9.64 acres (38,990m2)of BTM **likely reef** - is part of a larger ridge reef complex that extends for 2.3km – possibly even 4.6km.
0.1 acres of reef footage (453m2) pg.45

Potential reefs of interest for Dr Morrison
(currently no drop-camera video but based on bathymetry and backscatter)
Pink box Z5: “Likely to be discrete raised reefs. There are extensive areas of reefs to the west and south of this area. Pg.206
Pink box Z6: “shallowest reef mapped” “Extensive shallow rock, seen as a rising north slope. Pg 207

BLOCK 4: 101.59 acres (411,216 m2) of reef (BTM modelling) page 24
An exceptionally small area (0.91 acres of 101 acres of potential reef was drop-camera videoed.



Site K – Project Reef
19.9m-22.6m depth, pg. 94
0.74 acres (2,993m2) of BTM likely reef . . .which sits within a much larger reef complex of long narrow ridges up to 1.9km long

0.5 acres of reef footage (1,993m2) pg.45
The high amount of coverage - footage wise - of this reef was in order to assist Project Reef in obtaining a good visual of the reef, for planning surveys. The transect passed over seven times, with a nominal 9metre transect spacing.

Defined as low and high patch reef, with low broken rock and irregular cobbles extending beyond the reef, with shell contributions around the reef.
Ecklonia singles, patches and one small forest on the S/E edge.

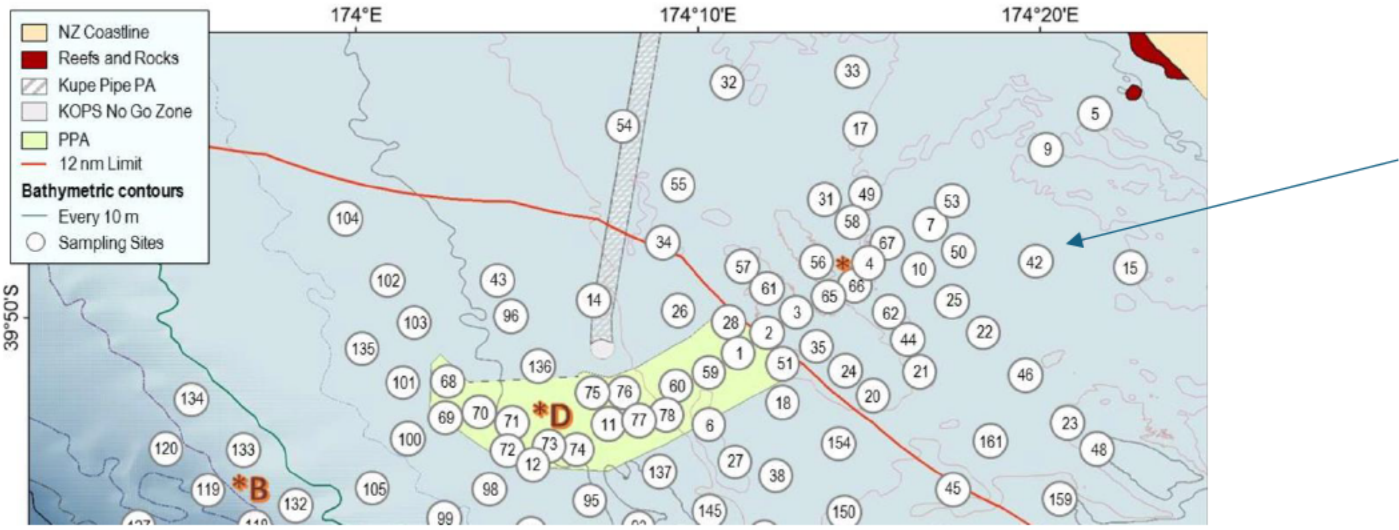
Site L

20.05-25.9m depth pg.109
74.57 acres (301,673m2) of BTM **likely reef**. Long ridge feature approx.. 1.17km long (likely the Ecklonia runs along this) with another shorted scalloped ridge to the west and east.
The north south ridge is around 300-330m wide.
0.17 acres of reef footage (689m2) page 45.

Site O
19.6m-25.4m depth page 107
Reef size of 27.19 acres (main ridge) and **16.48 acres** (east reef)

0.24 acres of reef footage (955m2) page 45

(SITE 42: "Rocky outcrop/rippled sands: Low-lying bedrock and cobbles, partially covered in coarse sand with shell-hash, adjacent to linear-rippled sand with shell-hash and gravel/pebbles in troughs. Bedrock with sponges (encrusting, massive, ball), coralline algae, sea squirt, seastar (Coscinasterias), filamentous red algae " Pg.145 Benthic flora and fauna of the Patea Shoals region, South Taranaki Bight

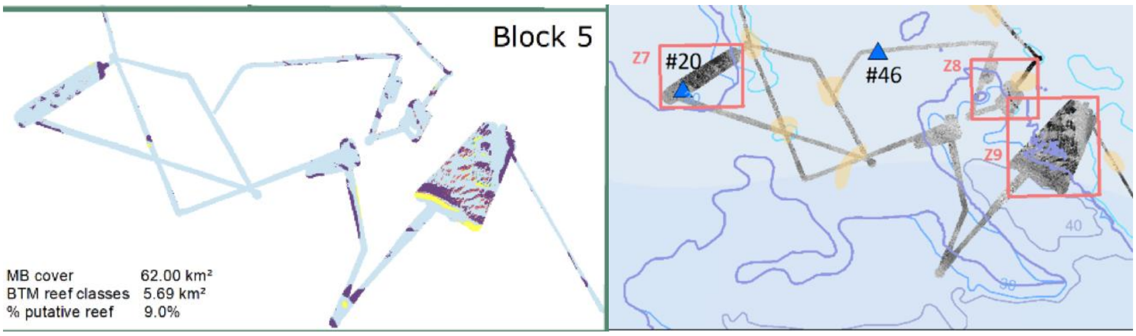


https://www.fasttrack.govt.nz/__data/assets/pdf_file/0015/4272/Report-3-NIWA-Patea-Shoals-Benthic-Ecology-FINAL.pdf

Benthic flora and fauna of the Patea Shoals region, South Taranaki Bight page 17

BLOCK 5: 642.48 acres (2,600,423 m2) of reef (BTM modelling) page 24

No drop-camera work in this area



Potential reefs of interest for Dr Morrison
(currently no drop-camera video but based on bathymetry and backscatter)
Pink box Z7: “Area of large seafloor bedforms – **possibly rock present** as part of depth drop seen in western half. Pg.208
Pink box Z8 Raised seafloor bedforms, in the **western block almost certainly reef**, less clear for the two features in the est block and north transect.
Pink box Z9:

Sites with the blue triangles, #20 & #46 were from **Benthic flora and fauna of the Patea Shoals region, South Taranaki Bight** see map on page 17 .

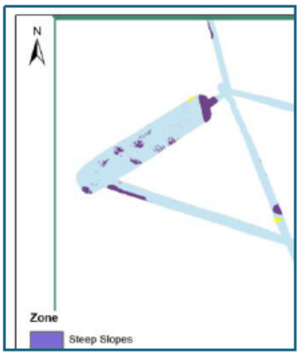
Descriptions of reef per pg.145:

#20: Rocky outcrop/rippled sands: low-relief outcrop partially buried by rippled sands, shell debris and gravel/pebbles in troughs, mudstone cobble; opalfish x5, sml fish x1.

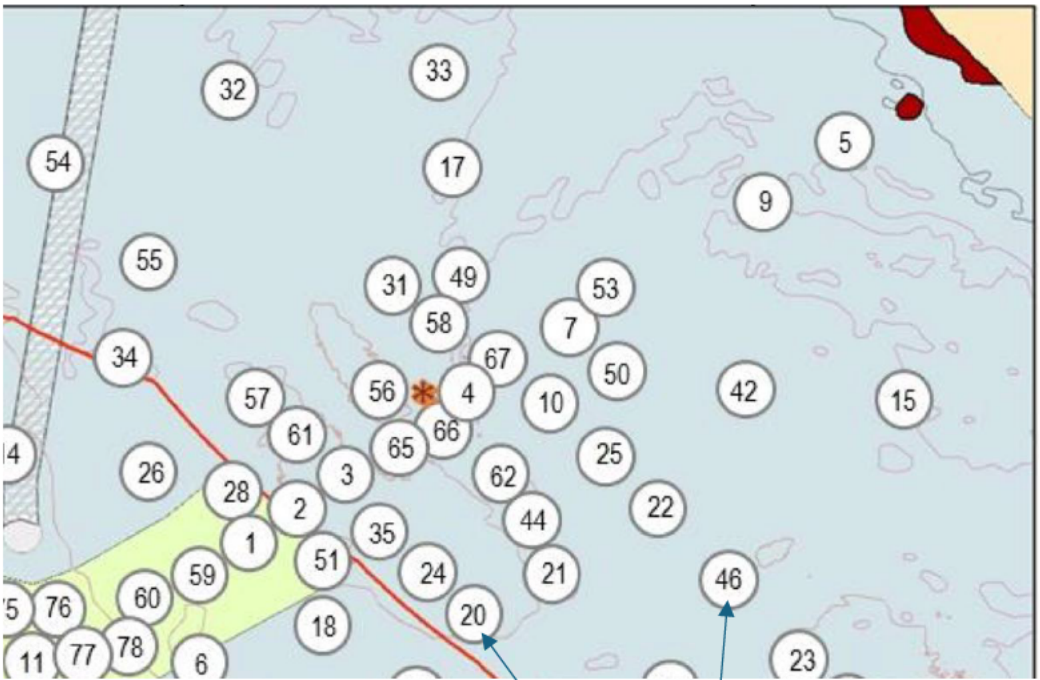
IKA1101_396: CoastCam reference

#46: Scree field/rippled sand: coarse sands with gravels, pebbles, cobbles and shell hash. and shell hash; (NB: possibly shallow buried reef as 3x sponges collected in dredge)

IKA1101_536: CoastCam reference



This is the area by reef #20, which shows some steep slopes, which could indicate reefs



It would be useful to see the CoastCam videos of sites 57, 61, 3, 35, 24, which are in close proximity to the mining site and which **have been described by commercial fishermen as being a scallop bed area (to Project Reef team).**

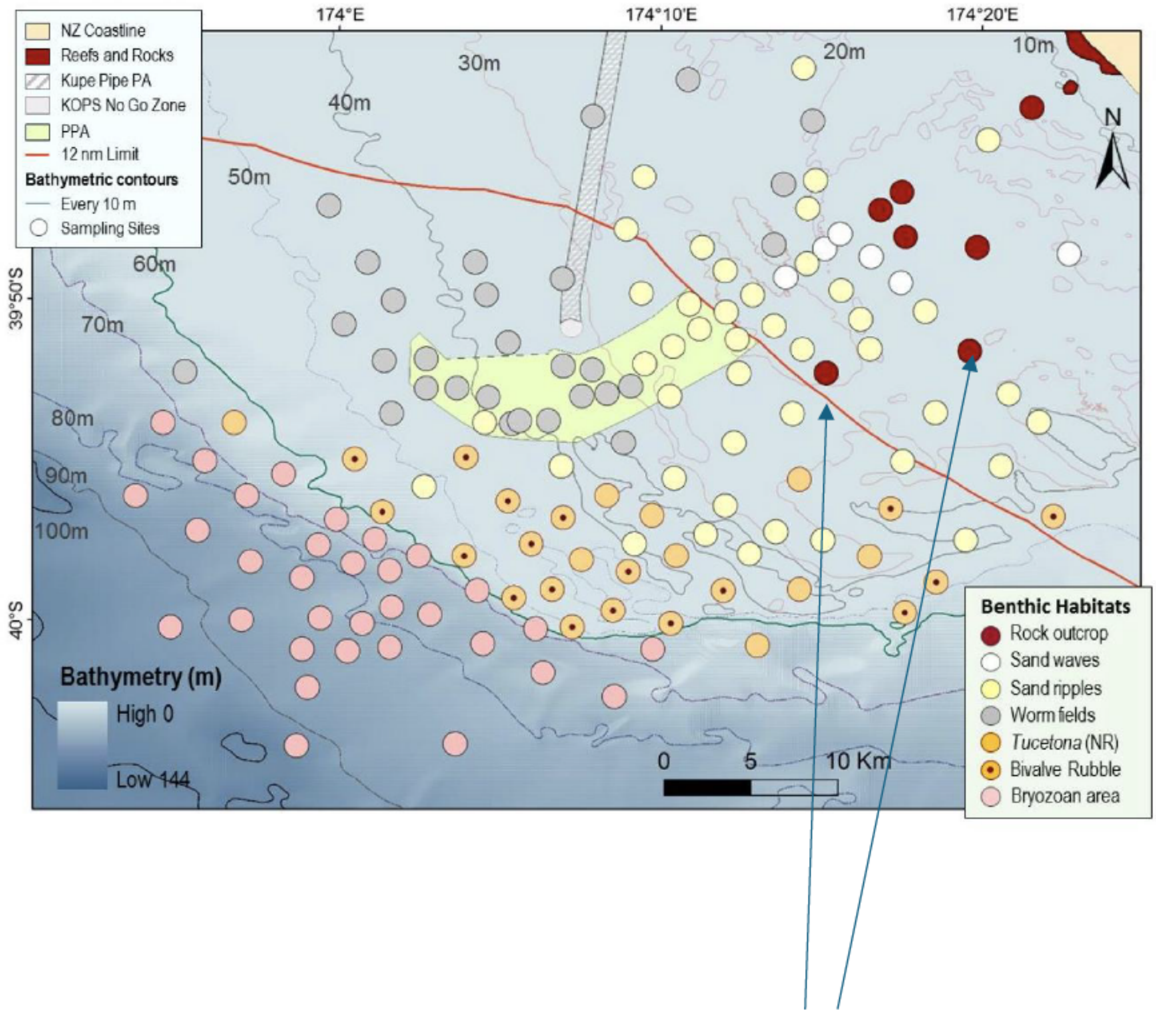
#57: Rippled sands: iron-rich sands with **coquina/shell-hash/gravel (heavy)** in troughs; IKA1101_374

#61: Rippled sands: iron-rich sands, with **shell hash in troughs**; no visible biota (except **loose red-sponge**) IKA1101_375

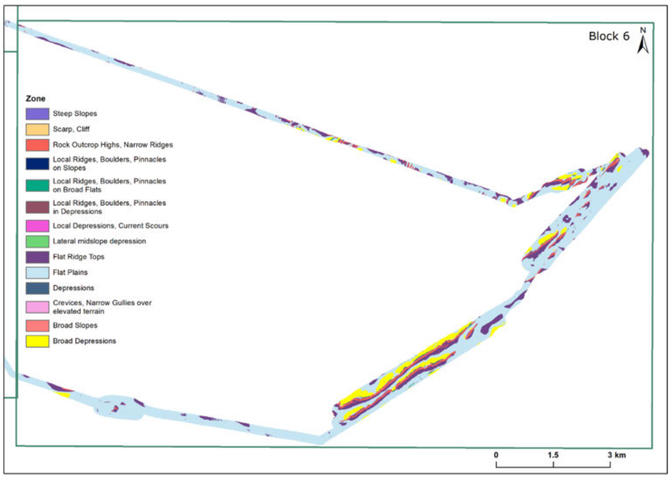
#3: Rippled sands: iron-rich sands with **heavy coquina and shell-hash** in troughs, **large trails**, opalfish x1 IKA1101_186

#35: Rippled sands: iron-rich sands lightly rippled with **coquina (heavy)** in shallow troughs, hermit crab, **large trails** IKA1101_193

#24: Rippled sands with **shell hash**; IKA1101_532



BLOCK 6: 629.73 acres of reef (BTM modelling) – 2,547,834m2 pg.24



(ran out of time to complete this)

INDEPENDENT MPI REPORTS

2024
https://www.mpi.govt.nz/dmsdocument/67287-Aquatic-Environment-and-Biodiversity-Annual-Review-AEBAR-2024-Part-1 (goes to Chapter 9)

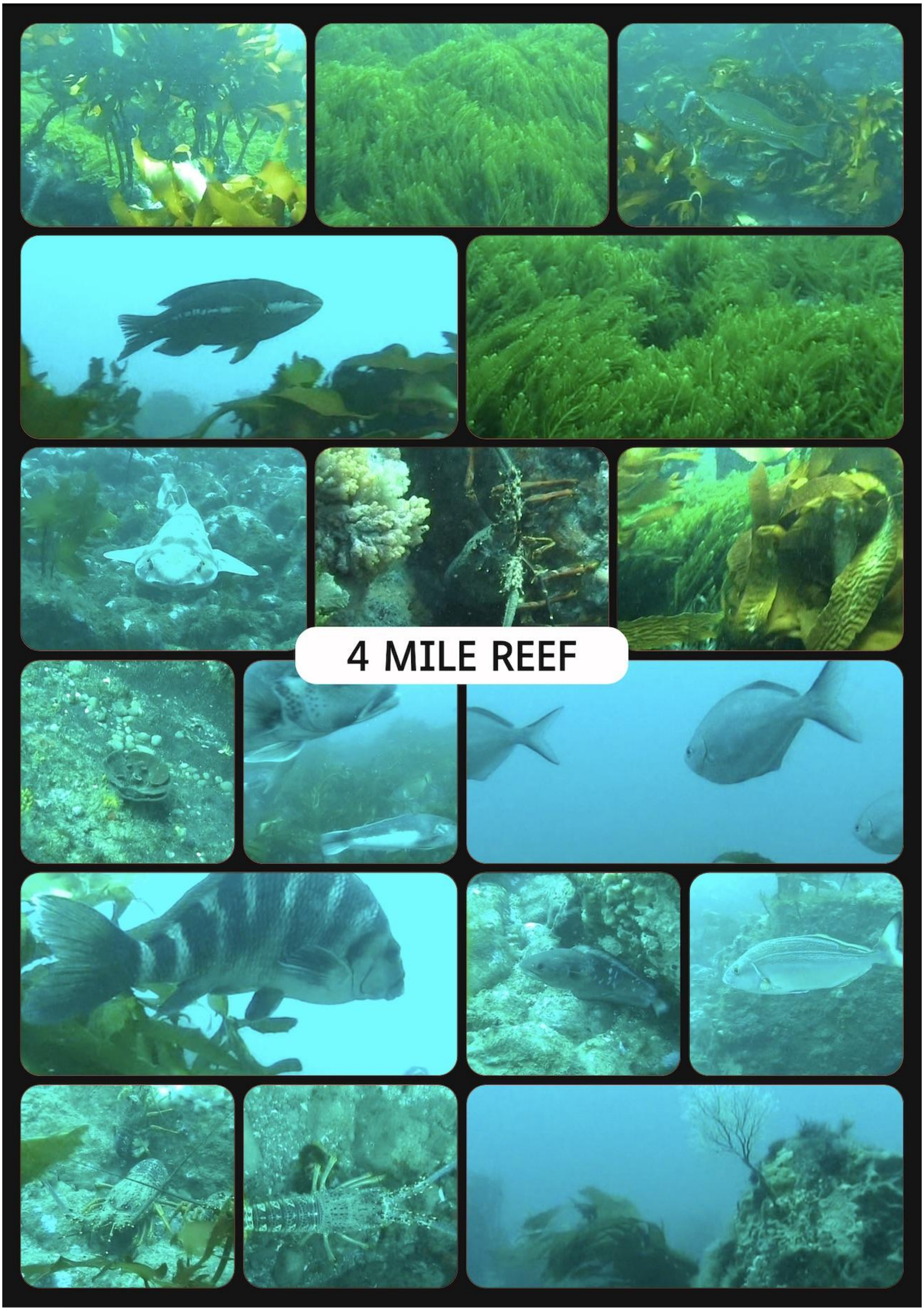
https://www.mpi.govt.nz/dmsdocument/67290-Aquatic-Environment-and-Biodiversity-Annual-Review-AEBAR-2024-Part-2 (goes to Chapter 18)

CHAPTER13. **TROPHIC AND ECOSYSTEM-LEVEL EFFECTS**: The potential effects of fishing on marine food webs are described. **Updated for 2024**

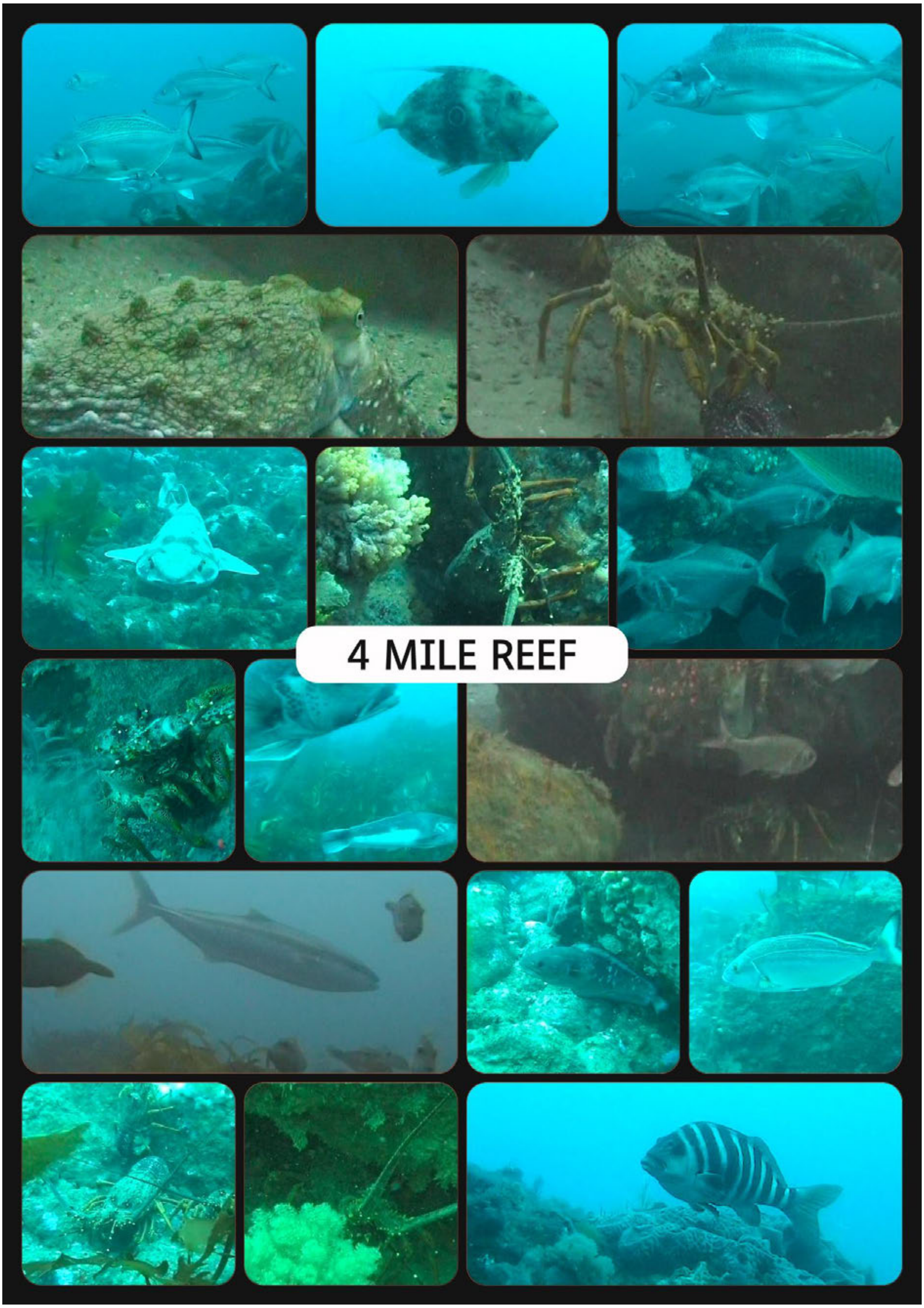
13.4.1 CASE STUDY 1: BOTTOM-UP ENVIRONMENTAL FORCING ON COASTAL REEFS

Bottom-up Environmental impacts on blue cod

Adult blue cod (*Parapercis colias,* Figure 13.3) are generalist predators that **mainly forage on kelp-associated fish and crabs in coastal waters** around much of New Zealand (Beentjes & Carbines 2005, Wade 2020, Kolodzey et al. 2023) . The distribution of large kelps has been negatively impacted by marine heatwave events and sedimentation from land-based runoff along parts of the South Island (See bottom-up forcing in Table 13.3, Tait et al. 2021, Thomsen et al. 2019). In these same regions blue cod abundance has shown a strong negative correlation with environmental variables such as *sedimentation and increasing sea surface temperature, though it is uncertain whether these variables are affecting blue cod directly or indirectly through effects on food and habitat (Brough et al. 2023).*



Photos extracted from footage shared by S Hornby with Project Reef team.



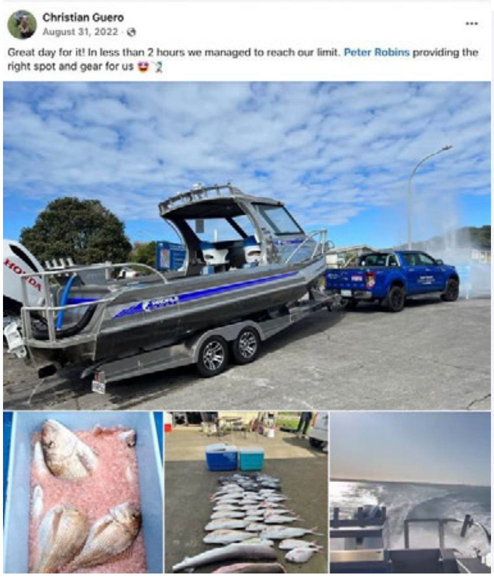
Photos extracted from footage shared by S Hornby with Project Reef team.

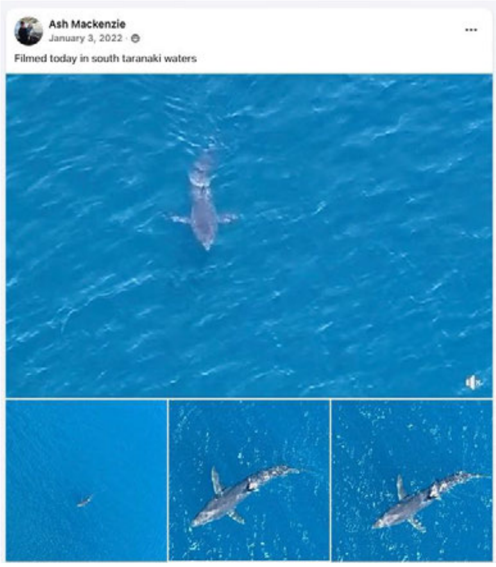
 

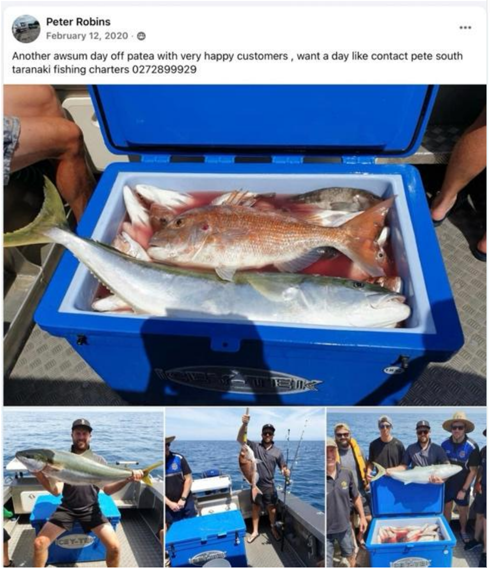
“Project Reef” stresses the importance when assessing the health of reefs – to provide sufficient light, so the nature of the organisms can be seen. To view reefs at 20+ meters without lights, renders them blue and green colours, which makes it harder to assess their health (red light having been lost by about 4m depth).

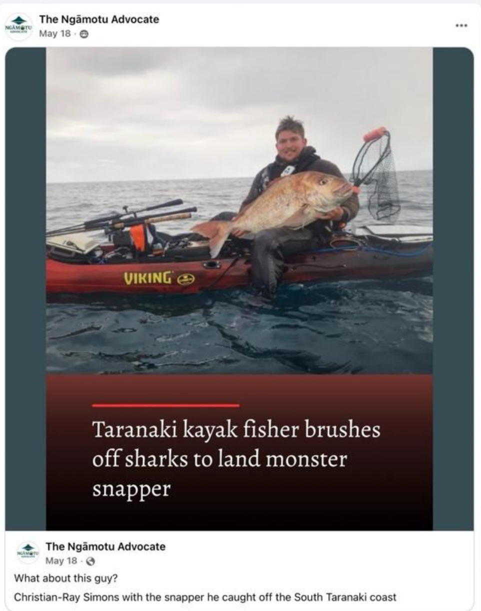
FACEBOOK ENTRIES

The following entries show how rich the fishery is off South Taranaki.









Jamie Newell
January 22, 2018

Another good cray we got on the weekend down south taranaki weighing in at just over 4.6kg. Had few more bigs boys over the day as well

Peter Robins
February 4, 2020

Wow what a good morning few hrs fishing got there snapper cod and a kingie happy people

JJ Atkin
January 4, 2021

Another epic South Taranaki morning 👌👌 released all the kings bar 1,and about 20 odd snapper released while we caught our quota 👍👍 cheers to the boys who crewed

Scarlet Wrasse

Insitu Camera

The footage we obtain also **captures the sounds** – with clear profiles at dawn and dusk. The density of sound is indicative of a healthy reef.

Links: to Dropbox footage taken with insitu camera

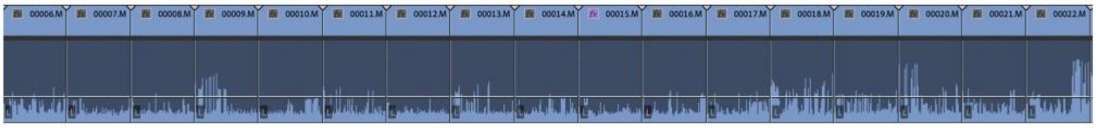
– showing Snapper (which are diver-shy, and we don't see on our dives)
https://www.dropbox.com/scl/fi/9mpa6q9n61mkrz21bmwjv/Snapper_Insitu.mp4?rlkey=ojjilvtwx833lrr8efu4kxvlt&st=uww993ds&dl=0

And another video with **lots of biogenic sounds,** as well as plenty of Tarakihi
https://www.dropbox.com/scl/fi/fypdupogxe323n2beehte/SOUND-VIDEO-Insitu-camera-footage-with-great-sound-00833.mp4?rlkey=r511y24yrmt9c7xbt0hbizoag&st=lwg207c1&dl=0

Below: our insitu camera Mark II and the Sound profiles from a deployment

31st Jan 2023 (#6-#30)

11.53am 12.23pm 12.53pm 1.23pm 1.53pm 2.23pm 2.54pm 3.24pm 3.54pm 4.24pm 4.54pm 5.24pm 5.54pm 6.24pm. 6.54pm 7.24pm 7.54pm



1st Feb 2023 (#31-#77)

8.24pm 8.54pm 9.24pm 9.54pm 10.24pm 10.54pm 11.24pm 11.55pm 12.25am 12.55am 1.25am 1.55am 2.25am 2.55am 3.25am 3.55am 4.25am

4.55am 5.29am 5.59am 6.29am 6.59am 7.29am 7.59am 8.29am 8.59am 9.29am 10.00am 10.30am 11.00am 11.30am 12.00p 12.30pm 1.00pm

1.30pm 2.00pm 2.30pm 3.00pm 3.30pm 4.00pm 4.30pm 5.00pm 5.30pm 6.00pm 6.31pm 7.01pm 7.31pm 8.01pm 8.31pm 9.01pm 9.31pm

2nd Feb 2023 (#78-#124)

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7.00am 7.30am 8.00am 8.30am 9.00am 9.30am 10.00am 10.30am 11.00am 11.30am 12.00pm 12.30pm 1.00pm 1.30pm. 2.00pm. 2.30pm. 3.01pm

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3rd Feb 2023 (#125-#171)

11.32pm 12.02am 12.32am 1.02am 1.32am 2.02am 2.32am 3.02am 3.32am 4.02am 4.32am 5.30am 6.00am 6.30am 7.00am 7.30am 8.00am

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4th Feb 2023 (#172-#218)

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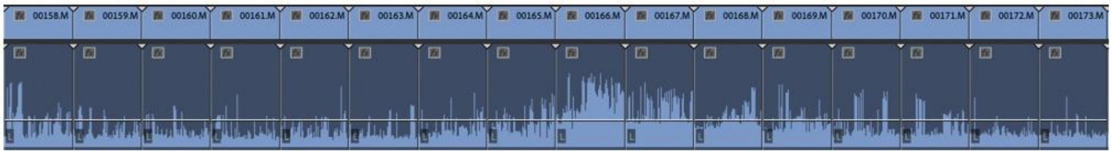

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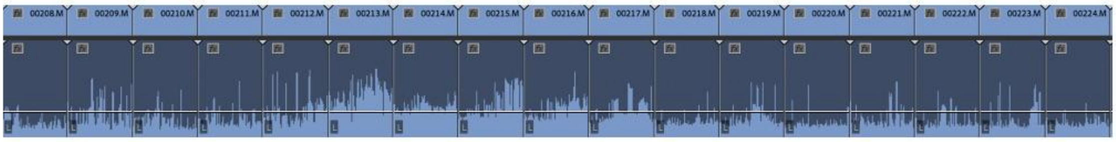
5th Feb 2023 (#219-#265)

6.32pm. 7.02pm. 7.32pm. 8.02pm. 8.32pm. 9.02pm. 9.32pm. 10.02pm. 10.32pm. 11.02pm 11.32pm. 12.02pm 12.32pm 1.03am 1.33am 2.03am 2.33am



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6th Feb 2023 (#267-#312)

8.02pm. 8.32pm. 9.02pm. 9.33pm. 10.03pm. 10.33pm. 11.03pm 11.33pm 12.03pm. 12.33am. 1.03am. 1.33am. 2.03am. 2.33am. 3.03am. 3.33am

4.03am. **4.33am.** **5.31am.** 6.01am. 6.31am. 7.01am. 7.31am. 8.01am. 8.31am. 9.01am. 9.32am. 10.02am. 10.32am. 11.02am. 11.32am 12.02pm 12.32pm

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7th Feb 2023 (#313-#351)

9.33pm. 10.03pm. 10.33pm. 11.03pm. 11.33pm. 12.03am 12.33am. 1.03am 1.33am. 2.03am. 2.34am. 3.04am. 3.34am. 4.04am. 4.34am

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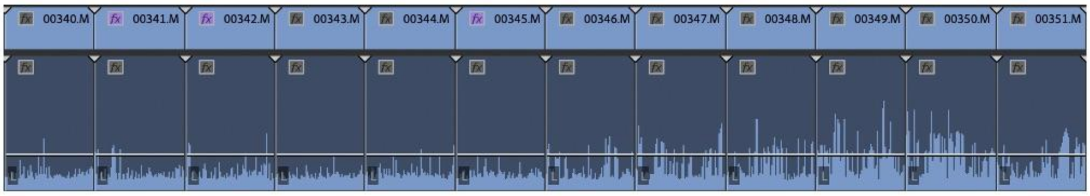


Marine Mammals

Having run out of time to respond more fully – we have provided details of these observations to Ngā Motu Marine Reserve.

Most of these observations should have been logged with DOC.

They are just a few of our Facebook posts.

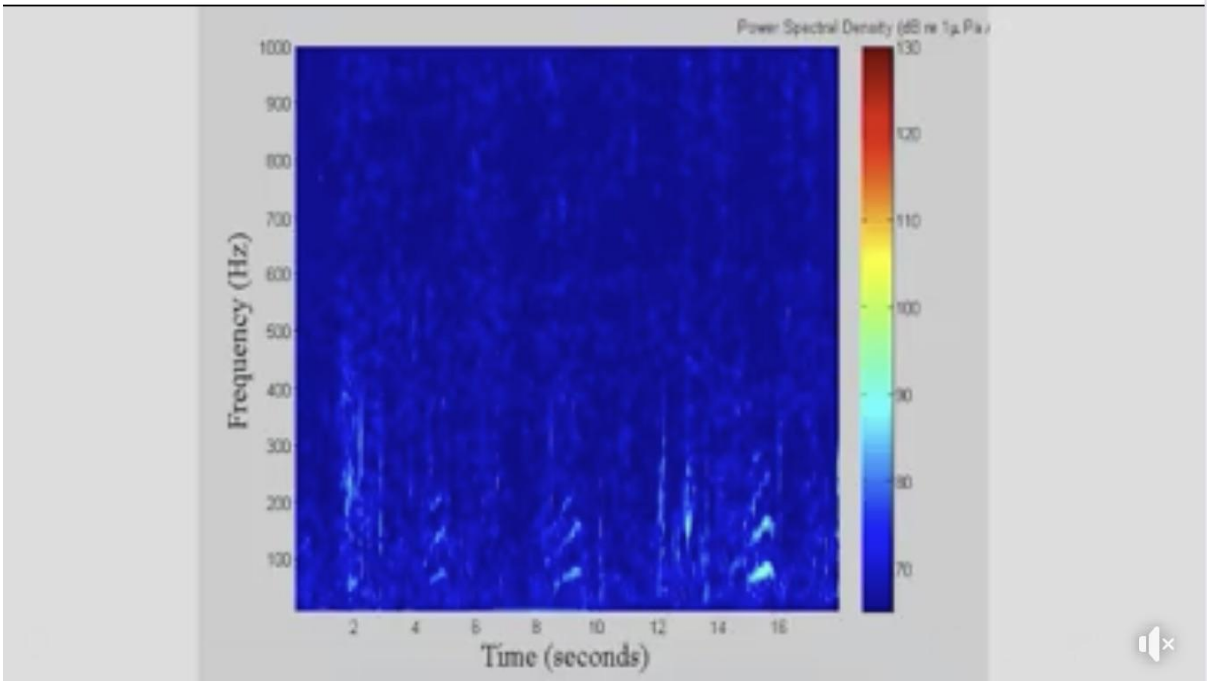
As mentioned earlier in our comments – club members have seen whales, dolphins, orca. While divers most likely have not individually recorded them with DOC, when Project Reef finds out, we do so.

Project Reef Life - South Taranaki
July 14, 2020 ·

To celebrate #worldorcaday (14th July)- we thought we'd share this awesome footage of orca in South Taranaki, taken in 2013, about 8km offshore of Patea. Big thank you... **See more**

Project Reef Life - South Taranaki
May 25, 2017 ·

Humpback whale recorded on the hydrophone at the Reef! Listen carefully and you will hear the sounds that correspond to the 'upsweeps' on the picture. Beautiful!!

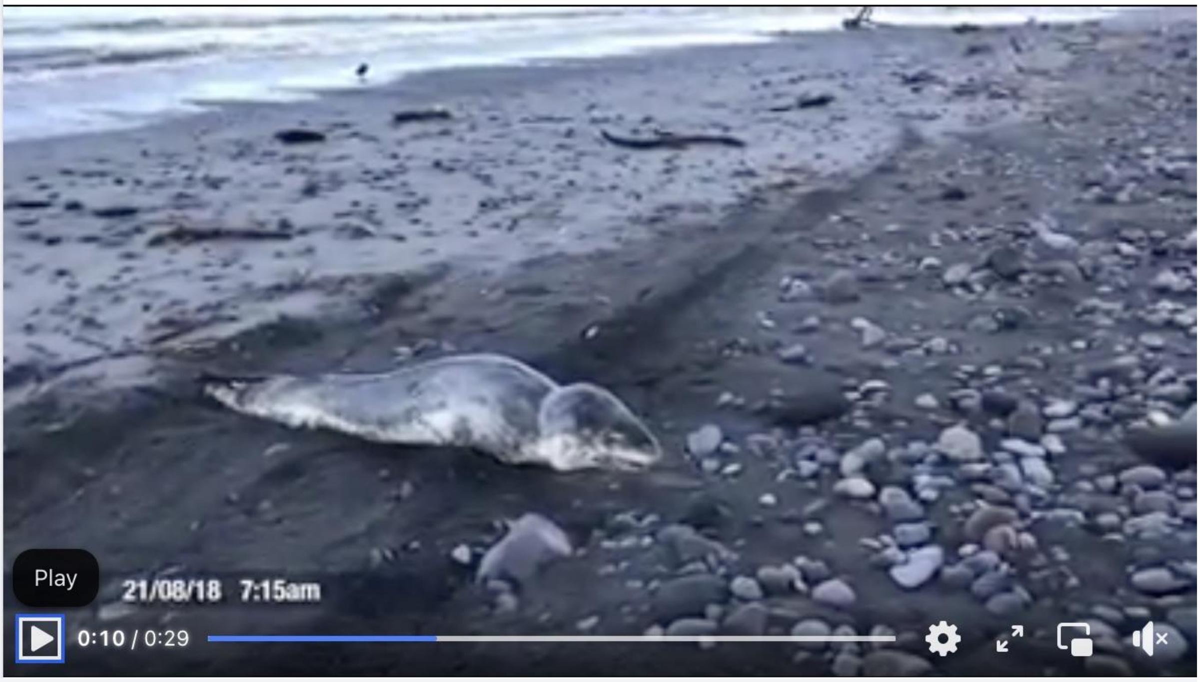


Project Reef Life - South Taranaki is in **Taranaki**.
June 14, 2024 ·

🐳 Breath-taking! Two humpback/paikia whale adults and a calf (10 miles off Mokoia, South Taranaki). ... **See more**

Project Reef Life - South Taranaki
August 21, 2018 ·

Sure, it's not usual Project Reef Life - South Taranaki content ... but when a young leopard seal makes a brief visit to South Taranaki – it's news too exciting not to ... **See more**



Project Reef Life - South Taranaki
December 9, 2017 ·

Whales spotted by joint Project lead Bruce Boyd on Thursday, 10 km off Patea- calm sea conditions certainly helps in spotting them!
Will get back to you about what species they are!

Project Reef Life - South Taranaki
September 1 ·

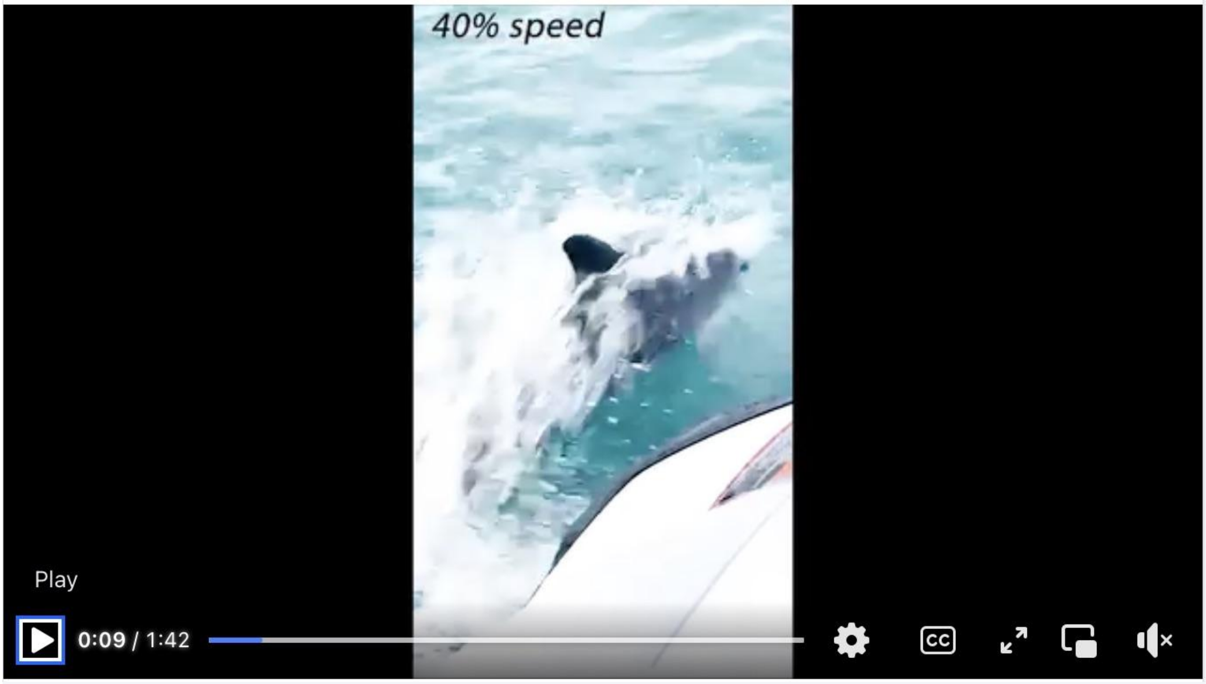
🐬✨ A pod of common dolphins was spotted 13km offshore from Pātea on 23rd August!
🎥 Footage captured by Bruce Boyd.
🌊... **See more**

Dean Pratt, Ngāneko Eriwata and 49 others 5 comments 13 shares

Like Comment Share

Project Reef Life - South Taranaki
June 8, 2024 ·

Dolphins 1 km off Ōhawe, South Taranaki . . .playing alongside a local out on his jet-ski yesterday. Great local footage to be sharing on 'World Ocean Day' 😀
#WorldOceanDay



Project Reef Life - South Taranaki
April 21, 2022 ·

Yesterday, this awesome footage of around 50 dolphins sighted about 7km offshore, south of Pātea, was taken by local South Taranaki Underwater Club - DiveClub member Br... **See more**

Project Reef Life - South Taranaki
May 30, 2020 ·

A pod of dolphins joining in on some jet ski action in the South Taranaki Bight! A big thank you to Shane for sharing this awesome footage with Project Reef Life - Sout... See more

Project Reef Life - South Taranaki
March 2, 2021 ·

These past two weekends had great conditions for diving & documenting life offshore of South Taranaki! 🐟 ☀️

Following a visit from a small pod of common dolphins just off Pātea, members of the South Taranaki Underwater Club headed out to dive and document the Project Reef. We're excited to share photos and videos of their adventures over the coming week... stay tuned.

#taranaki #ocean #reef #scubadiving

Project Reef Life - South Taranaki
January 27, 2017 ·

Video footage of a Risso dolphin sighted off Patea, South Taranaki – 13km further offshore than the Project Reef. 14 seconds in you can see a great view of the dolphin... **See more**

Minute 17

We note that in point [3] written responses *may* be provided using the headings given.

We have not chosen to do so – partly due to the limited time to collate information, and set it out.

1. Fish species using the area.
   We have provided fuller explanations on a selection of species in our RFI.
   We have also given you a 'snip' off the I-naturalist page showing all fish species recorded (though not sharks and rays) – so see below for those!
   We have provided the (main) fish species seen by Morrison on the drop-camera footage (the coloured dots and stars) which shows considerable variety between each reef. Even considerable variety along the length of each survey taken on a reef.
   We have provided some information on an unusual sighting the Lancet.
   We have provided a dropbox link to some insitu camera footage – for snapper and Tarakihi – which shows that a different lens entirely is gathered when observations are made without the presence of divers.

   To add: we forgot to add the catching of Hapuka in the deeper area (>30m) off the Pātea shoals up above. So this is noted here for you.

   In our conversations we realise that the 'densities of fish' seen on sounders, are often photographed, but then are deleted. This would have provided a good insight.

2. Parts of the area used by fish species – we have provided a map from a recent talk at the club – showing in a broad sense where there are good areas to catch certain fish species.
   We have also provided GPS (restricted) reef and sand points, which were rounded off, so that the exact area can't be located, with commentary from the divers.
   We have also highlighted some insights from MPI, and how local fishermen and divers can have a different view for the area in the shallow shelf within the territorial waters e.g. shark example.

3. We can't really provide much information on migration, feeding and breeding areas – other than to say when talking to retired commercial fisherfolk and club members saying that the sand areas in the Pātea shoals are breeding areas. Divers say they catch juveniles year round – and release them!

   Crayfish are an important food for divers, and the area's reefs are providing a healthy population.

Changes in fish use over ten years. Apart from a local diver who has kept a diary over his lifetime of fishing (which was provided to Dr Morrison), other club members don't have that kind of detail. In general terms there is the observation of less blue cod caught and more snapper. The best person to corroborate this would be South Taranaki Fishing Charters. We provided some of his FB posts – indicating that catching the limit of fish is easily done off South Taranaki.

Minute 14:

Pages 84-115 of our comments covered the benthic habitats and species. This RFI provides fuller details on some areas.

Location of habitats: Our club members provided their GPS coordinates and narratives on reefs and coverage on them. There are also the drop-camera reefs surveyed by Morrison. There is also in this information – some commentary on sand banks.

We do not have any comments to make about the changes in habitats over ten years. We are aware there are many places elsewhere in NZ where fish, crayfish stocks have fallen and there are restrictions. We are also aware of areas elsewhere in NZ with invasive species – which we don't suffer from. See pg. 125 & 126 of our comments.

The ocean offshore of South Taranaki provides excellent recreational fishing and diving – and as the access is limited, and the weather conditions need to be right – the opportunities when they arise are highly successful in terms of catch and experience. We know the area is naturally protected due to the inability to easily get out each day. It is notable that our club members dive around NZ, and regard our local area equal to, if not surpassing in some respects, elsewhere.
So we appreciate the high ecological value, and well as recreational value of the area. Through our work with local Iwi and hāpu we continue to learn and appreciate far more on the cultural lens, and how the local area has been a food basket over many generations to be shared with coastal and more inland hapu. We respect that we are in their rohe. Project Reef has an enduring relationship with local Iwi and we share insights with them, and

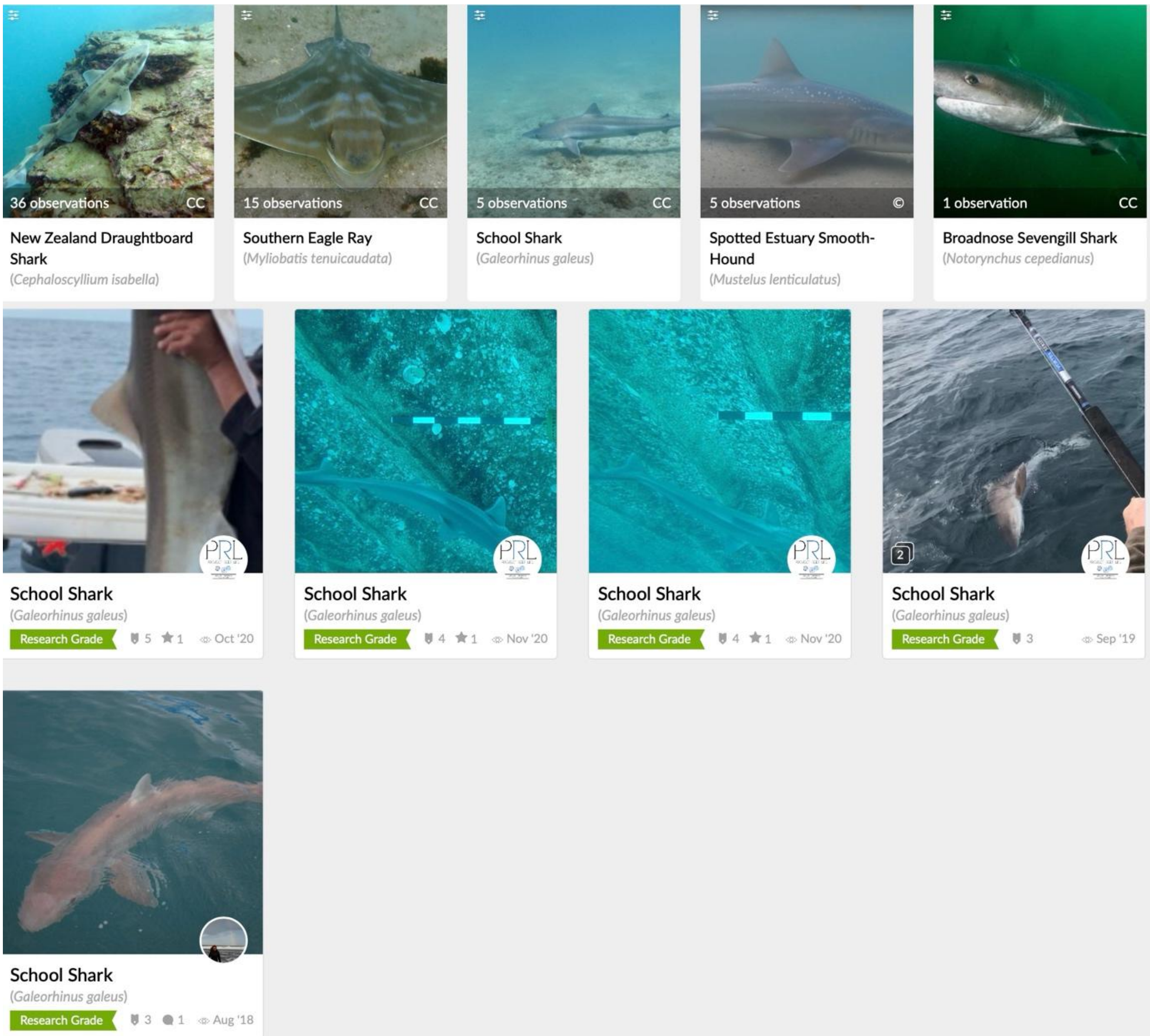
The more stories are shared – the more patterns seem to emerge.

We have provided in this RFI photo records of reef condition of the Project Reef, the Crack and 4-mile reef. This coming summer we hope to revisit all three, and would be happy to share footage with the panel.
We have found the Project reef to be in excellent condition, and no noticeable adverse impacts seen. As we have GB of visual footage we can evidence this. A number of places are returned to often e.g. the location where we deploy the insitu camera, and the jewel anemones shelf.

Minute 15 Marine Mammals

We have not given much time to this – other than to record conversations with club members who have seen whales, orca and dolphins and to give you some of Project Reef's FB posts. Project Reef has logged sightings with DOC, where we are notified of sightings. . . so we suggest DOC be asked for all sightings logged for our area. The pleasing aspect is that over time more community members share their recordings with us.

One of the Project Team's memorable experiences was sighting four humpback whales whilst on the boat close to the Project Reef.



Spotted Estuary Smooth-Hound
(Mustelus lenticulatus)
Research Grade 3 Dec '23

Spotted Estuary Smooth-Hound
(Mustelus lenticulatus)
Research Grade 4 Dec '23

Spotted Estuary Smooth-Hound
(Mustelus lenticulatus)
Research Grade 3 Dec '23

Spotted Estuary Smooth-Hound
(Mustelus lenticulatus)
Research Grade 4 Dec '23

Spotted Estuary Smooth-Hound
(Mustelus lenticulatus)
Research Grade 2 Dec '23

Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 2 Feb '25

Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 4 Nov '24

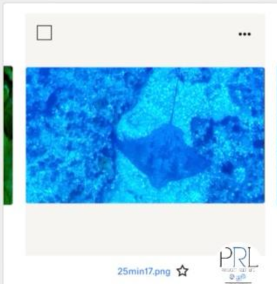
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 4 Nov '24

Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 4 Nov '24

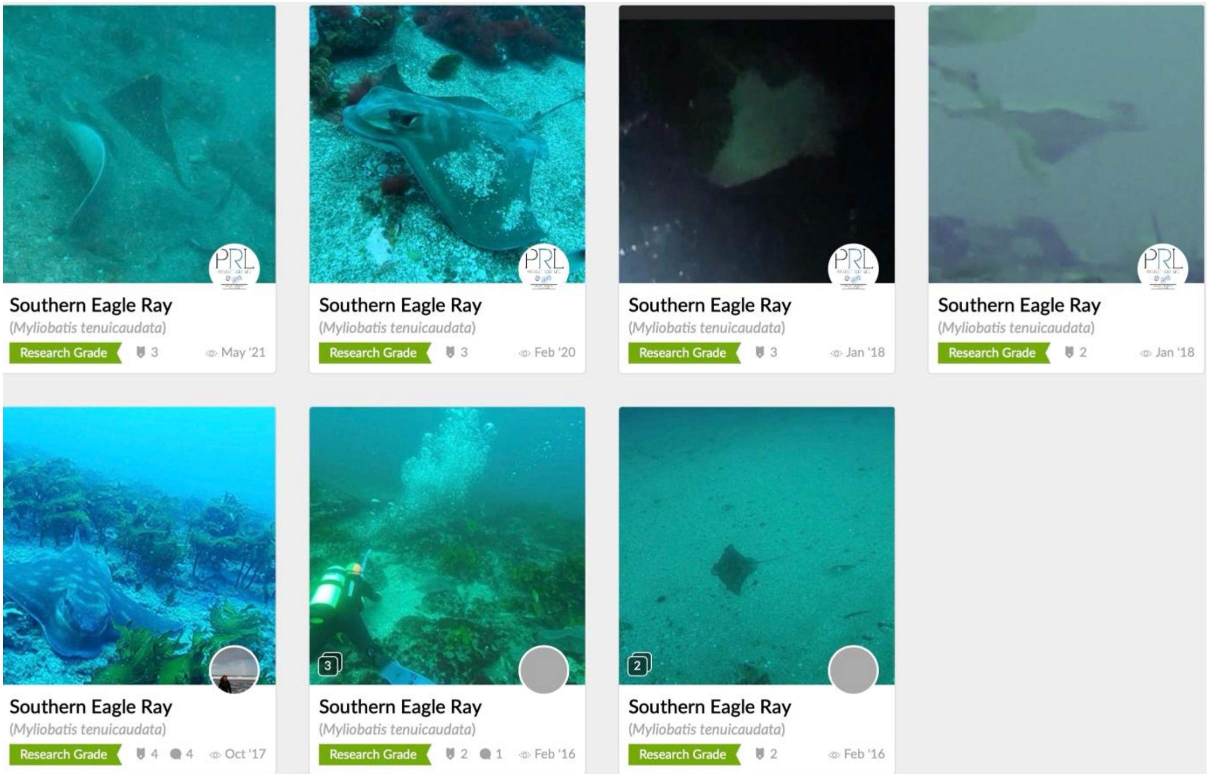
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 2 Feb '23

Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 3 Feb '23

Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 2 Jan '23



Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 2 Mar '21


Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 3 May '21
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 3 Feb '20
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 3 Jan '18
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 2 Jan '18
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 4 4 Oct '17
3
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 2 1 Feb '16
2
Southern Eagle Ray
(Myliobatis tenuicaudata)
Research Grade 2 Feb '16