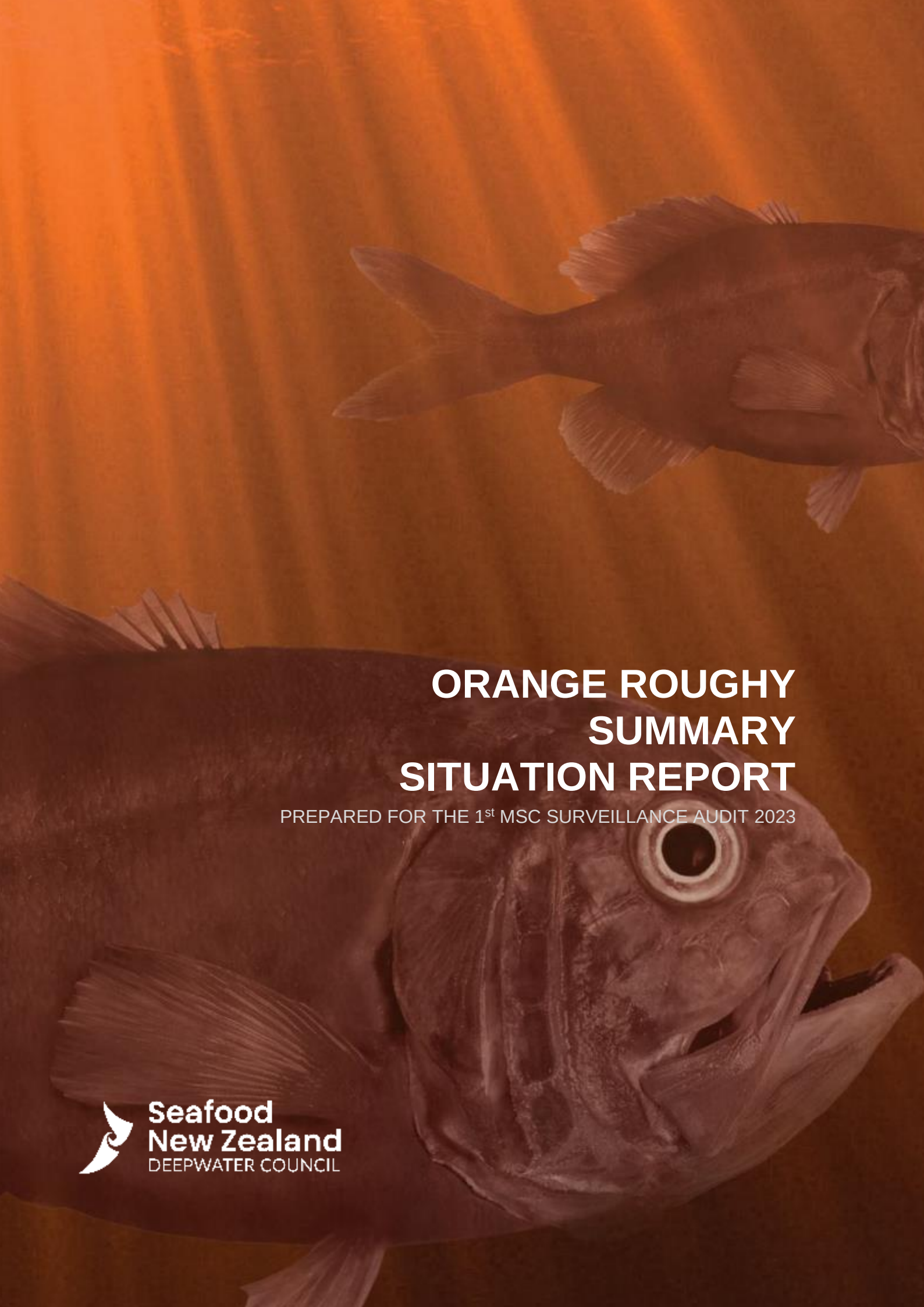

ORANGE ROUGHY SUMMARY SITUATION REPORT

PREPARED FOR THE 1st MSC SURVEILLANCE AUDIT 2023

Seafood New Zealand
DEEPWATER COUNCIL

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SUMMARY
SITUATION REPORT FOR THE 1ST MSC SURVEILLANCE AUDIT 2023

NEW ZEALAND ORANGE ROUGHY TRAWL FISHERIES

PURPOSE OF THIS REPORT

This summary report is prepared for the first annual MSC surveillance audit of three New Zealand orange roughy units of Certification (UoC): ORH 3B Northwest Chatham Rise (NWCR), ORH 3B East & South Chatham Rise (ESCR) and ORH 7A Challenger Plateau & Westpac Bank (ORH 7A-WB) trawl fisheries.

Cited references can be found on our website: https://deepwatergroup.org/certification/orange-roughy-first-surveillance-audit-2023/

OVERVIEW OF FISHERY MSC CERTIFICATION

Orange roughy trawl certification details

Certification date	Initial Certification: 2016 First Recertification: 2022
Stock areas	UoC 1: ORH 3B NWCR UoC 2: ORH 3B ESCR UoC 3: ORH 7A-WB
Species	*Hoplostethus atlanticus*
Method/gear	Trawl

P1 OVERVIEW OF STOCK MONITORING, STATUS, AND INFORMATION

Stock status summary for the combined UoC

Table 1: Summary of the stock status of the UoC based on the base model runs

Stock	Most recent assessment	Stock status [Year]	P < Target	P < Soft Limit	P < Hard Limit
ORH 3B NWCR	2017	38 %	40 – 60 %	<40 %	<40 %
ORH 3B ESCR*	2020	36 %	>60 %	<10%	<1 %
ORH 7A-WB	2019	47 %	>90 %	<1 %	<1 %

* This relates to the ESCR stock assessment as per the May 2022 plenary and prior to the updated position of the May 2023 plenary where the stock assessment has been removed due to inconsistent trends between data sources.

Stock status, TACCs, catch limits & catches by component UoCs

	ORH 3B NWCR	ORH 3B ESCR	ORH 7A WB
UoA share of TACC	100 %	100 %	100 %
UoC share of TACC	95.8 %	95.8 %	93.9 %

UoC 1 – ORH 3B NWCR

Update on stock status (FNZ, 2023

- B_{2017} was estimated at 38% B_0. Based on 2023 evaluation B_{2017} was As Likely as Not (40–60 %) to be at or above the lower end of the management target range
- Based on 2023 evaluation B_{2017} is Unlikely (< 40%) to be below the Soft Limit and Unlikely (< 40%) to be below the Hard Limit.
- Overfishing is Exceptionally Unlikely (< 1%) to be occurring.
- Catches have been low since 2018–19 (< 33% of catch limit).
- Acoustic estimates of spawning biomass have been increasing.

TACC & catch trends (FNZ, 2022)

Table 2 and Figure 1 - Figure 3 show the TACC and catch trends for ORH 3B NWCR.

Table 2 Catch limits, ACE, catch and associated balances for the ORH 3B NWCR fisheries from 2018-19 to 2022-23.

Stock		2018-19	2019-20	2020-21	2021-22	2022-23	5-year average
ORH 3B NWCR	Catch limit	1150	1150	1150	1150	1150	
	ACE	1243	1272	1276	1277	1287	
	Catch	294	230	356	203	176	210
	Balance	948	1042	920	1075	1111	

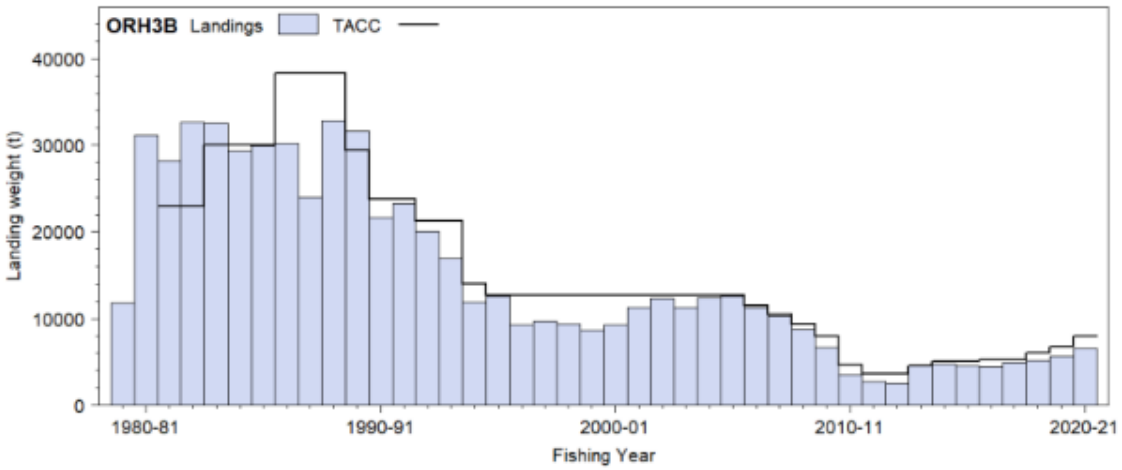

Figure 1: Total Allowable Commercial Catches and reported catches for ORH 3B (FNZ, 2022c).

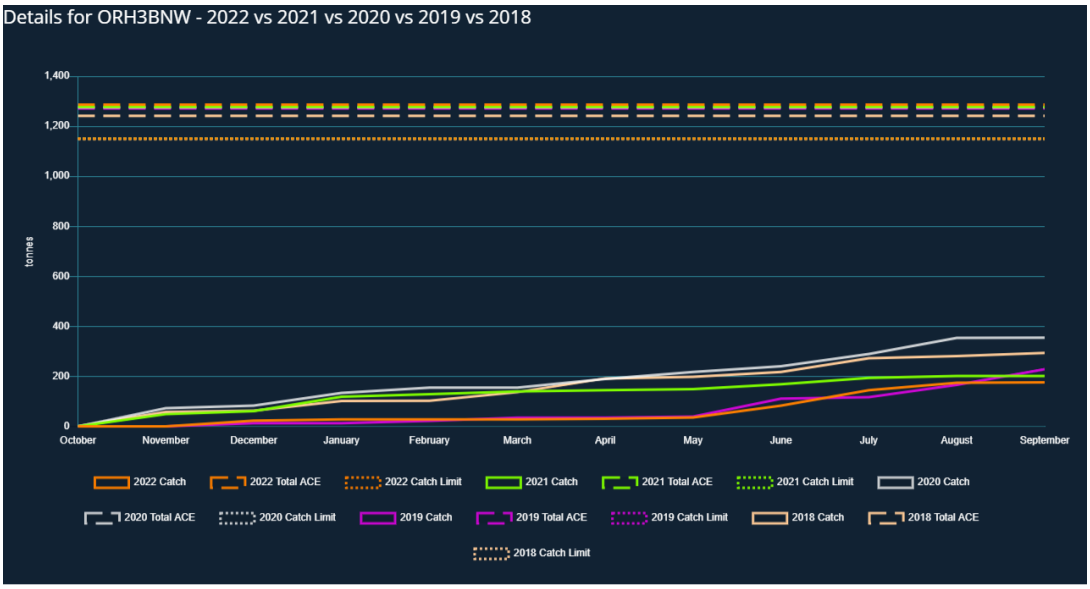

Figure 2: Catch trends and associated total allowable commercial catch for ORH 3B NWCR (Source: FishServe KUPE system)

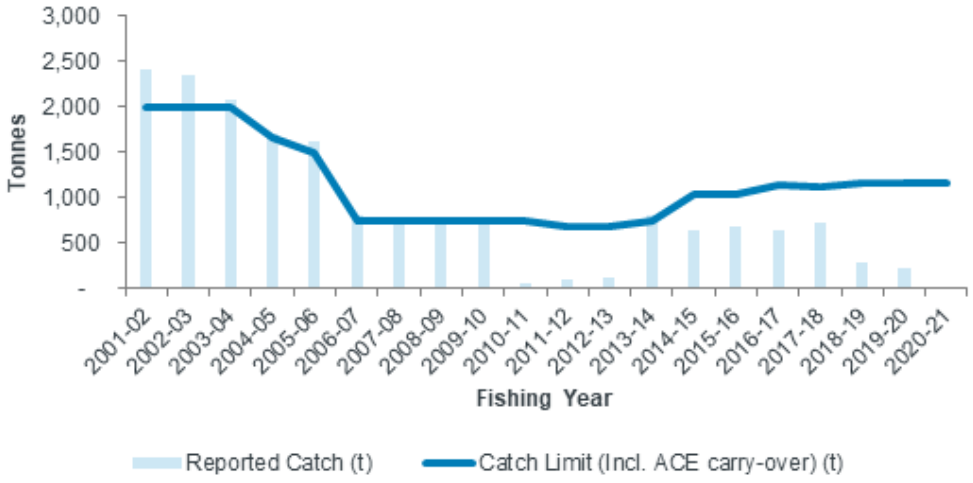

Figure 3: ORH 3B NWCR Catch Limits and Commercial Catches. Voluntary fishery closure from 2010-11 to 2012-13 to promote stock rebuilding.

Catch management

Figure 4 details the ORH 3B fishery sub-areas and the approximate position of other named fisheries. One of these sub-areas is the NWCR area. The NWCR catch limit from 2014-15 of 1,250 t, was established prior to development of the HCR. The industry chose a more conservative approach by shelving 207 t annually. Application of the HCR to the 2018 stock assessment resulted in a reduced catch limit of 1,150 t. Catches have been below the catch limit since 2014-15. Much of the biomass during the spawn in NWCR resides on the Underwater Topographical Feature (UTF) Morgue, which is closed to fishing by Regulation. Most of the catch is taken outside of the spawning season over flat/undulating grounds in the western part of NWCR. **Table 3**

Biomass surveys and stock assessments are performed at four-year intervals based on a Management Strategy Evaluation (MSE), (Cordue, 2014) and scheduled by Fisheries New Zealand's Medium Term Research Plan for Deepwater Fisheries 2020/21 to 2024/25 (FNZ, 2020).

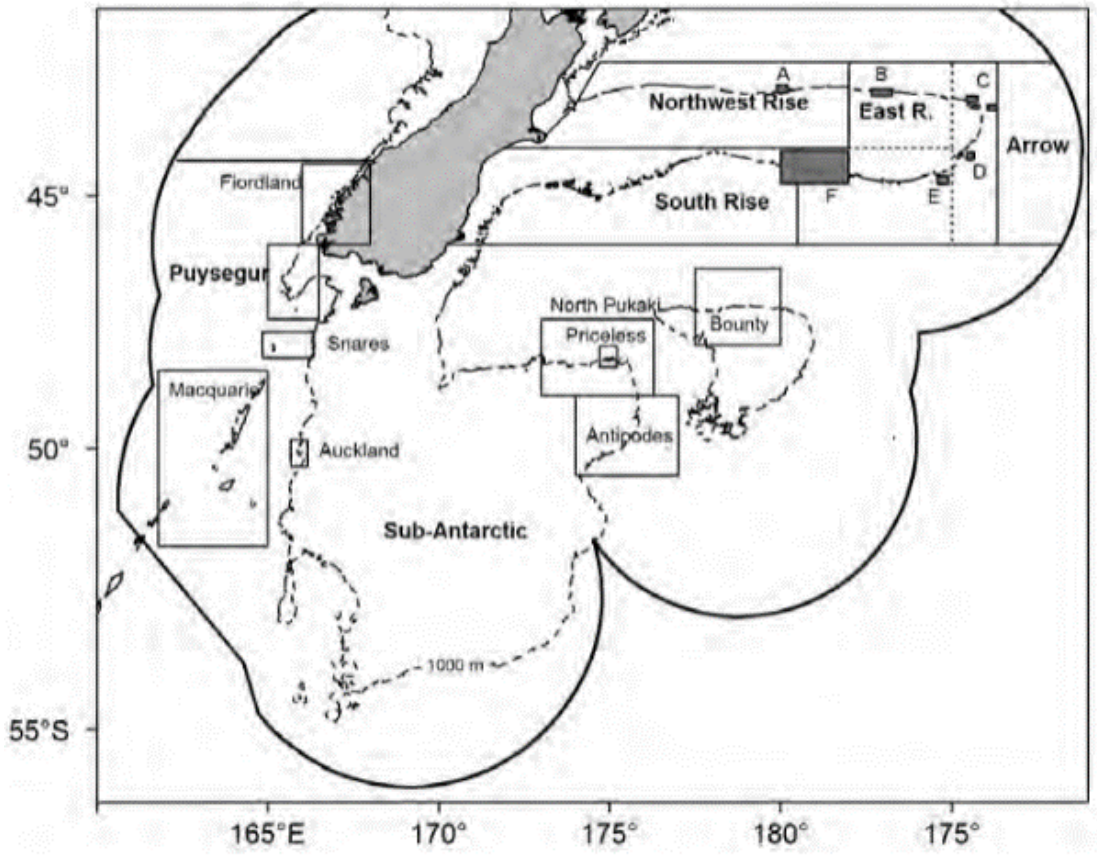

Figure 4: ORH 3B fishery sub-areas and the approximate position of other named fisheries. The recognised stocks are indicated by bold text. The rectangles mark the main fishing grounds, with those on Chatham Rise shaded: A, Graveyard (180) hills; B, Spawning Box; C, Smith's City NE hills; D, Andes; E, Chiefs; F, South Rise (Mt. Kiso & Hegerville) (FNZ, 2022c).

Table 3: Number of vessels targeting ORH in each of the UOAs from 2018-19 to 2022-23 (Rob Tinkler, pers comm)

	2018-19	2019-20	2020-21	2021-22	2022-23	Grand total
ORH 3B East Chatham Rise	5	5	5	9	4	28
ORH 3B Northwest Chatham Rise	4	2	6	3	3	18
ORH 7A	2	4	2	5	3	16
Westpac Bank	1	1	2			4
Grand Total	**12**	**12**	**15**	**17**	**10**	**66**

Stock assessment

The 2018 accepted stock assessment estimated the Northwest Chatham Rise Spawning Stock Biomass (SSB) was at 38% B_0 in 2016–17 (Figure 6).

The Northwest Chatham Rise fishery took 17% of the agreed catch limit in 2021–22. About 20% of the recent catch was taken during the spawning season, compared with 60–85% historically (Anderson & Dunn 2012). This may be because the main spawning aggregation now occurs on the Morgue hill which was closed to bottom fishing in 2001, rather than Graveyard hill which remains open to fishing

Research in 2023 raised some concerns about the results of the most recent stock assessment models of the Northwest Chatham Rise (2018) and East and South Chatham Rise (2020) which estimated both stocks to be in the target zone of 30–50% B_0. The concerns stemmed from inconsistencies between the stock biomass and trends estimated by the models, and observational data such as local estimates of CPUE and acoustic time series.

The acoustic estimates of the Northwest Chatham Rise SSB were low and variable for the Graveyard hill and increased for the Morgue hill (Figure 5). The combined area series shows an increasing SSB. The 2018 assessment model estimated SSB to be about 40% higher than was observed. It is unknown whether the orange roughy SSB on the closed Morgue hill move away from the hill to areas open for fishing outside the spawning season (Figure 6).

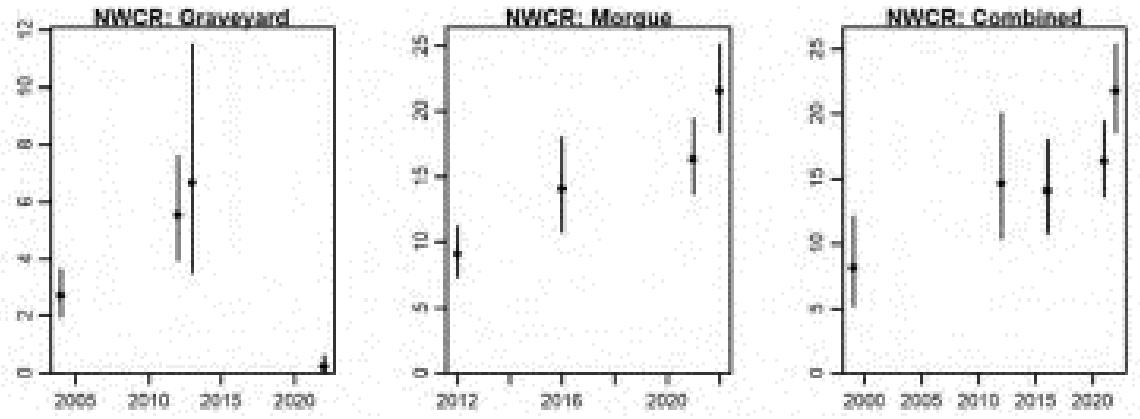

Figure 5: ORH 3B sub-areas and Spawning Stock Biomass estimated from acoustic surveys from the Northwest Chatham Rise (NWCR). Vertical lines indicate 95% CI.

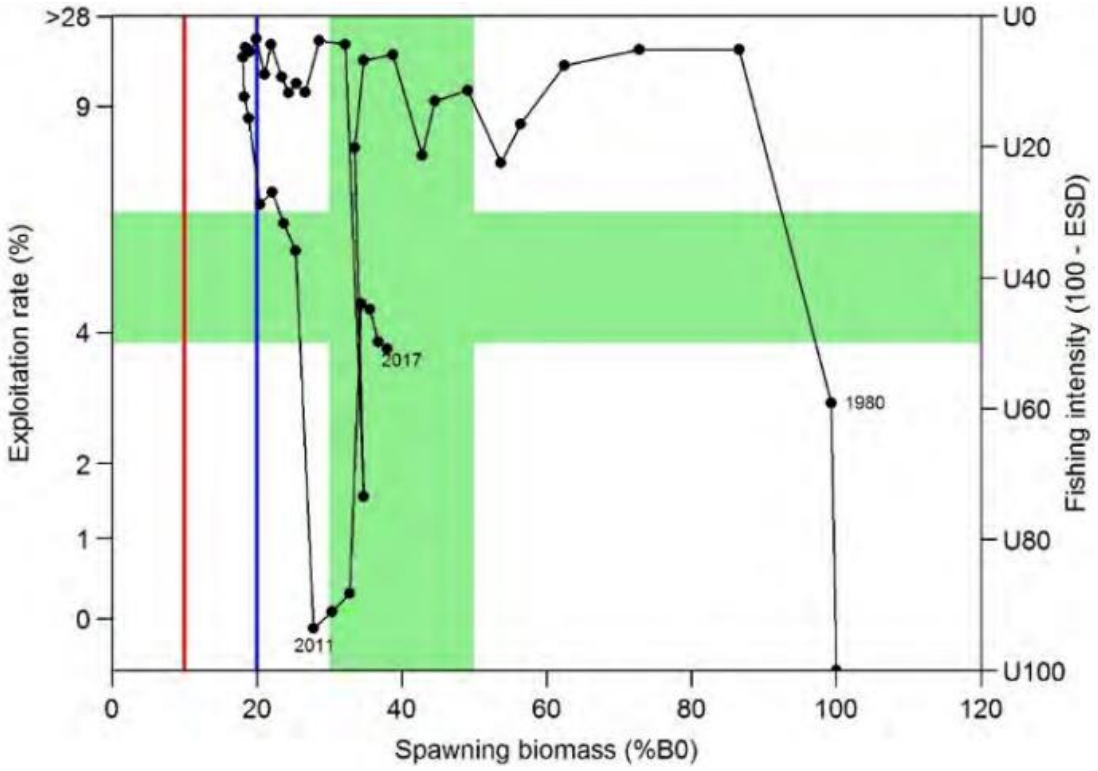

Figure 6: Historical trajectory of spawning biomass (% B_0), median exploitation rate (%), and fishing intensity (100-ESD) (base model, medians of the marginal posteriors). The biomass target range of 30–50 % B_0 and the corresponding exploitation rate range are marked in green. The soft limit (20% B_0) is marked in blue and the hard limit (10% B_0) in red. Note that the Y-axis is non-linear.

At the TACC (1,250 t) and the current agreed catch limit (1,043 t), SSB is predicted to remain stable or slowly increase over the next five years, and the probability of the SSB going below the soft or hard limits is zero

UoC 1 – ORH 3B ESCR

Update on stock status (FNZ, 2023)

- The consensus of the Working Group was that the previously accepted assessment model for the (2020) ESCR can no longer be considered to accurately reflect stock status.
- The recent increase in SSB predicted by the previous 2018 and 2020 assessments is not seen in the observational data and there are inconsistencies between the trends and indicators from different data sources such as the acoustic survey data and recent catch trends.
- For context, and as the most recent assessment, the 2020 stock assessment detail has been provided in the situation report.

TACC & catch trends

Table 4, Figure 7 and Figure 8 show the TACC and catch trends for ORH 3B ESCR.

Table 4: Catch limits, ACE, catch and associated balances for the ORH 3B ESCR from 2018-19 to 2022-23.

Stock	TACC	2018-19	2019-20	2020-21	2021-22	2022-23	5-year average
ORH 3B ESCR	Catch limit	4095	4775	5970	5970	5970	
	ACE	4152	4775	5972	6126	6068	
	Catch	4143	4776	5781	6064	6123	5377
	Balance	10	-1	191	62	-54	

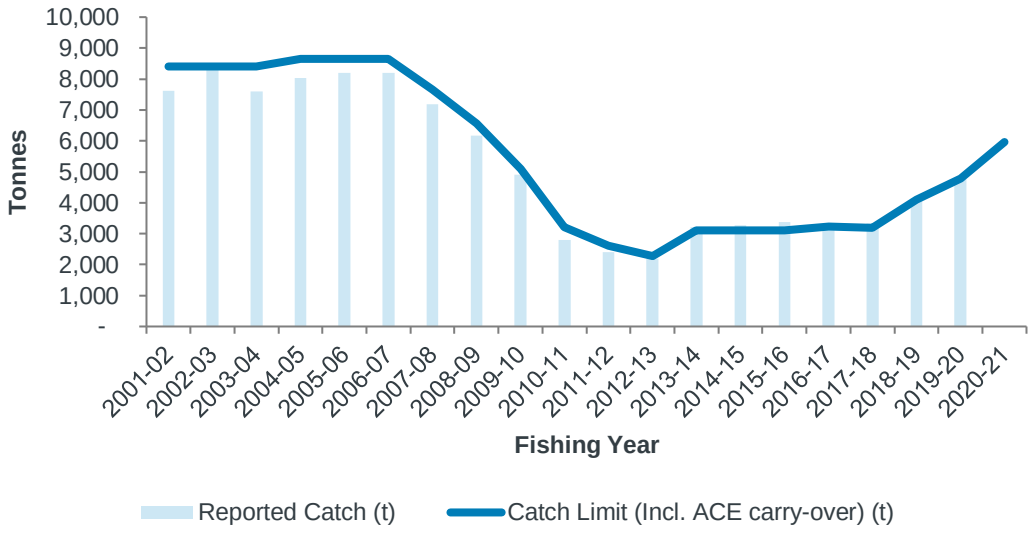

Figure 7: ORH 3B ESCR Catch Limits and Commercial Catches

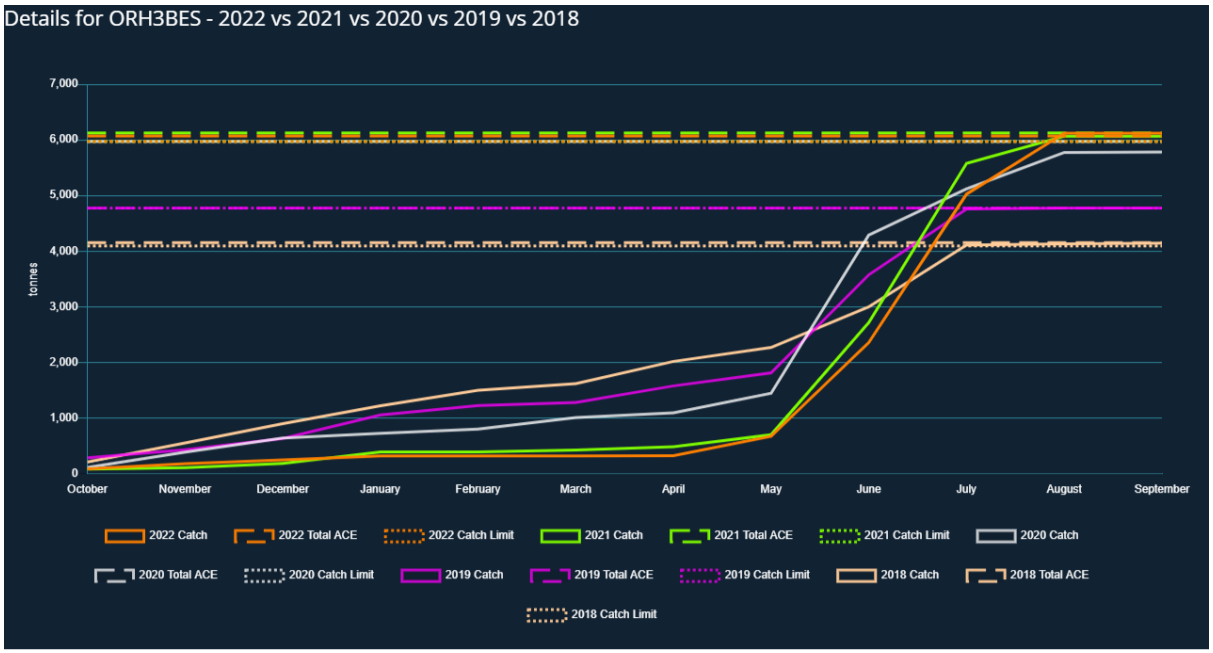

Figure 8: Catch trends and associated total allowable commercial catch for ORH 3B ESCR (Source: FishServe KUPE system)

Catch management

The catch limit from 2013-14 through to 2017-18 of 3,100 t, was set before the HCR-recommended yield estimate was calculated in 2014-15. While the HCR indicated a catch limit of 3,772 t, industry chose to adopt a more conservative approach to promote stock rebuilding and elected to retain the limit of 3,100 t. Following the 2018 stock assessment, the HCR indicated a catch limit of 5,670 t (FNZ, 2018). Industry again adopted a conservative approach by agreeing to a phased increase over three years. The 2018-19 catch limit of 4,095 t marked the first of three increases.

Stock assessment

The 2018 stock assessment estimated the stock was at 33% B_0 with an 86% probability that it was above the lower bound of the management target range of 30% of B_0 and was increasing. Projections from the stock assessment showed the median biomass increasing each year for the next five years to 37% of B_0 by 2023 under the increased catch limit (FNZ, 2019). The 2019-20 catch limit of 4,775 t marked the second increase.

A revised stock assessment in 2020 (Cordue, 2021), estimated the stock had increased to 36% B_0. Application of the HCR suggested a catch limit of 6,348 t, based on the exploitation rate of 0.043. Forward projections estimated that at this catch, plus 5% to allow for other sources of mortality caused by fishing, the biomass would continue to increase to 40% B_0 in 2028. The third scheduled increase in the catch limit was set at the more conservative level of 5,970 t for the 2020-21 fishing year (FNZ, 2020a).

The 2020 East and South Chatham Rise assessment estimated the SSB trend was roughly flat from about 1994–95, with a steady rebuild after 2009–10. The biomass was estimated to have increased by about 45% between the low point, 2007–08, and 2019–20, and was at 36% B_0 in 2019–20 (Figure 9, Figure 10 and Figure 11).

Operational changes in the fishery have resulted in an increase in tow duration and the temporal spatial nature of the fishery. Now 50–60% of the catch is from long tows of > 2 hours duration, and about 90% taken during the spawning season. The signals in the unstandardised CPUE analysis, recognising it is unstandardised, are providing trends that are inconsistent message with the recent acoustic surveys that show a flat trend for the combined areas. The 2020 assessment model estimated SSB to be just over double the observed SSB for Old Spawning Plume, Rekohu, and Mt. Muck combined.

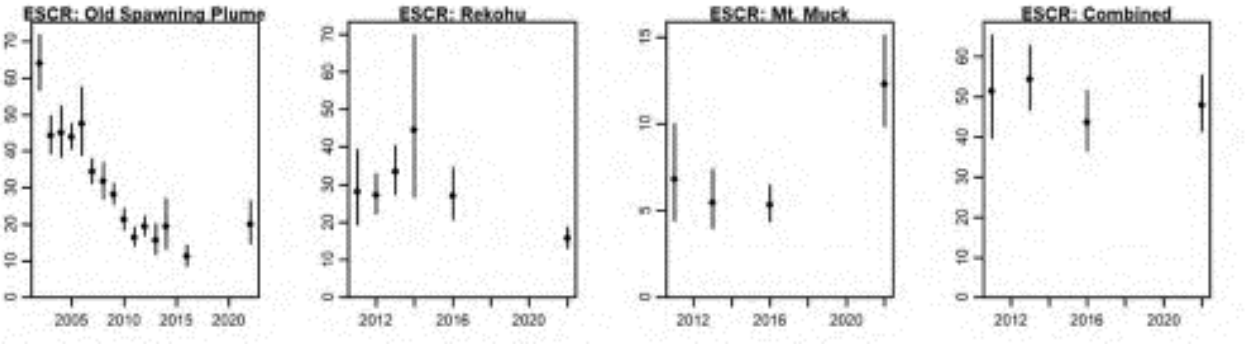

Figure 9: ORH 3B sub-areas and Spawning Stock Biomass estimated from acoustic surveys from the East and South Chatham Rise (ESCR). Vertical lines indicate 95% CI.

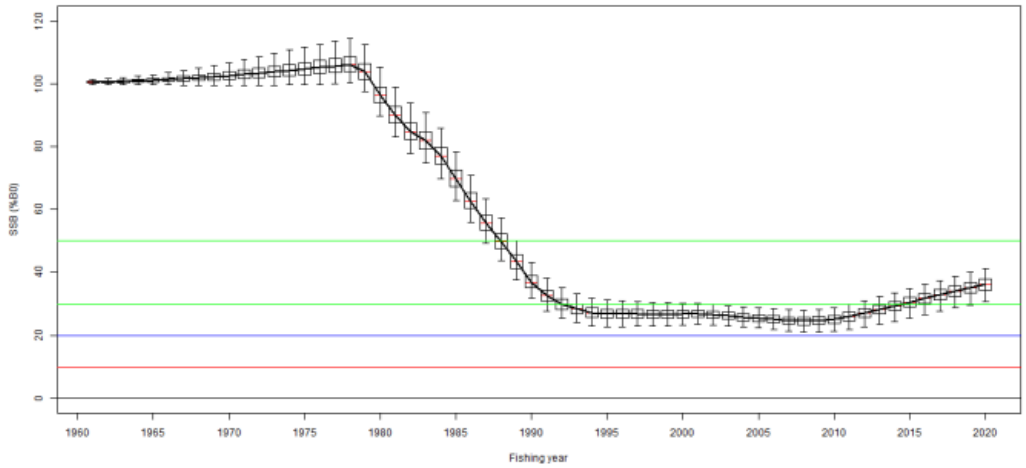

Figure 10: ESCR current model, MCMC estimated spawning-stock biomass trajectory. The box in each year covers 50% of the distribution and the whiskers extend to 95% of the distribution. Horizontal lines are plotted at the hard limit (10% B_0), the soft limit (20% B_0), and the biomass target range (30–50% B_0) (May 2022 plenary)

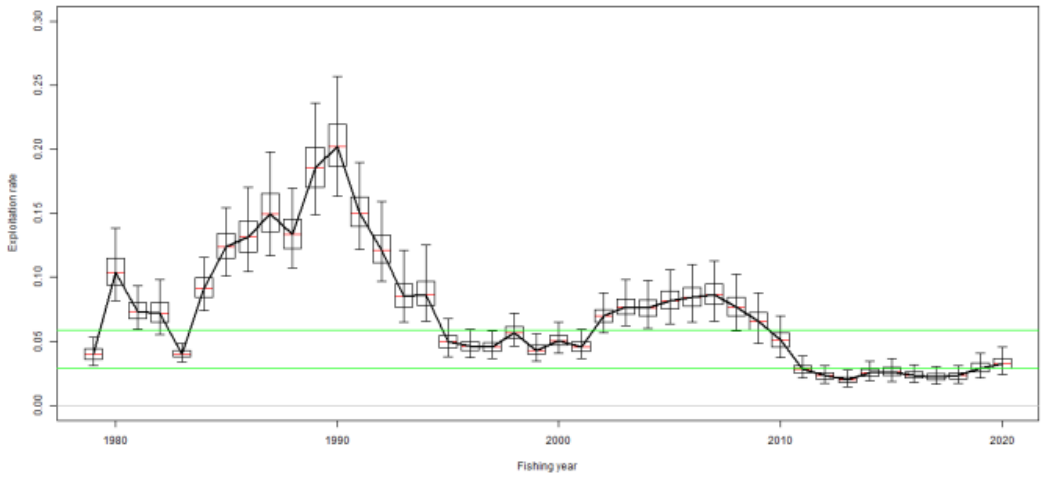

Figure 11: ESCR current model, MCMC estimated exploitation rates. The box in each year covers 50% of the distribution and the whiskers extend to 95% of the distribution. The exploitation rates associated with the biomass target of 30–50% B_0 are marked by horizontal lines at U30%B_0 and U50%B_0 (May 2022 plenary).

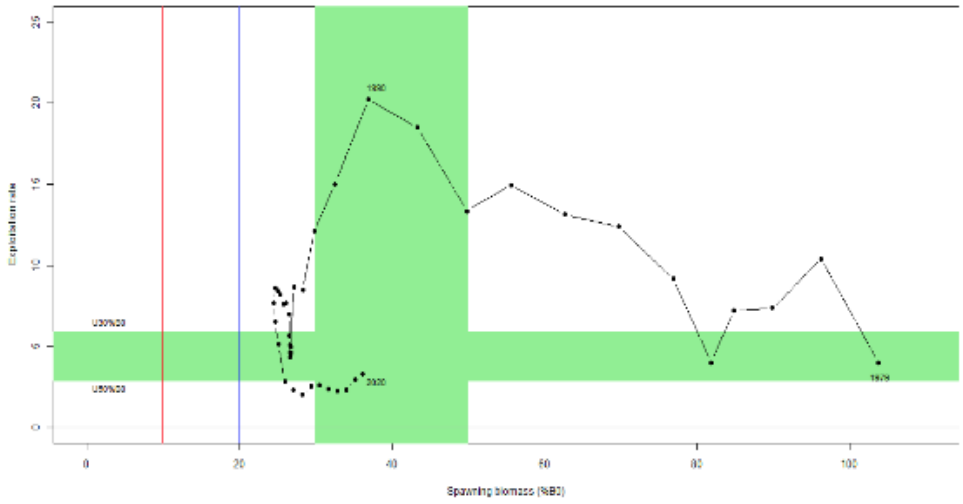

Figure 12: Historical trajectory of spawning biomass (% B_0) and exploitation rate (%) (current model, medians of the marginal posteriors). The biomass target range of 30–50 % B0 and the corresponding exploitation rate range are marked in green. The soft limit (20% B_0) is marked in blue and the hard limit (10% B_0) in red (May 2022 plenary).

UoC 3 – ORH 7A

Update on stock status (FNZ, 2023)

- B_{2019} estimated to be 47% B_0. 'Very Likely' (>90%) to be at or above the lower end of the management target range. About as Likely as Not (40– 60%) to be at or above the upper end of the management target range.
- B_{2019} is Exceptionally Unlikely (< 1%) to be below the Soft Limit and Hard Limit.
- Overfishing is Very Unlikely (< 10%) to be occurring.
- At the current TACC (1600 t) the biomass is expected to remain within the target range over the next 5 years.

TACC & catch trends

Table 5, Figure 13 and Figure 14 show the TACC and catch trends for ORH 7A (eastern and western sides).

Table 5 Catch limits, ACE, catch and associated balances for ORH 7A fisheries from 2018-19 to 2022-23 (Source KUPE).

Stock		2018-19	2019-20	2020-21	2021-22	2022-23	5-year average
ORH 7A-WB	TACC	1600	2058	2058	2058	2058	
	ACE	1617	2085	2246	2230	2094	
	Catch	1589	1897	2074	2193	1763	1903
	Balance	28	188	172	36	332	

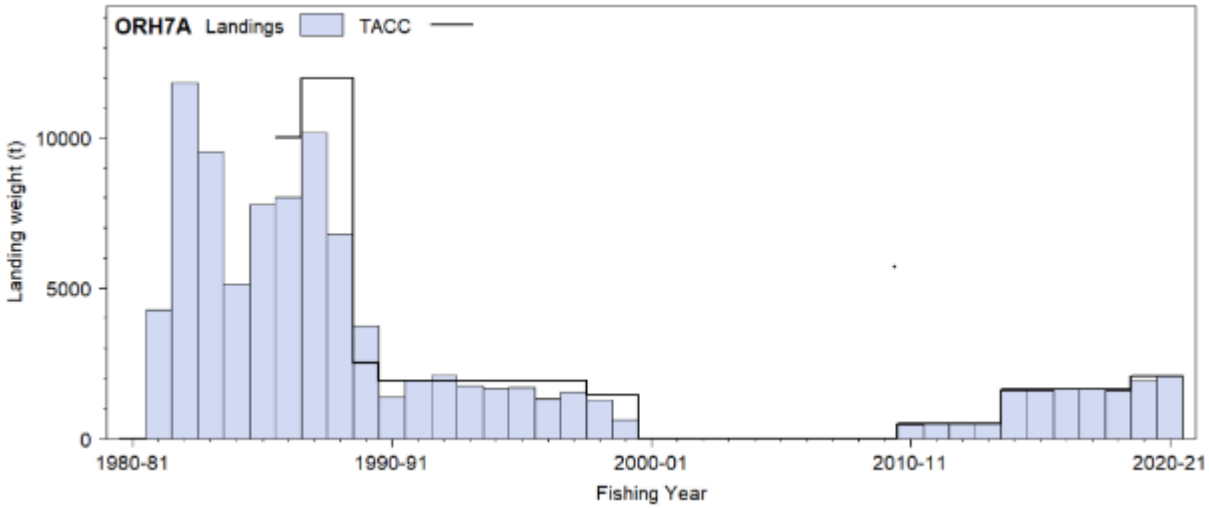

Figure 13: Total Allowable Commercial Catches and reported catches for ORH 7A (FINZ, 2023).

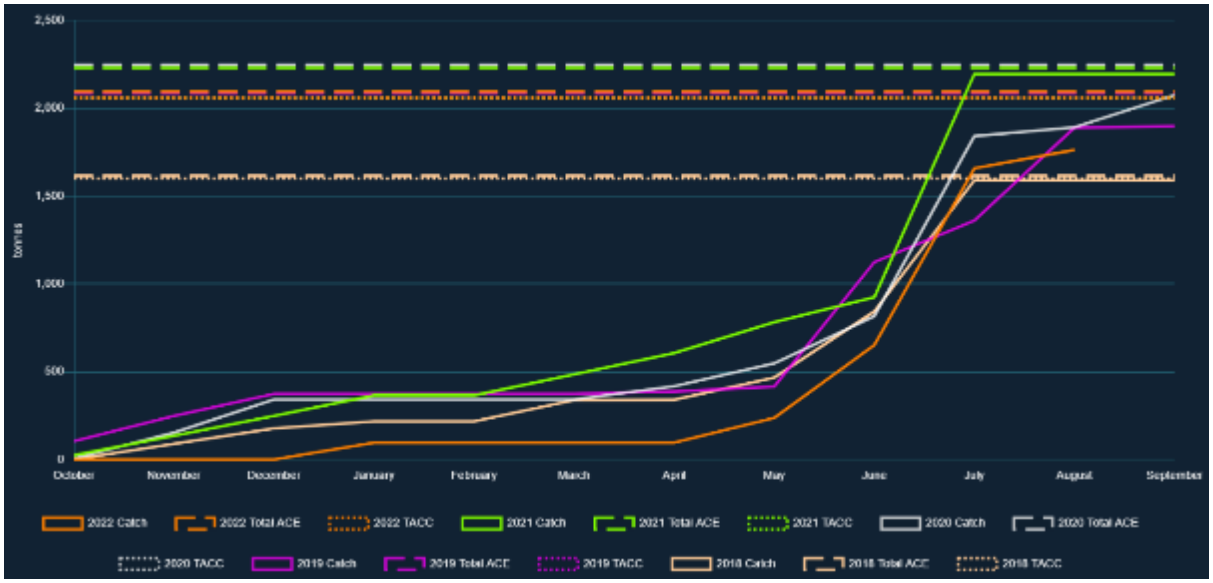

Figure 14: Catch trends and associated total allowable commercial catch for ORH 7A (Source: FishServe KUPE system)

Stock assessment

Historical trajectory of spawning biomass (% B0) and exploitation rate (%) (current model, medians of the marginal posteriors) is shown in Figure 15, Figure 16 and Figure 17. The biomass target range of 30–50 % B0 and the corresponding exploitation rate range are marked in green. The soft limit (20% B0) is marked in blue and the hard limit (10% B0) in red (May 2022 plenary).

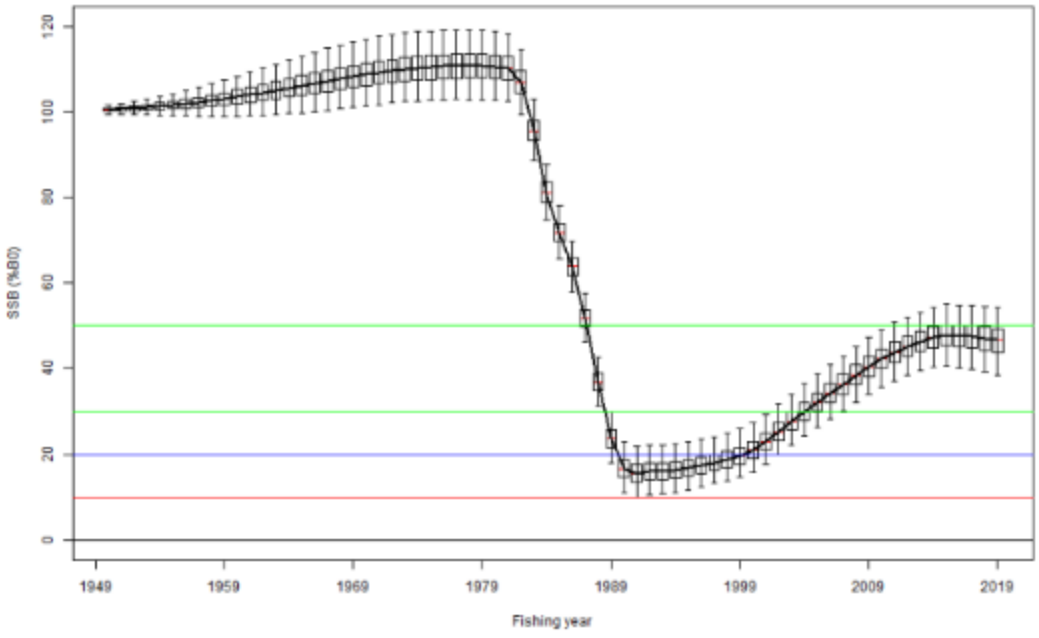

Figure 15 Base, MCMC estimated spawning-stock biomass trajectory. The box in each year covers 50% of the distribution and the whiskers extend to 95% of the distribution. The hard limit 10% B_0 (red), soft limit 20% B_0 (blue), and biomass target range 30–50% B_0 (green) are marked by horizontal lines (FNZ, 2022c).

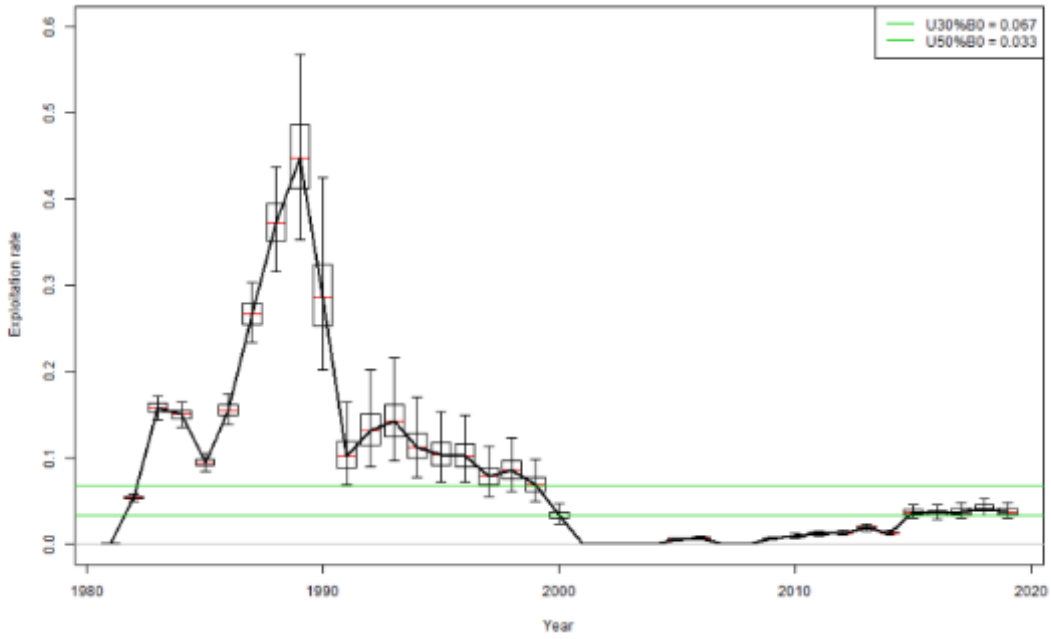

Figure 16 Base, MCMC estimated fishing-intensity trajectory. The box in each year covers 50% of the distribution and the whiskers extend to 95% of the distribution. The fishing-intensity range associated with the biomass target of 30–50% B_0 is marked by horizontal lines (FNZ, 2022c).

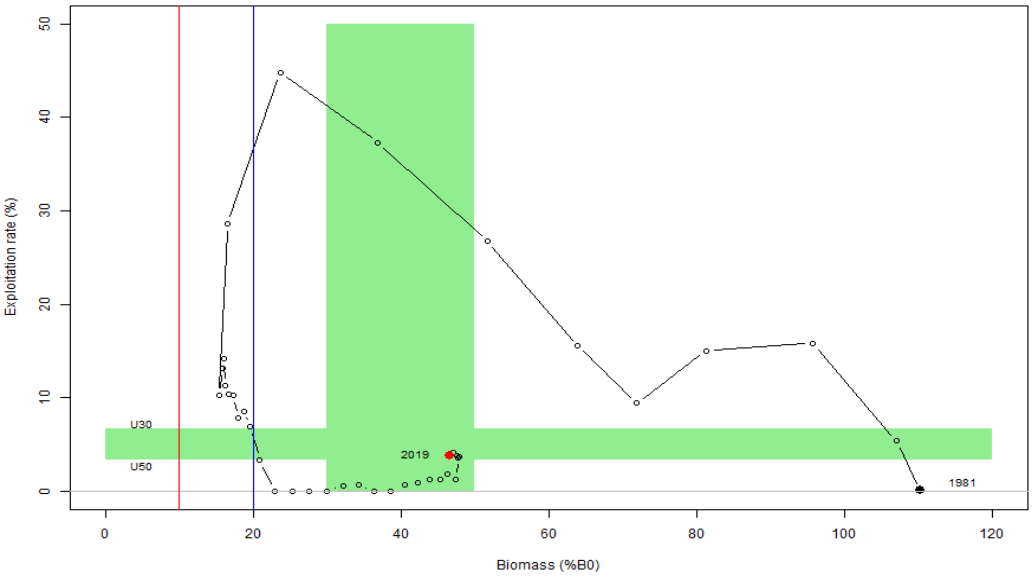

Figure 17: Historical trajectory of spawning biomass (% B0) and fishing intensity (exploitation rate) (base model, medians of the marginal posteriors). The biomass target range of 30–50% B_0 and the corresponding exploitation rate (fishing intensity) target range are marked in green. The soft limit (20% B_0) is marked in blue and the hard limit (10% B_0) in red (FNZ, 2022c).

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P2 OVERVIEW OF ENVIRONMENTAL INFORMATION

Observer Coverage

Fisheries New Zealand (FNZ) observers are deployed on commercial fishing vessels to carry out biological sampling, monitor environmental interactions, and observe and record compliance with a range of regulatory and non-regulatory management measures. An important function is to collect data on incidental catches and mortalities of endangered, threatened and protected (ETP) species. The monitoring of ETP captures is administered and funded by the Department of Conservation (DOC) through levies recovered from quota owners. Observer data are used for the following purposes:

- As an input to monitor key fisheries against harvest strategies
- As an input to monitor bycatch species
- To enable reliable estimations and nature of ETP species interactions and captures
- To enable timely responses to sustainability and environmental impact issues
- To provide a high level of confidence in fishers at sea compliance with regulatory and non-regulatory measures.

The level of observer coverage for the different fisheries/sectors is tailored to suit the data and information requirements, including for stock assessment, compliance monitoring and ETP species captures. FNZ considers that 30% coverage is sufficient for most fisheries/sectors but implements high (80-100%) coverage for fisheries where there may be what are deemed by management to be high-risk ETP species.

Observer coverage of deepwater fisheries is planned by financial year and is based on biological information requirements, international requirements, percentage-level coverage targets and observer programme capacity. Table 6 outlines the objectives and rationale for ORH observer coverage. The planned observer coverage for 2022/23 has been included based on FNZ's observer coverage plans for middle-depth, mixed species fisheries in 2022-23 are provided in the Annual Operational Plan. The latest Annual Review Report for Deepwater Fisheries covers the 2020/21 fishing year, meaning the publicly available information on 2021/22 and 2022/23 fishing years is based on the Annual Operating Plans for Deepwater Fisheries (

Table 7 and

Table 8). Table 9 and

Table **10** provides the latest number of observed ORH target tows in each of the UOAs from 2018-19 to 2022-23 (Rob Tinkler, pers comm).

Table 6: Objectives and rationale for deepwater observer coverage for fisheries that target ORH (FNZ (2021d))

Fishery complex & stocks covered	Main objective(s)	Rationale and comment
Deepwater trawl fisheries		
North Island Deepwater ORH 1, 2A, 2B, 3A BYX 2, CDL 2	Biological sampling of ORH	30 ORH LFs per area (ORH 1 A, B, C, D, ORH 2ANorth, Mid-East Coast) (total 180 LFs) Estimated 1 LF per day[2]
Chatham Rise Deepwater ORH 3B OEO 3A, 4 BYX 3	Biological sampling of ORH 30% effort coverage target for MSC stocks	50 LFs (300 otoliths) per ORH sub-stock (600 total) Estimated 1 LF per day
Sub-Antarctic Deepwater ORH 3B OEO 1, 6	Biological sampling of ORH	100 LFs for Puysegur (300 otoliths), no target for Sub-Antarctic ORH stock Estimated 1 LF per day
West Coast Deepwater ORH 7A, 7B	Biological sampling of ORH 30% effort coverage target for MSC stocks	50 LFs for ORH 7A (300 otoliths), same to apply for ORH 7B if re-surveyed or re-opened – Estimated 1 LF per day 30% effort coverage for ORH 7A only

Table 7: Comparison of planned and achieved observer coverage for the 2021/22 financial year. Figures exclude 'training days' so are not directly comparable to those from previous years (FNZ, 2023)

Fishery complex	Target stocks	Total days planned	Total days delivered	Percent delivered
Deepwater trawl				
North Island deepwater	ORH 1, ORH 2A, ORH 2B, ORH 3A, BYX 2 & CDL 2	75	80	107%
Chatham Rise deepwater	ORH 3B, OEO 3A, OEO 4 & BYX 3	275	331	120%
Sub-Antarctic deepwater	ORH 3B, OEO 1 & OEO 6	75	57	76%
West Coast deepwater	ORH 7A	80	63	79%
Middle-depth trawl				
West Coast North Island	JMA 7, EMA 7 & BAR 7	255	226	89%
West Coast South Island (FMA 7)	HOK 1, HAK 7, LIN 7 & SWA 1	500	518	104%
WCSI HOK 'inside the line'	HOK 1	100	99	99%
Cook Strait HOK	HOK 1	100	62	62%
Chatham Rise middle-depth (FMA 3/FMA 4)	HOK 1, HAK 1, HAK 4, LIN 3, LIN 4, SWA 3, SWA 4, JMA 3, BAR 1 & BAR 4	680	671	99%
Sub-Antarctic middle-depth exc. SQU/SBW (FMA5/FMA6)	HOK1, SWA 4, WWA 5B, BAR 5 & JMA 3	550	441	80%
Southern blue whiting	SBW (all)	450	216	48%
Squid	SQU 1T & SQU 6T	1960	2306	118%
Bottom longline				
Bottom longline	LIN 3 - LIN 7	420	261	62%
Scampi trawl				
Scampi	Scampi (all)	401	303	75%
Total		**5,520**	**5,331**	**87%**

Table 8: Percent observer coverage obtained within deepwater fisheries during the 2021/22 fishing year (FNZ, 2023)

Fishery complex	Target stocks	Commercial tows / hooks	Observed tows / hooks	Percent observed
Deepwater trawl				
North Island deepwater	ORH 1, ORH 2A, ORH 2B, ORH 3A, BYX 2 & CDL 2	1,307	259	20%
	Orange roughy target	878	144	16%

Fishery complex	Target stocks		Commercial tows / hooks	Observed tows / hooks	Percent observed
Chatham Rise deepwater	ORH 3B, OEO 3A, OEO 4 & BYX 3		1,803	834	46%
	Orange roughy target		1,134	662	58%
	ORH 3B	*NW Rise*	139	35	25%
		E&S Rise	995	627	63%
Sub-Antarctic deepwater	ORH 3B, OEO 1 & OEO 6		244	146	60%
	Orange roughy target		60	58	97%
West Coast deepwater	ORH 7A (excluding Westpac Bank)		665	126	19%

Table 9: Number of observed ORH target tows in each of the UOAs from 2018-19 to 2022-23 (Rob Tinkler, pers comm)

	2018-19	2019-20	2020-21	2021-22	2022-23	Grand total
ORH 3B East Chatham Rise	350	417	564	621	267	2219
ORH 3B Northwest Chatham Rise	61	67	61	35	69	293
ORH 7A	59	154	116	126	148	603
Westpac Bank	49	39	25			113
Grand Total	**519**	**677**	**766**	**782**	**484**	**3228**

Table 10: Number of observed non-ORH target tows in each of the UOAs from 2018-19 to 2022-23 that recorded ORH catch (Rob Tinkler, pers comm)

	2018-19	2019-20	2020-21	2021-22	2022-23	Grand total
ORH 3B East Chatham Rise	18	32	29	12	29	120
ORH 3B Northwest Chatham Rise	51	20	49	36	17	173
ORH 7A	2	2	1	10	1	16
Westpac Bank			1			1
Grand Total	**71**	**54**	**80**	**58**	**47**	**310**

Retained & Bycatch Species (In-scope species)

Finucci et al. (2019) analysed bycatch trends in deepwater fisheries, including orange roughy trawl, from 1990–91 until 2016–17. They found that the most common bycatch species by weight (t) were smooth oreo (Pseudocyttus maculatus, SSO), black oreo (BOE), and unspecified sharks (SHA) (FNZ, 2022c).

Updated analysis by Anderson & Finucci (2022) summarised the bycatch of orange roughy and oreo trawl fisheries from 2002–03 to 2019–20. Total non-target catch in the orange roughy fishery ranged from a low of 535 t in 2012–13 to a high of 4834 t in 2003–04. Levels dropped sharply for a few years after 2009–10 with declining overall trends in bycatch. During the period 2015-16 to 2019- 2020, orange roughy accounted for approximately 80% of the total observed catch and the remainder comprised mainly smooth oreo (4.8%), rattails (1.7%), shovelnose dogfish (1.3%) and ribaldo (1.0%) (FNZ, 2022b).

Total estimated annual discards of non-target QMS species were very low, ranging from only 1 t in 2007–08 to 46 t in 2015–16, while discards of non-QMS species ranged from 108 t in 2013–14 to 1504 t in 2017–18, both showed no obvious trend over time (FNZ, 2022b).

Invertebrate species are caught in low numbers in the orange roughy fishery (Anderson & Finucci 2022) with squid (0.3%; mostly warty squid, Onykia spp., 0.22%) being the largest component of invertebrate catch followed by various echinoderms (0.3%) and cnidarians (0.2%). . Tracey et al. (2011) analysed the distribution of nine groups of protected corals based on bycatch records from observed trawl effort

from 2007–08 to 2009–10, primarily from 800–1000 m depth. For the orange roughy target fishery, about 10% of observed tows in FMAs 4 and 6 included coral bycatch, but a higher proportion of tows in northern waters included coral (28% in FMA 1, 53% in FMA 9, Tracey et al. 2011) (FNZ, 2022b).

In addition to the most recent deepwater catch composition reports observers continue to provide catch estimates for ORH fisheries. Abundance estimates and trends of bycatch species are supported by independent trawl surveys and acoustic surveys. Relative biomass estimates are publicly available for a range of species associated with ORH fisheries (including the UoAs) via NIWA's Trawl Survey Information Portal (https://tsip-uat.niwa.co.nz/search). Figure 18 and Figure 19 provide examples of the abundance trends for different bycatch species that can be viewed via the newly available NIWA website. The latest catch composition provided by Robert Tinkler (pers comm) is provided in Table 11.

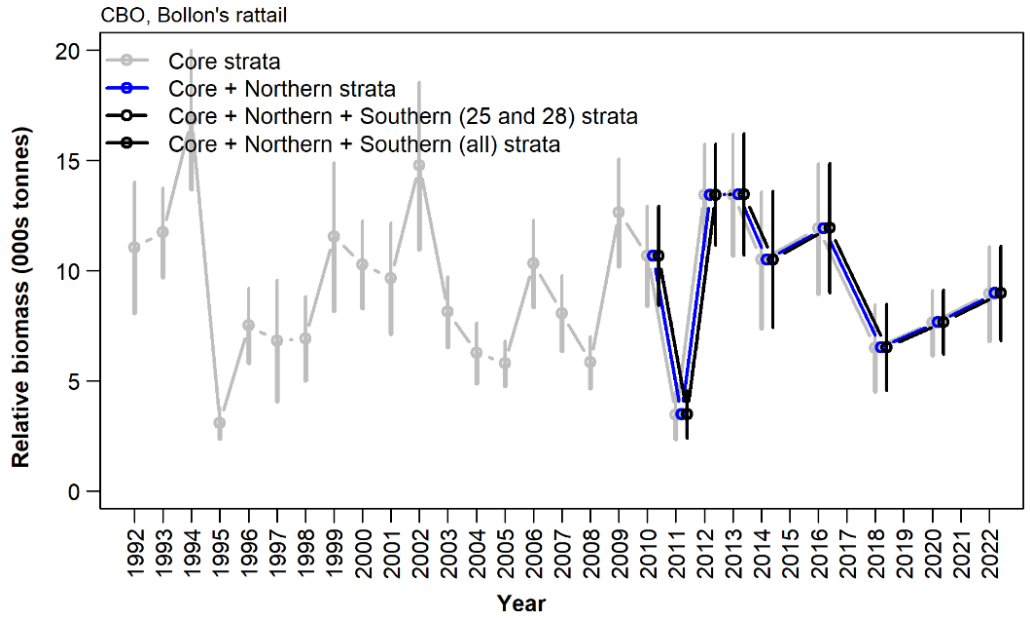

Figure 18: Relative biomass estimates of Bollon's (below) rattails sampled by annual Chatham Rise trawl surveys. Black solid lines, black dotted lines and blue solid lines are biomass estimates from the core strata plus northern and southern deep strata (https://tsip-uat.niwa.co.nz/search).

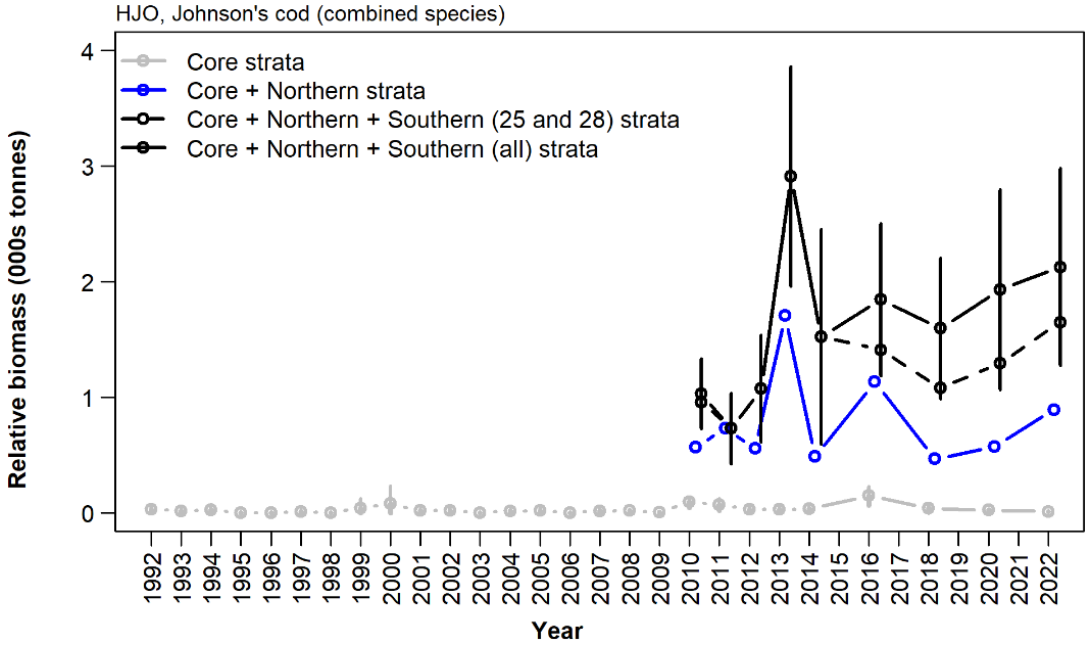

Figure 19: Relative biomass estimates of Johnson's cods sampled by annual Chatham Rise trawl surveys. Black solid lines, black dotted lines and blue solid lines are biomass estimates from the core strata plus northern and southern deep strata (https://tsip-uat.niwa.co.nz/search).

Table 11: Catch composition from observed ORH target tows from all UOAs from 2018-19 to 2022-23 shown by greenweight (kg). The data presented only shows the top species that contribute over 1% of the total catch across the time period (Rob Tinkler, pers comm).

Species	2018-19	2019-20	2020-21	2021-22	2022-23	Grand total	% of total ORH target tows
ORH	2,834,171	2,273,513	3,496,586	3,790,436	2,558,754	14,953,460	86%
SSO	125,525	93,237	119,078	59,892	15,116	412,848	2%
HJO	15,269	39,069	31,772	145,841	31,074	263,025	2%
SLK	11,691	15,562	83,938	35,372	71,006	217,569	1%
RAT	44,388	21,640	31,768	61,129	25,793	184,718	1%
RIB	17,920	10,077	36,977	66,589	24,844	156,407	1%
MOD	6,023	17,976	48,862	28,407	31,648	132,916	1%
HOK	18,612	11,558	33,215	39,512	17,792	120,689	1%
WSQ	2,030	29,168	10,921	37,982	37,840	117,941	1%
SND	7,338	12,519	25,705	32,561	19,469	97,592	1%

ETP Species

Seabirds

The following information is available for use in assessing the nature and extent of ETP seabird interactions with these fisheries:

- Seabird interactions recorded by MPI Observers (as reported by MPI/Dragonfly)
- Assessments of the risk posed to ETP bird species using the estimation of Annual Potential Fatalities (APFs) and Potential Biological Removals (PBRs) (Richard & Abraham, 2015; Baker & Hamilton, 2016; Edwards et al., 2023)
- Population studies
- Annual Environmental Liaison Officer reports
- Trigger reports (i.e., real time responses to actual incidents)
- Review of ETP species monitoring

Between 2014-15 and 2018-19, approximately 88% of observed seabird captures on deepwater trawl vessels were classed as 'net captures', of which 37% were released alive. Smaller seabirds (e.g., petrels or shearwaters) may get trapped inside the net when they dive into its mouth, while other species (e.g., albatrosses) tend to get tangled in the net mesh from the outside when they try to seize fish (FNZ, 2021c).

The National Plan of Action Seabird Reports 2018/19, 2019/20 and 2020/21 provide breakdowns of the observed seabird captures by deepwater trawlers (Deepwater trawl includes fishing effort targeting orange roughy, oreo species and black cardinalfish). Figure 33 shows the historical capture rate trend showing that the capture rate is reasonably stable with a slight downward trend, noting that it has remained below the baseline level (FNZ, 2020b). Deepwater fisheries have a low capture rate when compared to other fisheries.

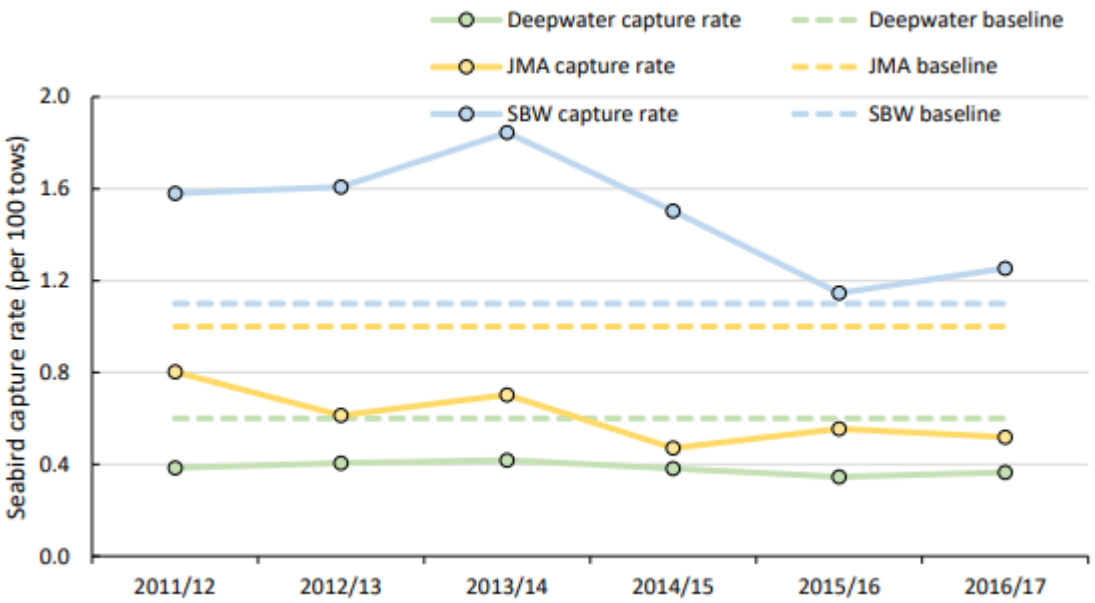

Figure 20: Estimated seabird capture rates relative to baseline capture rates, for the deepwater, jack mackerel and southern blue whiting trawl fisheries between the 2011/12 and 2016/17 fishing years. As seabird capture rates are expressed as three-year rolling averages, figures for 2016/17 represent the average over three years between the 2015/16 and 2017/18 years. Data taken from the Protected Species Capture webpage.

Risk assessment modelling

The latest Spatially Explicit Fisheries Risk Assessment (SEFRA) framework for seabirds in the New Zealand Exclusive Economic Zone was released on 5 July 2023 and attempts to quantify the impact of New Zealand commercial fisheries on New Zealand populations of seventy-one seabird species. The new SEFRA has made significant structural changes to improve seasonal resolution and improve the transparency diagnosis of the capture predictions. The results of the update are noticeably different and are reported to be a result of the updated structural changes.

The results show that only the southern Buller's albatross was estimated to have a risk metric of greater than one, indicating that current captures are higher than what can be sustained by the population over the long term. The results of the annual deaths from the ORH trawl fisheries are shown in Table 12. ORH trawl fisheries do not catch a lot of seabirds.

The associated catchability and vulnerability for the ORH trawl fisheries are shown in Figure 21, Figure 22 and Figure 23.

Reviewing the latest risk assessment results and the previous comparison between the 2017 and 2020 risk assessments indicates a continued reduction in risk indicating that ongoing operational mitigation is resulting in beneficial outcomes.

Table 12: ORH trawl fisheries' annual deaths for the top thirty at-risk species, ranked in order of highest to lowest median risk (Source: Edwards et al., 2023).

	Deepwater		Large Freezer		Large Fresher	
Code	Mean	95% CI	Mean	95% CI	Mean	95% CI
XBM	0	[0–2]	215	[150–315]	0	[0–4]
XSA	21	[8–41]	553	[390–780]	37	[14–80]
XWM	7	[0–19]	292	[204–429]	33	[13–69]
XBP	0	[0–3]	0	[0–2]	1	[0–5]
XWP	0	[0–2]	13	[6–27]	0	[0–3]
XCI	17	[6–36]	4	[0–13]	3	[0–15]
XFS	0	[0–1]	2	[0–8]	0	[0–1]
XNB	2	[0–8]	30	[14–55]	3	[0–19]
XAU	0	[0–5]	0	[0–2]	0	[0–2]
XAN	0	[0–2]	0	[0–2]	0	[0–1]
XWC	2	[0–6]	206	[130–372]	1	[0–6]
XRA	3	[0–11]	6	[0–17]	0	[0–3]
XNP	0	[0–3]	8	[1–19]	0	[0–4]
XCM	0	[0–2]	14	[4–30]	0	[0–4]
XYP	0	[0–0]	0	[0–0]	0	[0–0]
XPP	0	[0–0]	0	[0–1]	0	[0–0]
XNR	0	[0–2]	0	[0–6]	0	[0–2]
XLM	0	[0–2]	0	[0–3]	0	[0–3]
XGM	0	[0–2]	0	[0–3]	0	[0–3]
XGP	0	[0–2]	1	[0–4]	0	[0–2]
XCA	0	[0–0]	5	[0–31]	0	[0–0]
XSI	0	[0–0]	0	[0–0]	0	[0–0]
XBS	0	[0–2]	0	[0–14]	0	[0–3]
XKS	0	[0–0]	0	[0–0]	0	[0–0]
XBC	0	[0–0]	0	[0–0]	0	[0–0]
XFC	0	[0–0]	0	[0–0]	0	[0–0]
XPS	0	[0–0]	0	[0–0]	0	[0–0]
XPV	0	[0–6]	2	[0–21]	0	[0–6]
XFX	0	[0–0]	0	[0–0]	0	[0–0]
XSH	3	[0–8]	165	[105–293]	0	[0–4]

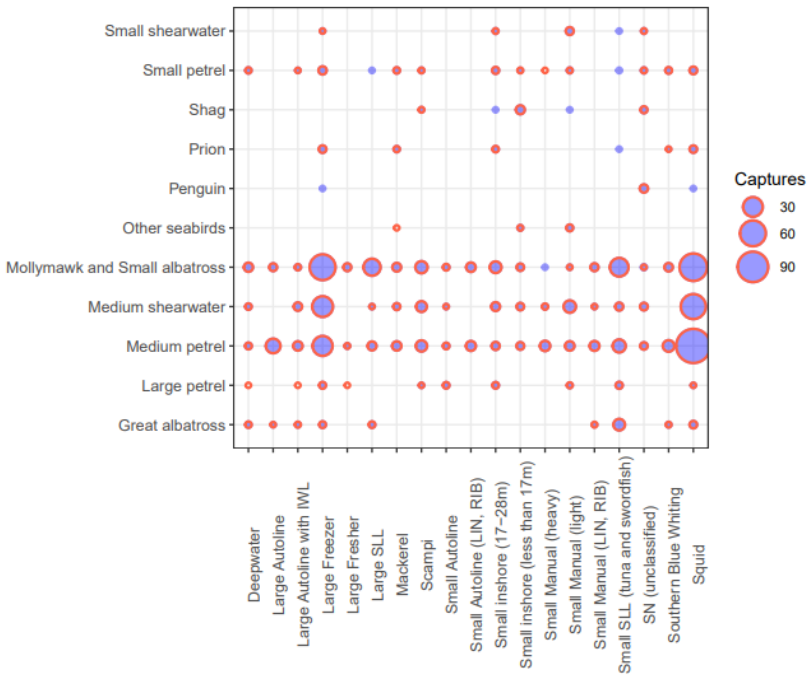

Figure 21: Model fit to observed average annual captures (C 0 f,z) per species and fishery group combination, between 2006/07 and 2019/20. Model predicted values are represented by the posterior median of the sum across species per group and shaded in blue. Empirical values are represented by red circles (Source: Edwards et al., 2023).

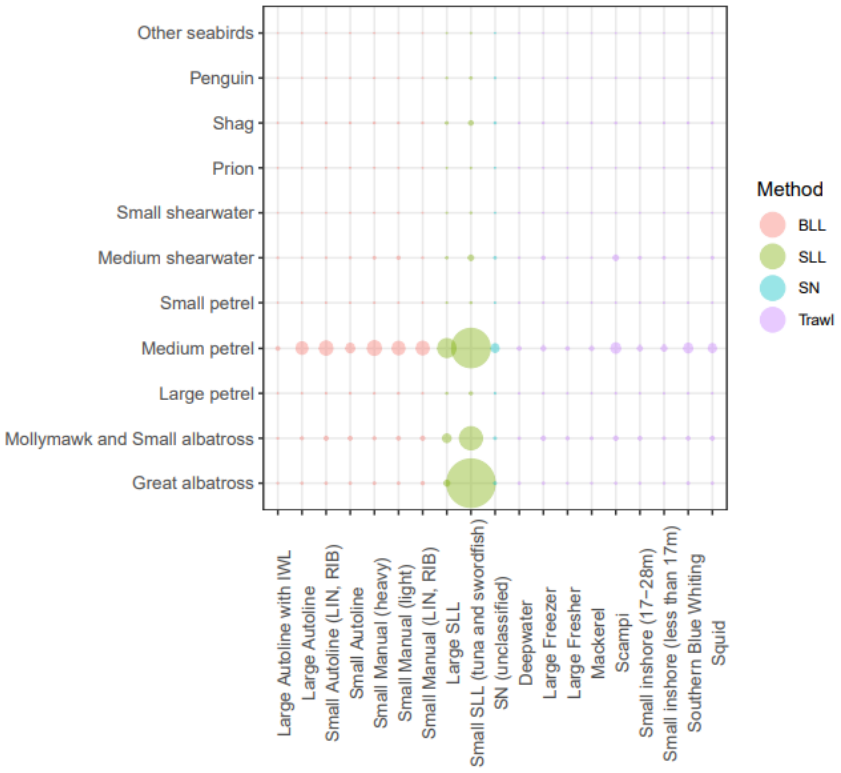

Figure 22: Catchability (qf,z) per species group and fishery group combination. Catchabilities are only comparable between methods and groups that share the same effort units (Source: Edwards et al., 2023).

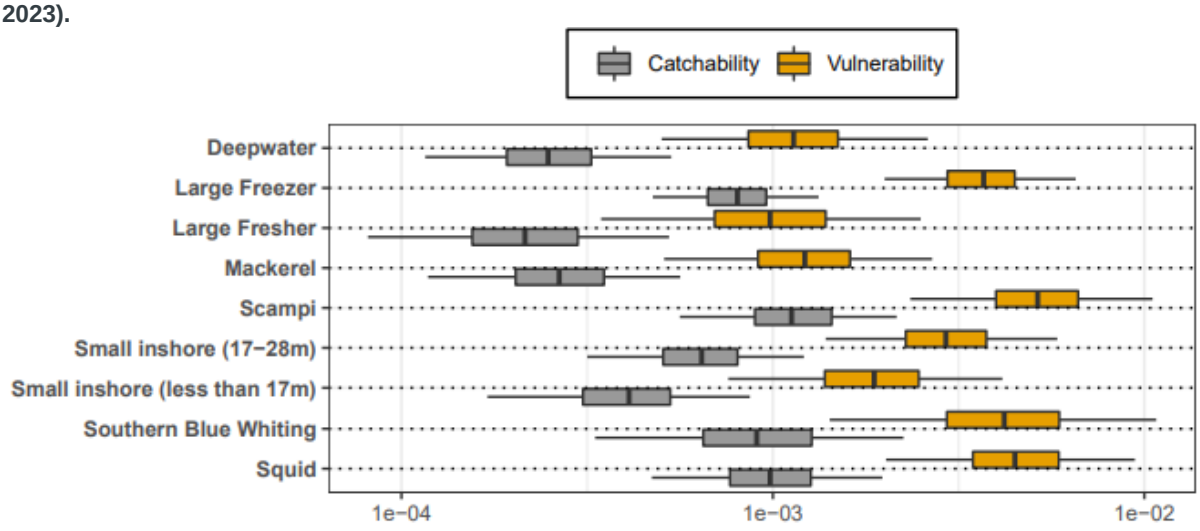

Figure 23: Marginal catchability (qf) and vulnerability (uf) per trawl fishing group assuming a geometric mean across species. Values are given on a log10-scale. Boxplots show the median, and 75% and 95% posterior quantiles (Source: Edwards et al., 2023).

Observed incidental seabird captures

The orange roughy fisheries have a negligible impact on seabird populations. Figure 24 shows there have only been sixteen observed captures across all ORH fisheries from 2016-17 to 2020-21. In the Chatham Rise UoAs (ORH 3B) there have only been twelve observed captures across all ORH fisheries from 2016-17 to 2020-21 (Figure 25:) and four observed captures in the ORH 7A UoA over the same time period (Figure 26).

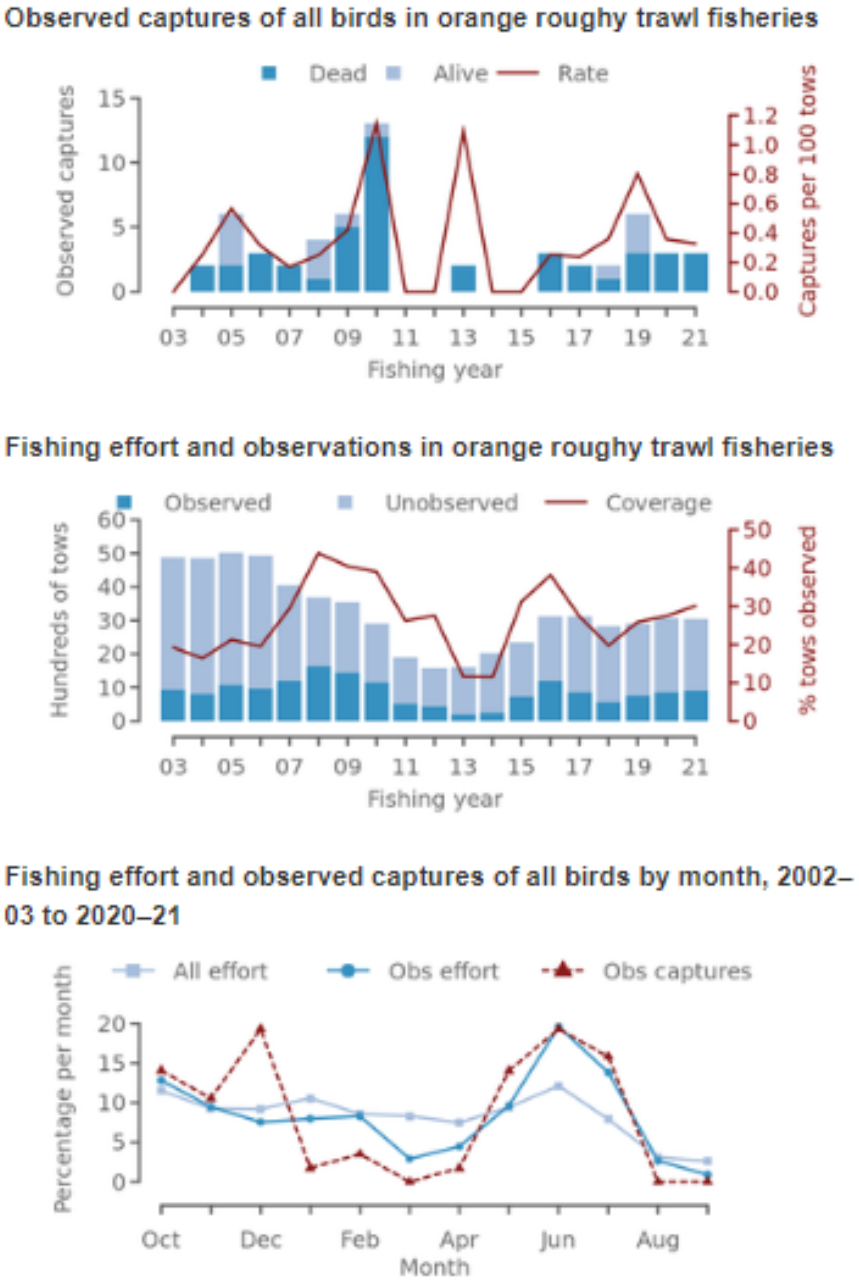

Figure 24: Observed seabird captures in the ORH trawl fisheries (MPI, 2021).

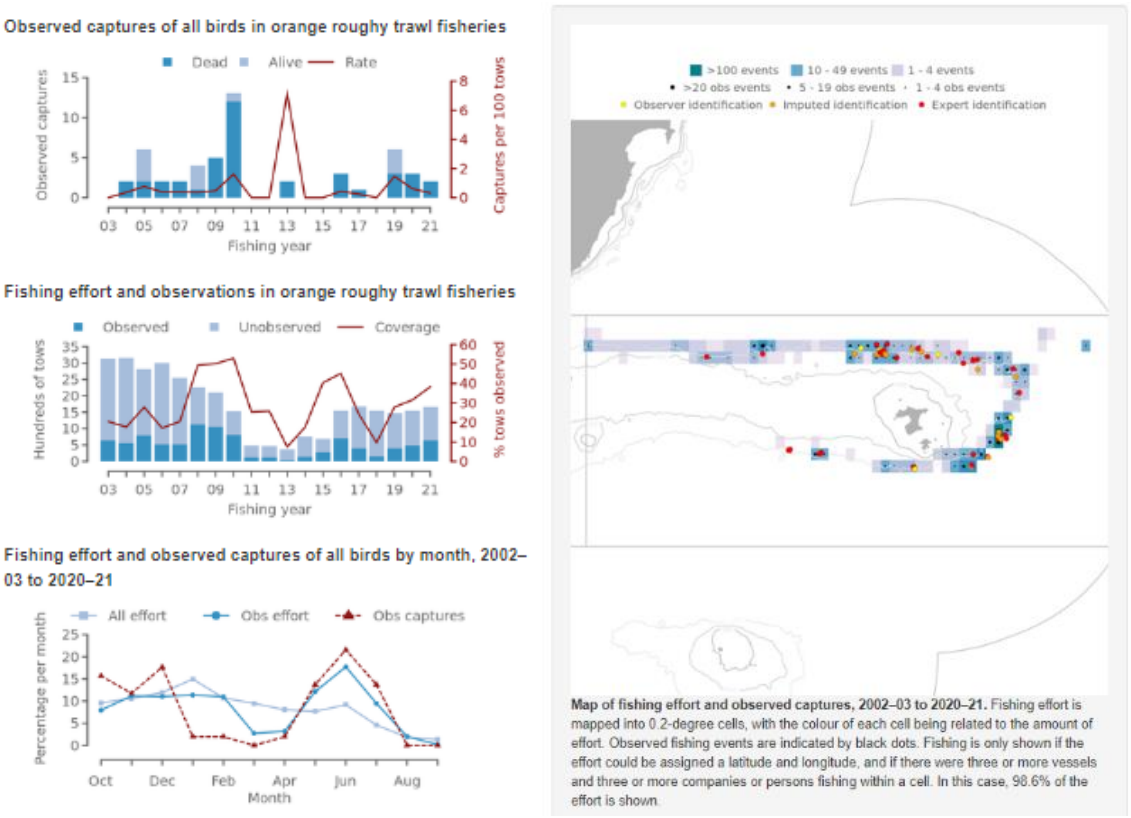

Figure 25: Observed seabird captures in the ORH 3B UoAs on the Chatham Rise ((MPI, 2021).

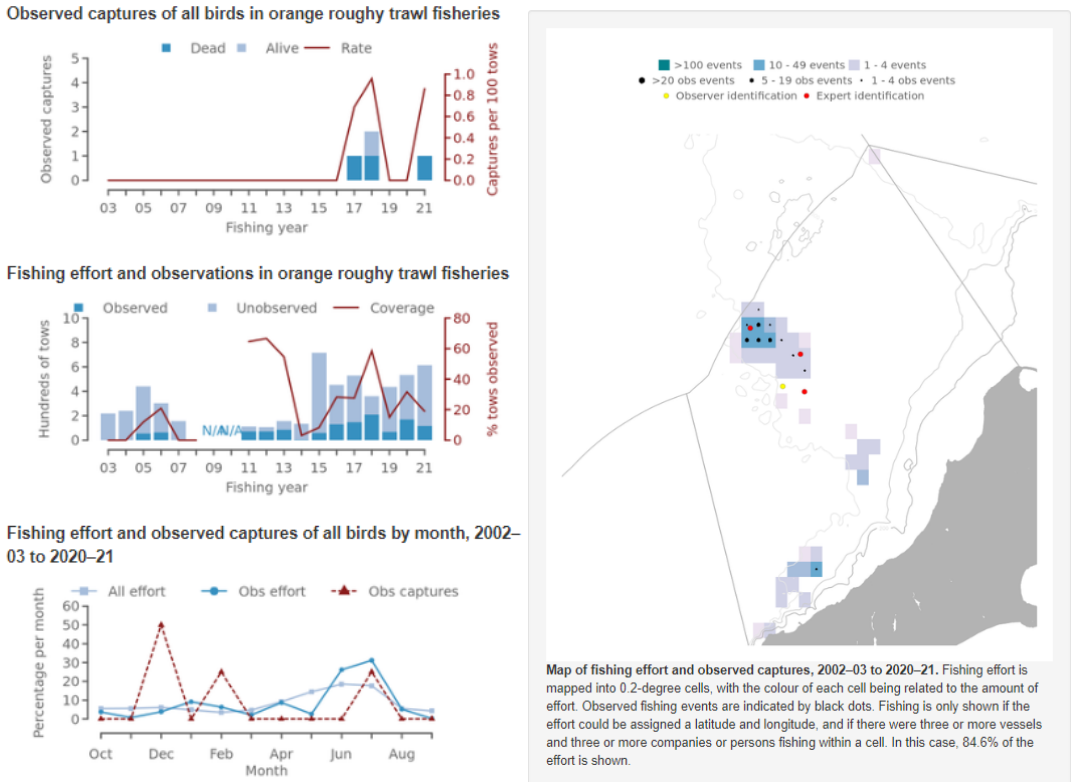

Figure 26: Observed seabird captures in the ORH 7A UoA (MPI, 2021).

New Zealand fur seal

The New Zealand fur seal is abundant and classified as 'least concern' by DOC. In 2001 the population was estimated to be between 100,000 and 200,000 with numbers increasing. The most recent multi-species marine mammal risk assessment in 2017 showed the level of this risk from fisheries to the New Zealand fur seal is unlikely to pose a threat to the NZ fur seal population sustainability (AEBR, 2021). The DOC threat classification status for fur seals is 'Not Threatened' and their population size is believed to be increasing (Baker et al., 2019).

There has been no observed fur seal capture by an orange roughy vessel in recent years (Figure 27).

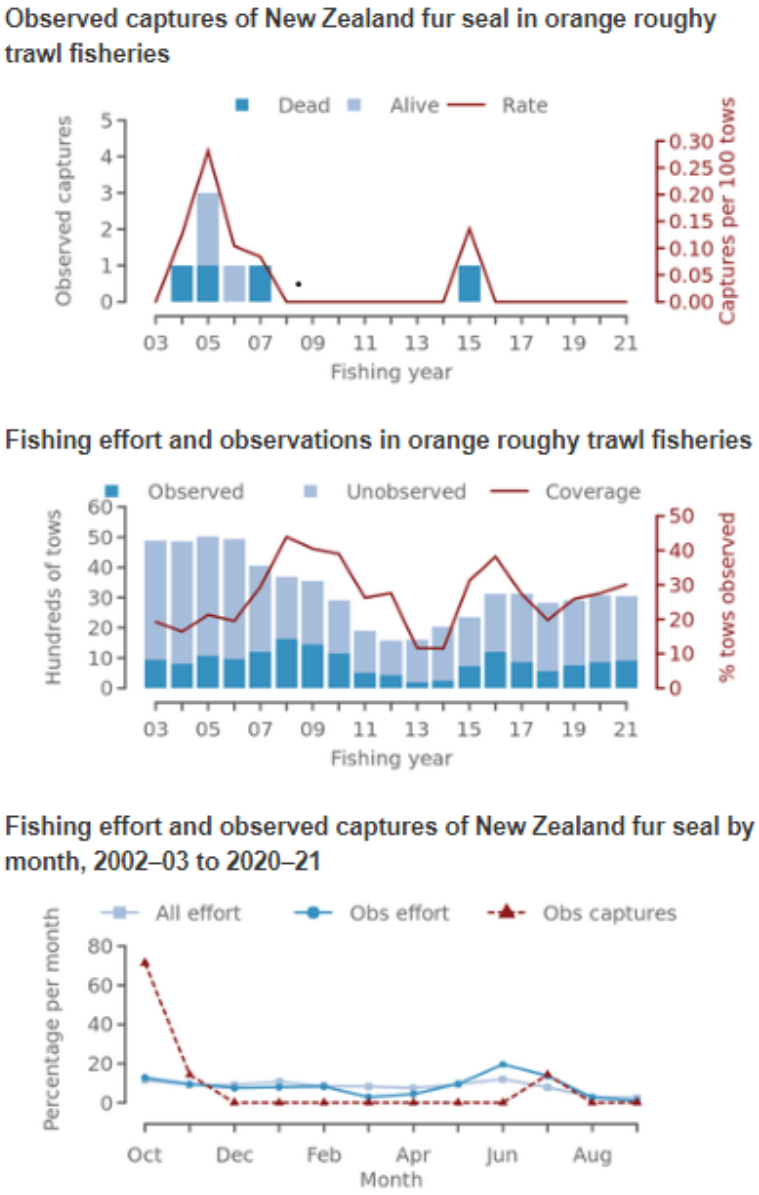

Figure 27: Observed fur seal captures by ORH trawl fisheries 2002-03 to 2020-21.

New Zealand sea lion

The New Zealand sea lion is listed as 'Threatened – Nationally Vulnerable' (Baker et al., 2019; FNZ., 2022). A New Zealand Sea Lion Threat Management Plan (TMP) was finalised in 2017 (DOC, 2017) with a vision to "promote recovery and ensure the long-term viability of New Zealand sea lions".

There is no spatial overlap of sea lions with the orange roughy fishery. This is shown by the fact that there have been no observed or reported captures of a New Zealand sea lion by any orange roughy trawl fisheries during the period 2003-03 to 2020-21 (Figure 28) (MPI, 2021).

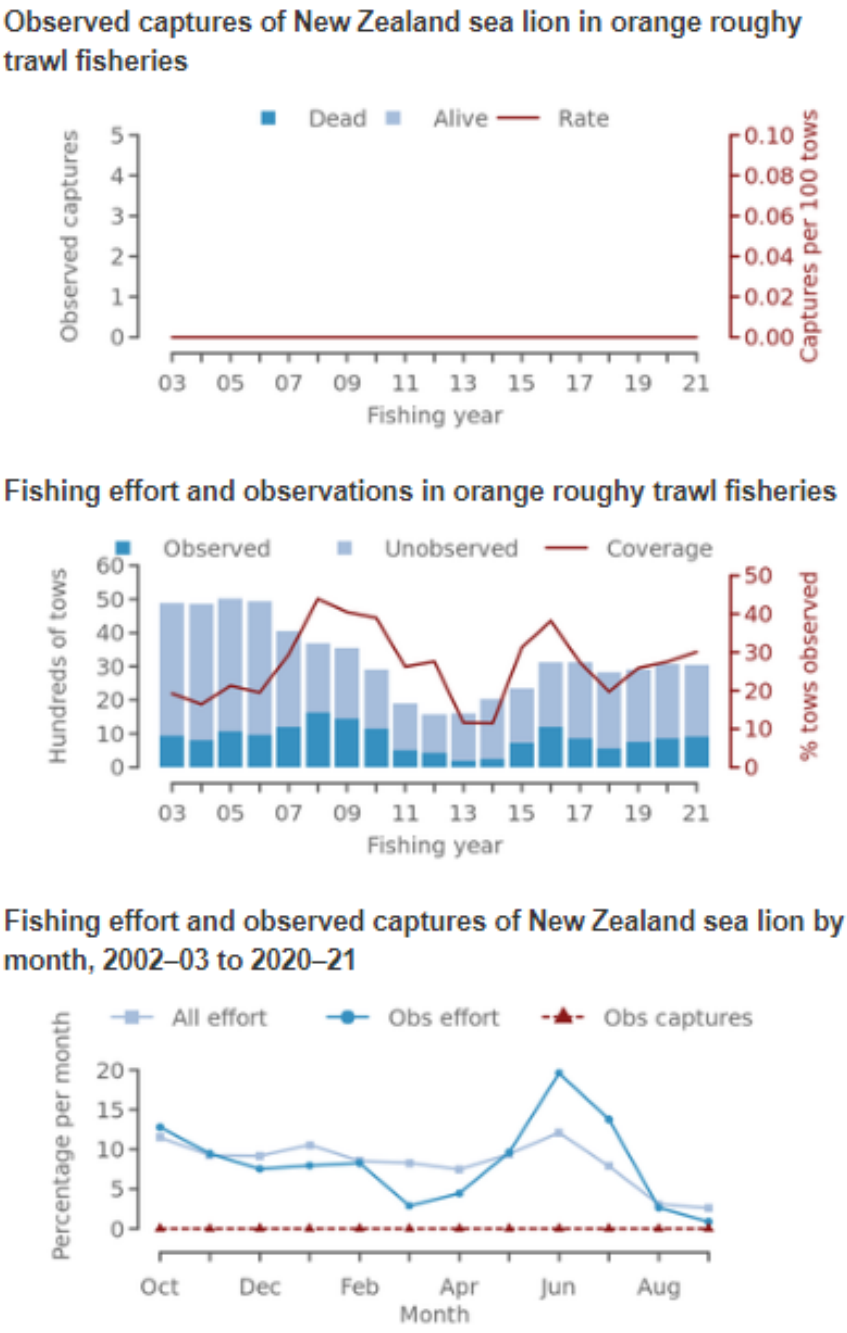

Figure 28: Observed New Zealand seal lion captures by orange roughy trawl fisheries, 2002-03 to 2020-21 (MPI, 2021).

Sharks

Very few protected sharks have been reported captured by ORH trawl fisheries; a single basking shark (*Cetorhinus maximus*) capture was reported in 2019. DWG's Sharks OP provides guidelines for returning protected sharks to the sea unharmed wherever possible (DWG, 2022).

A review of basking shark interactions in New Zealand found that while captures were greater for tows deeper than 400 m and for net headline heights that exceeded 4 m, there was no clear understanding of when/where encounters were likely to occur. Basking sharks may undergo very extensive migrations, both within ocean basins and trans-equatorially (Francis, 2017).

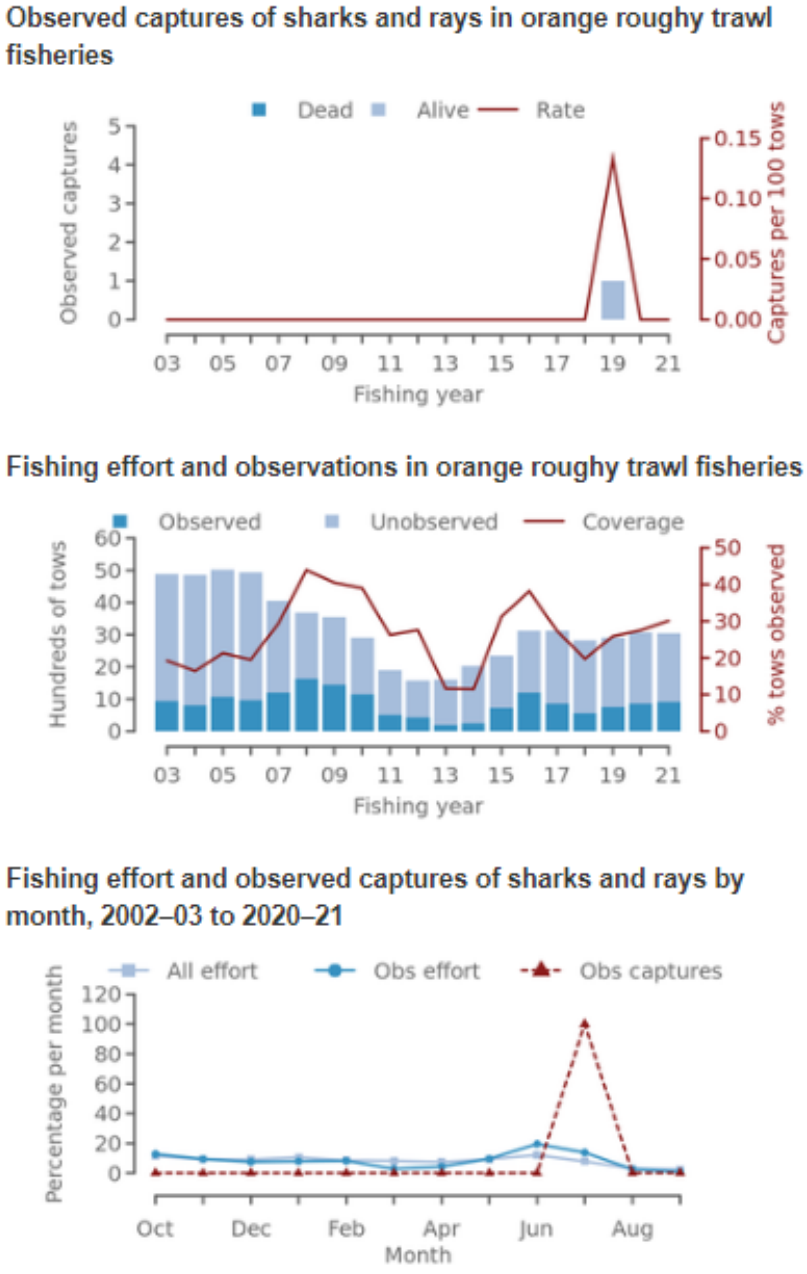

Figure 29: Observed shark and rays captures by orange roughy trawl fisheries, 2002-03 to 2020-21 (MPI, 2021).

Whales & dolphins

There have been no observed or reported captures of whales or dolphins by orange roughy UoA trawl fisheries during the period 2003-03 to 2020-21 (Figure 30) (MPI, 2021).

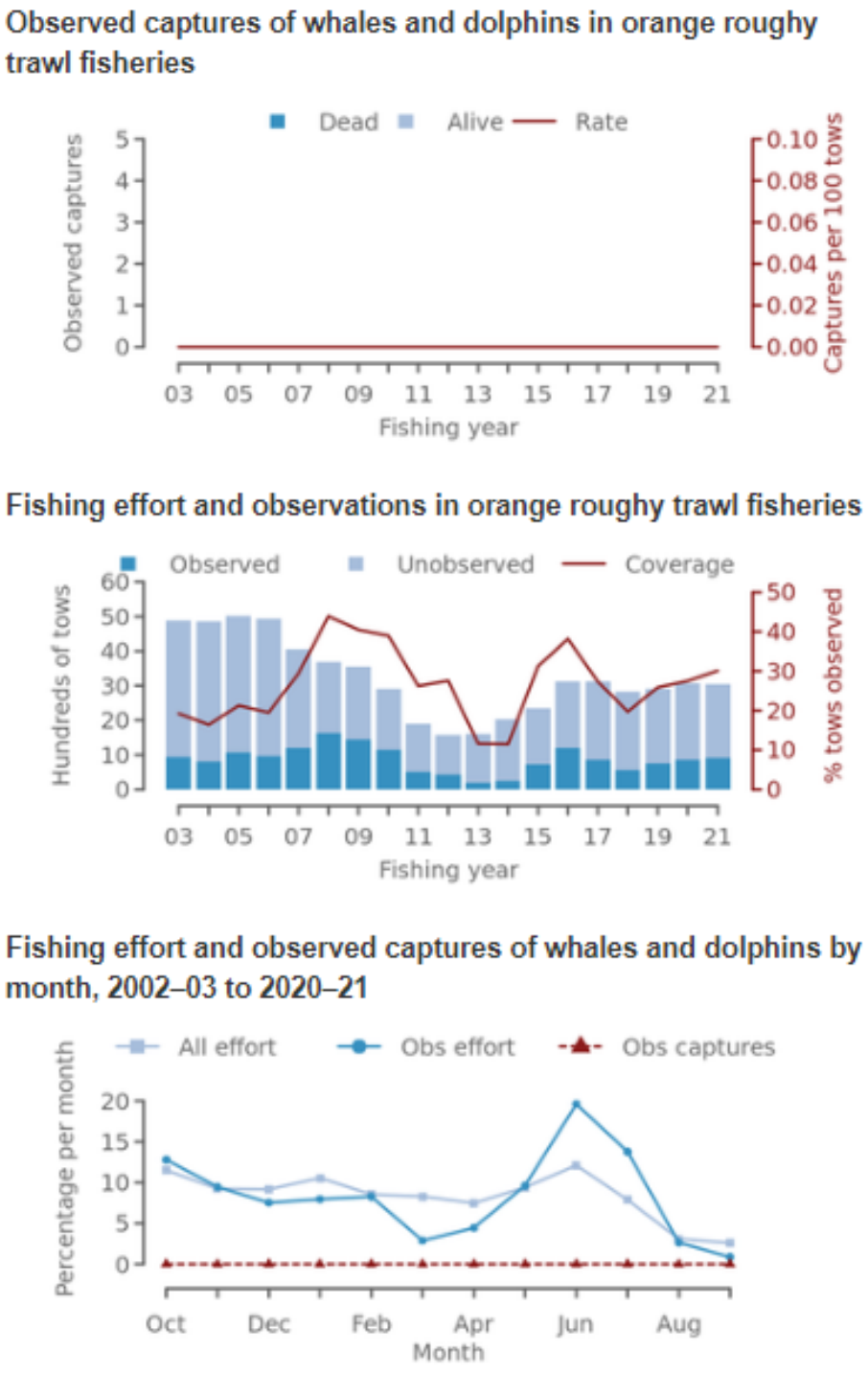

Figure 30: Observed whale and dolphin captures by orange roughy trawl fisheries, 2002-03 to 2020-21 (MPI, 2021).

Turtles

There have been no observed or reported captures of turtles by orange roughy UoA trawl fisheries during the period 2003-03 to 2020-21(Figure 31) (MPI, 2021).

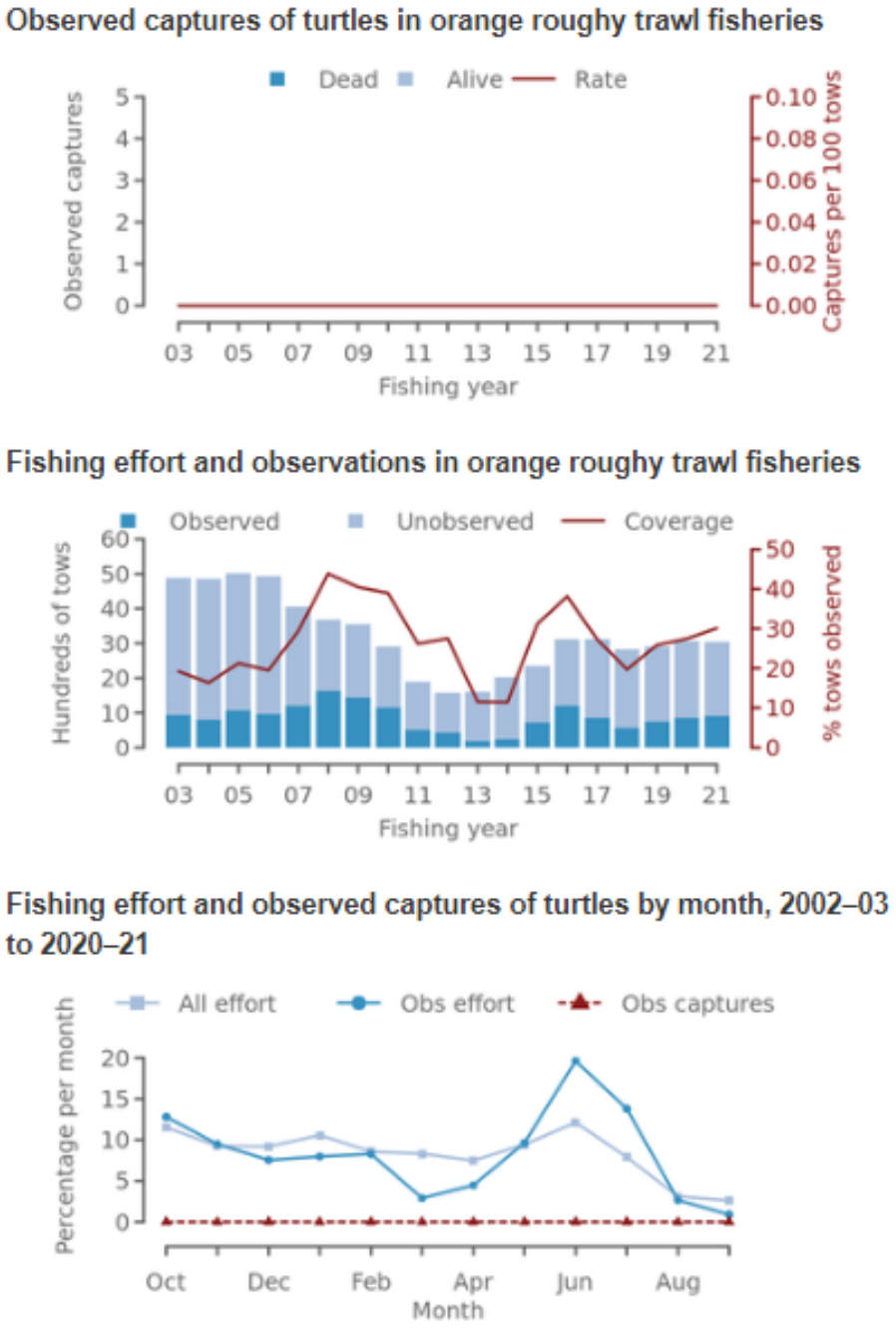

Figure 31: Observed turtle captures by orange roughy trawl fisheries, 2002-03 to 2020-21 (MPI, 2021).

Benthic Interactions

Trawl footprint

The trawl footprint of New Zealand's trawl fisheries is assessed annually to monitor their interactions with the benthic habitat. The latest trawl footprint report was released in July 2023 and presents the spatial analysis of bottom-contacting trawl effort by commercial trawlers within the New Zealand 200 n. mile Exclusive Economic Zone and Territorial Sea (EEZ+TS), in waters open to trawling down to 1600 m in depth (the 'fishable area'), for different time periods, based on available data.

The latest trawl footprint analysis shows that for the deepwater data between 1990 – 2007 the annual footprint was 1.2 - 2.0% of the EEZ and TS, representing 3.4 - 5.8% of the fishable area. Whilst in the most recent years 2008 – 2021 the annual footprint has declined to 1.0 - 1.2% of the EEZ and TS - representing 2.9 - 3.6% of the fishable areas (MacGibbon and Mules, 2023). The data shows there has been a decrease in the total number of bottom-contacting tows by year for the Deepwater Tier 1 species (
Figure 32).

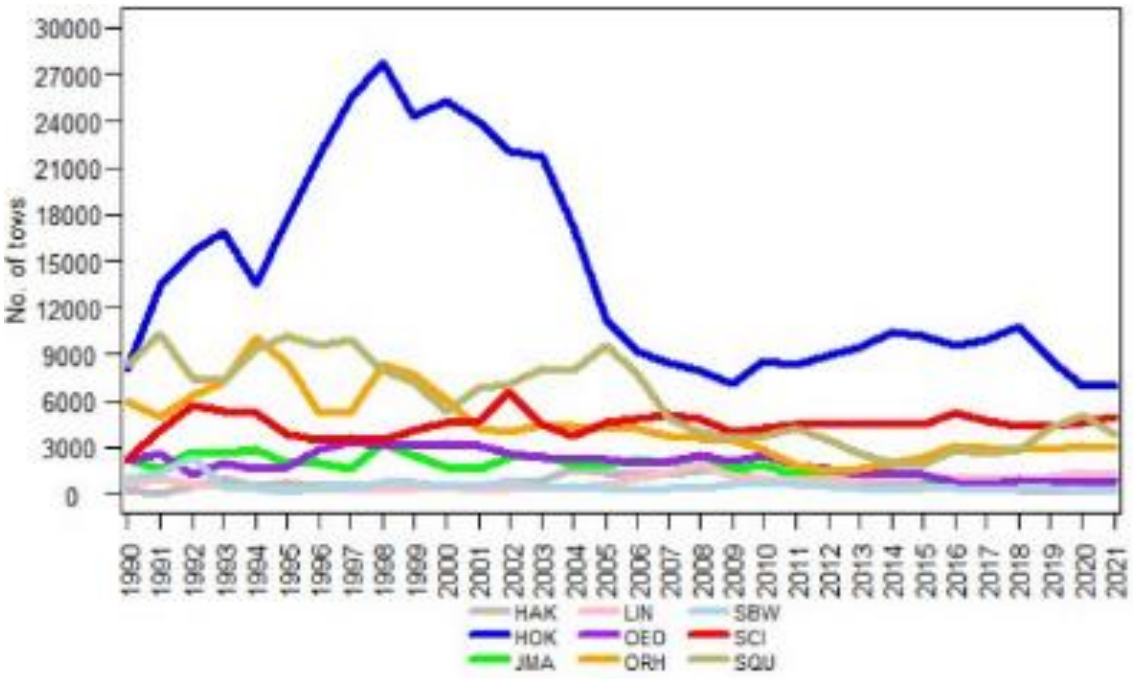

Figure 32: The number of bottom-contacting tows by year for the Deepwater Tier 1 species (MacGibbon and Mules, 2023)

The following key observations were made:

ORH 3B NWCR

- The NWCR area contacted fewer cells overall (861 cells), a slightly smaller aggregate area (22 706 km2) and a smaller footprint (7057 km2) when compared with ORH 7A.
- The main period of contact in NWCR was during 1997–2005, albeit with a noticeable dip in 2000 (footprint range of 639 to 1609 km2), with the peak years being 2001–2004.
- From 2014 to 2021, the footprint was variable, at 239 km2 in 2014, a peak at 881 km2 in 2017, and 514 km^2 in 2021.

ORH 3B ESCR

- Overall, the ESCR area had an aggregate area of 37,565 km^2 and a footprint of 10,388 km^2 that contacted 1366 cells. This is the largest overall of the three orange roughy areas examined in the project.

- Of the three areas, ESCR is the one with the most consistent effort each year during 1990–2021; however, there were still periods of smaller footprints (1992–2002), with footprints generally under 600 km^2, with higher footprints in some years (e.g., 690 km^2 in 1998).
- The 2021 footprint of 2,025 km^2 is the second-highest footprint in the time series, behind 2,849 km^2 in 1990.

ORH 7A

- ORH 7A had an aggregate area of 26,965 km^2 and a footprint of 11,187 km^2 that contacted 1,568 cells. This is a noticeable increase from the 1990–2019 analysis when, for the total period, the footprint was 8,975 km^2, the aggregate area was 22,467 km^2.
- This suggests in 2021 the effort in ORH 7A was more widespread and intensive than in previous years.

Summary data for the ORH/OEO targets reflect the generally shorter tows for these targets, often in isolated areas, and the effects of quota changes in some years. Table 13, Table 14 and

Table 15 shows the main fishing depth is between 800-1000m and the overlap for the preferred habitat. Figure 33 shows the extent of the spatial footprint with

Table 16 showing the observed and industry-reported catch of benthic species from the deepwater fleet.

The latest report advances the precision of trawl footprint analysis by using GPR data and showed that for deepwater trawls it increased from 39,403 km^2 to 41,462 km^2. The difference is expected to be a result of moving from the 'traditional methodology' for ERS data which assumes a straight line between start and end positions and the use of GPR tracks to better inform the spatial footprint. See Table 32 of AEBR 316 for a full comparison of the footprint and aggregate area for the GPR swept areas and the equivalent area for ERS data.

Table 13: The total area of the seafloor in each depth zone within 'fishable' waters, all depth zones ≤ 1600 m combined, and the percentage of each depth zone covered by the 2021 trawl footprint for each Tier 1 target species and for the Tier 1 targets combined. – indicates no overlap (MacGibbon & Mules, 2023).

Depth	Area	Footprint area overlap (%)									
zone (m)	(km^2)	HAK	HOK	JMA	LIN	OEO	ORH	SBW	SCI	SQU	Tier 1
< 200	249 341.90	0.01	0.06	1.10	0.05	–	0.00	–	0.01	1.09	2.30
200–400	98 295.90	0.04	0.73	0.06	0.32	–	0.00	0.01	2.73	1.07	4.81
400–600	253 939.20	0.13	5.66	0.00	0.37	–	0.00	0.21	0.75	0.12	7.07
600–800	185 161.60	0.18	2.65	0.00	0.12	0.00	0.06	–	0.00	0.00	2.94
800–1000	166 645.00	0.01	0.20	–	0.00	0.09	1.91	–	0.00	0.00	2.22
1000–1200	144 930.50	0.00	0.00	–	–	0.08	1.13	–	–	–	1.21
1200–1400	168 376.80	–	0.00	–	–	0.01	0.23	–	–	–	0.24
1400–1600	124 988.80	–	0.00	–	–	0.00	0.07	–	–	–	0.08
≤ 1600	1 391 679.70	0.05	1.47	0.20	0.12	0.02	0.39	0.04	0.33	0.29	2.86

Table 14: The total seafloor area in each depth zone within 'fishable' depth zones ≤ 1600 m, and the percentage of each depth zone contacted by the 1990–2021 Tier 1 footprint (MacGibbon & Mules, 2023).

Depth zone (m)	Area (km^2)	Footprint area overlap (%)									
		HAK	HOK	JMA	LIN	OEO	ORH	SBW	SCI	SQU	Tier
< 200	249 341.90	0.1	5.3	15.8	1.2	0.0	0.1	0.0	0.7	9.9	27.4
200–400	98 295.90	1.2	18.6	6.1	7.0	0.1	0.2	3.7	9.5	8.0	36.7
400–600	253 939.20	5.1	28.0	0.4	4.8	0.1	0.2	7.6	3.6	2.1	40.1
600–800	185 161.60	3.0	28.6	0.2	3.3	0.7	0.9	0.2	0.2	1.7	31.3
800–1000	166 645.00	0.6	5.3	0.0	0.2	5.2	12.2	0.0	0.1	0.3	21.4
1000–1200	144 930.50	0.0	1.3	0.0	0.0	3.5	9.6	0.0	0.1	0.2	13.3
1200–1400	168 376.80	0.0	0.3	0.0	0.0	0.9	3.2	0.0	0.0	0.1	4.1
1400–1600	124 988.80	0.0	0.3	0.0	0.0	0.3	1.5	0.0	0.1	0.1	2.0
≤ 1600	1 391 679.70	1.5	12.0	3.4	2.1	1.3	3.2	1.7	1.5	3.0	23.6

Table 15: The total area of each 'preferred habitat' (probability of capture) and the percentage of each species 'preferred habitat' (probability of capture) area for ORH covered by the 1990–2021 and 2021 bottom-contact trawl footprint. – indicates no data. (MacGibbon & Mules, 2023).

Probability occurrence (%)	ORH footprint overlap (%)	
	1990–2021	2021
0	0.14	<0.01
0.1–1.0	0.20	<0.01
1.1–5.0	0.39	0.01
5.1–10.0	0.86	0.03
10.1–0.0	1.33	0.05
20.1–30.0	1.67	0.08
30.1–40.0	1.99	0.21
40.1–50.0	2.43	0.33
50.1–60.0	2.44	0.22
60.1–70.0	2.52	0.31
70.1–80.0	3.08	0.29
80.1–90.0	5.91	0.85
90.1–95.0	10.58	1.28
95.1–99.0	30.52	4.08
0.0–99.0	3.16	0.39

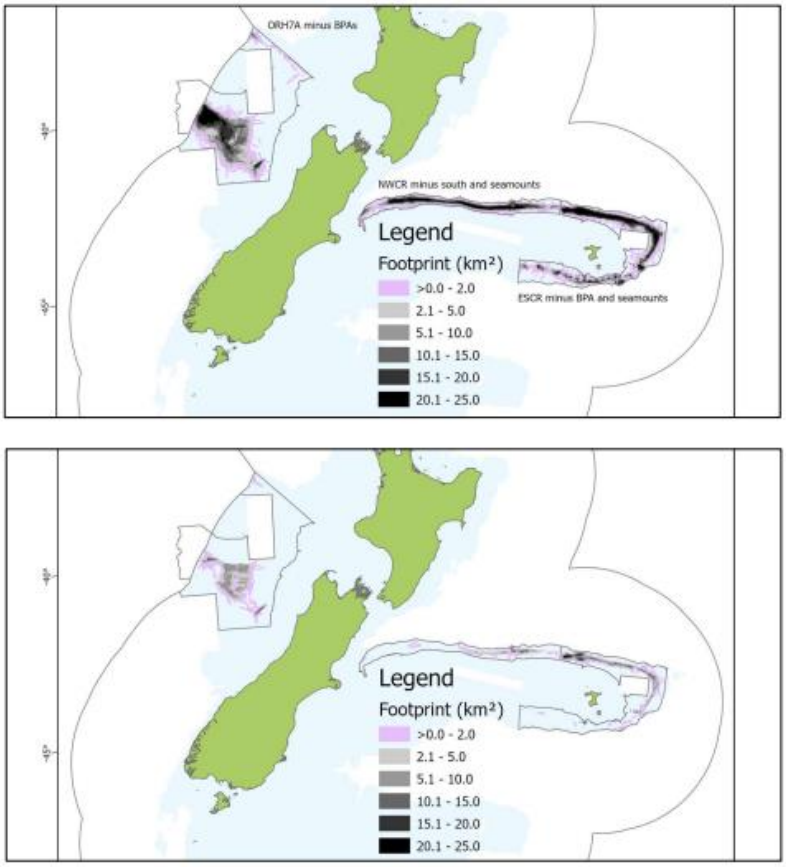

Figure 33: The extent of the footprint, based on 25-km2 cells, for the ORH/OEO fishery for the ORH MSC ORH 7A, NWCR, and ESCR areas, in 800–1600 m, for 1990–2021 (upper plot) and 2021 (lower plot).

Table 16: Observed and industry-reported catch of benthic species (kg) by the core deepwater fleet between the 2017/18 and 2021/21 fishing years

	17/18		18/19		19/20		20/21	
	Observed	Industry Reported	Observed	Industry Reported	Observed	Industry Reported	Observed	Industry Reported
Anemones	18,463	5,754	7,773	4,275	5,064	9,249	7,852	14,312
Corals (COU)	240	82	631	163	2,656	35	3,860	20
Corals, Sponges, Bryozoans (CSB)[62]	2,166	2,926	8,141	27,928	1,024	1,488	938	5,350
Hydroids	23	-	18	-	65	-	10	
Sea pens	169	-	104	-	125	-	95	
Sponges	47,692	89,452	18,752	78,622	30,639	57,909	33,772	49,936

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P3 OVERVIEW OF MANAGEMENT INFORMATION

Fisheries Change Programme

The programme has 3 parts:

- Introducing mandatory electronic catch and position reporting to improve the collection and reliability of fisheries information
- Changing fishing rules and policies to make them simpler, fairer and more responsive, while also incentivising better fishing practice
- Improving monitoring and verification capabilities, including the use of on-board cameras, to better observe fishing practice.(https://www.mpi.govt.nz/fishing-aquaculture/commercial-fishing/fisheries-change-programme/)

The Fisheries Amendment Act has been passed into law with the vision that it will encourage better fishing practices, and modernise and strengthen New Zealand's fisheries management system by:

- strengthening the commercial fishing rules relating to the landing and discarding of fish
- introducing new graduated offences and penalties, including enabling the creation of an infringement regime for less serious offences and a system of demerit points
- enabling the further use of on-board cameras
- creating a new defence to help save marine mammals and protected sharks and rays
- streamlining the adjustment of recreational management controls.

Table **17** shows the historical Schedule 6 species which are being updated through the Fisheries Change process. FNZ is currently starting the review process of some existing exceptions (primarily for finfish and sharks) (Implementing the Fisheries Amendment Act 2022). Once the implementation process has been completed the table below will be replaced by exemption notices.

Table 17: Management categories and species in each category (including species listed on Schedule 6 of the Fisheries Act) (FNZ, 2022a)

Protected	**Schedule 4C**	**Quota Management System (QMS)**	**Open Access** (species not included in QMS or on Schedule 4C)
(species for which utilisation is not considered appropriate)	(may not be targeted)		
Basking shark (*Cetorhinus maximus*)	Hammerhead shark (*Sphyrna zygaena*)	Spiny dogfish (*Squalus acanthias*)*	All others not listed elsewhere on this table
Whale shark (*Rhincodon typus*)	Sharpnose sevengill shark (*Heptranchias perlo*)	Dark ghost shark (*Hydrolagus novaezelandiae*)	
Oceanic whitetip shark (*Carcharhinus longimanus*)		Pale ghost shark (*H. bemisi*)	
White pointer shark (aka white or great white shark; *Carcharodon carcharias*)		Smooth skate (*Dipturus innominatus*)*	
Deepwater nurse shark (*Odontapsis ferox*)		Rough skate (*Dipturus nasutus*)*	
Manta ray (*Manta birostris*)		School shark (*Galeorhinus galeus*)*	
Spinetail devil ray (*Mobula japanica*)		Elephantfish (*Callorhinchus milii*)	
		Rig (spotted dogfish; *Mustelus lenticulatus*)*	
		Mako shark (*Isurus oxyrinchus*)*	
		Porbeagle shark (*Lamna nasus*)*	
		Blue shark (*Prionace glauca*)*	

* *Species listed on Schedule 6 of the Fisheries Act 1996. With some exceptions, all catches of QMS species must be landed. One specific exception is for species that are listed on the 6th Schedule of the Fisheries Act, which may be returned to the sea*

Fisheries Plan

The actual management measures and delivery outcomes in the Plan are specified in MPI's Annual Operational Plan (AOP), which is reviewed and updated annually. In addition, an Annual Review Report assesses performance against the AOP and is publicly available. The latest Annual Review publication has been drafted and is scheduled to be released publicly by FNZ shortly, it was not publicly available at the time of writing.

National Plans of Action (NPOAs)

New Zealand has a responsibility to act in accordance with the objective of International Plans of Action for Seabirds and Sharks. The two NPOAs applicable to deepwater fisheries are:

1. **NPOA-Sharks 2022**

New Zealand's first NPOA-Sharks was in 2008 and the most recent one was NPOA-Sharks 2013. The 2013 NPOA has been reviewed and the NPOA-Sharks 2022 has been consulted on and a draft NPOA circulated. The final NPOA-Sharks 2022 is imminent.

The review of NPOA-Sharks 2013 identified that overall there has been good progress was made on implementing the NPOA-Sharks 2013. A major achievement since the release of the NPOA was the elimination of shark finning – the removal of fins from the shark and returning the carcass to the sea

(either dead or alive). Since 2014, it has been illegal for fishers to remove fins from sharks and then discard the bodies into the sea.

The specific feedback on Objective 2.4 Eliminate shark finning in New Zealand fisheries by 1 October 2015, with one exception shows that the combined approach of; (a) fins-attached approach, whereby fins must be naturally or artificially attached to the body of the shark; and (b) a ratio approach, whereby retained shark fin weight must be within a specified percentage of shark greenweight, has provided the best balance between eliminating shark finning and minimising disruptions on fishing operations.

The review identified that this pragmatic approach is providing an effective deterrent to shark finning. Prior to the ban, the highest volume of QMS sharks caught and retained were spiny dogfish, school shark, blue shark, elephant fish and rig. Since the ban, there have been substantial decreases in retained catch for these species as reported on Monthly Harvest Returns that fishers provide to Fisheries New Zealand (FNZ, 2022b). FNZ's view is that the ban has resulted in stopping the landings of fins alone for rig and school shark, with one or two exceptions across all fisheries that have been identified and addressed).

The NPOA-Sharks 2022 sets out the desired future state for shark conservation and management in New Zealand. Underpinning this, goals have been developed for a range of areas where improvements in current management arrangements can be achieved, and objectives are aligned with each of the goals.

A consultation in 2022 sought to amend aspects of shark fin management measures ('fins artificially attached' approach) in order to allow changes to the species subject to this approach to be implemented via circular rather than regulation. This was a recognition in the Discussion document: Proposed technical amendments to fisheries regulations and Summary of proposed technical amendments to fisheries regulations that an administrative change was needed to reduce the resource-intensive and time-consuming nature of extending or changing the species covered by the fins artificially attached approach.

The Deepwater Group's (DWG) Sharks Operational Procedures provide the deepwater fleet with guidance on processes to minimise harm to protected shark species and maximise their chance of survival on return to the sea.

2. **NPOA-Seabirds**

New Zealand's first NPOA was published in 2004 and a revised NPOA-Seabirds published in 2013. The NPOA Seabirds 2020 is New Zealand's third iteration of a national plan of action.

The NPOA Seabirds 2020's vision is New Zealanders work towards zero fishing-related seabird mortalities. Its four goals are:

- Avoiding bycatch — effective bycatch mitigation practices are implemented in New Zealand fisheries.
- Healthy seabird populations — direct effects of New Zealand fishing do not threaten seabird populations or their recovery.
- Research and information — information to effectively manage direct fisheries effects on seabirds is continuously improved.
- International engagement — New Zealand actively engages internationally to promote measures and practices that reduce impacts on New Zealand seabirds.

Research Plans

Research needs for deepwater fisheries are driven by the objectives of the National Fisheries Plan for Deepwater Fisheries and delivered through the Medium-Term Research Plan for Deepwater Fisheries (MTRP), (FNZ, 2020d). The MTRP provides a five-year schedule of science and monitoring projects (e.g., biomass surveys and stock assessments), required to support the sustainable management of deepwater fisheries.

FNZ's Annual Operational Plan for Deepwater Fisheries 2021/22 (Tables 8-11 and 16) provides FNZ and DOC research projects to be undertaken during 2020-21 that relate to deep water species (FNZ, 2021). FNZ's NPOA Seabirds 2020 – Implementation Plan outlines the seabird risk assessment, monitoring and mitigation projects to be undertaken from 2020 to 2024 (FNZ, 2020b).

A comprehensive review of progress achieved against aquatic environment-related research projects and environmental objectives is undertaken by FNZ annually (FNZ, 2022c).

Orange roughy stock assessments are scheduled to align with the relevant acoustic surveys. For ORH acoustic surveys are often used to monitor and estimate abundance of fish stocks that aggregate for either spawning or feeding. Acoustic surveys at regular cycles are employed to monitor orange roughy during their respective spawning periods and take place in winter. Survey outputs are used as key inputs to stock assessments. In 2014, a Management Strategy Evaluation indicated that surveys and assessments of orange roughy could be completed every four years would provide for utilisation while ensuring that stocks are not overfished and to allow fisheries managers to respond appropriately to any changes in abundance.

Table 18 and Table 19 outline the planned schedules, however these are updated to reflect operational and logistical challenges on an annual basis. For example the ORH 3B NW Rise and ES Rise assessment was not completed as scheduled in 2020/21 because of the delay in the completion of the survey. These were then subsequently rescheduled for 2021/22 which will be industry-led. ORH 3B ES Rise is scheduled to be completed again in July 2024 as part of timely response to recent stock assessment developments.

ORH 3B Puysegur wasn't completed in July 2023 as scheduled. Surveys and assessments for ORH 3B Puysegur, ORH 7B, and ORH 2A North are currently industry-led initiatives (Table 18 and Table 19) (FNZ, 2021). The fishing industry has progressed orange roughy acoustic surveys, both within and outside of Fisheries New Zealand contracting processes for ORH 3B Northwest Chatham Rise, East & South Chatham Rise, Puysegur, in ORH MEC (2A, 2B, and 3A), ORH 7A, and in ORH 7B.

Table 18: Orange roughy assessment schedule by financial year (incl. month of delivery) (FNZ, 2021) (Note this is the scheduled plan and the latest dates are now a year out except for MEC).

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
ORH 2A North			**Assessment**			
ORH MEC		Assessment				
ORH 3B – NW Rise	~~Assessment~~	**Assessment**			Assessment	
ORH 3B – ES Rise	~~Assessment~~	**Assessment**			Assessment	
ORH 3B – Puysegur				**Assessment**		
ORH 7A			Assessment			
ORH 7B		~~**Assessment**~~				

Assessments in bold reflect where data used will be from planned industry-led survey initiatives

Table 19 Orange roughy survey schedule (FNZ, 2021)

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
ORH 1						
ORH 2A North		**June 2022**			**June 2025**	
ORH MEC	July 2021			June 2024		
ORH 3B – NW Rise	**July 2021**		July 2023			July 2026
ORH 3B – ES Rise	**July 2021**		July 2023			July 2026
ORH 3B – Puysegur			**July 2023**			
ORH 7A		July 2022			July 2025	
ORH 7B	~~***July 2021***~~					

Dates in bold reflect planned industry-led survey initiatives

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