Fisheries New Zealand
Tini a Tangaroa

Inshore trawl survey from South Taranaki Bight to the west coast South Island, March–April 2025 (KHR2503/KHR2504)

New Zealand Fisheries Assessment Report 2026/11

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ISSN 1179-5352 (online)
ISBN 978-1-997309-27-7 (online)

March 2026

Te Kāwanatanga o Aotearoa
New Zealand Government

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Please cite this report as:

Underwood, M.J.; Devine, J.A.; Jones E.G.; MacGibbon, D.J.; Bian, R.; Ballara, S.; Walsh, C. (2026). Inshore trawl survey from South Taranaki Bight to the west coast South Island, March–April 2025 (KHR2503/KHR2504). *New Zealand Fisheries Assessment Report 2026/11.* 54 p.

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PLAIN LANGUAGE SUMMARY

This report presents the results from the first inshore trawl survey in a new time series from New Plymouth south along the west coast of the North and South Islands to the Haast River mouth, and including Tasman Bay and Golden Bay. The survey covers depths from 10 to 400 m, using RV *Kaharoa II* and was principally aimed at surveying snapper, giant stargazer, red cod, red gurnard, spiny dogfish, and tarakihi, though useful estimates are achieved for other species too. The joining of the North Island strata to the South Island strata was to cover the full distribution of snapper in the geographic area at the same time of year. The survey was split into two areas: west coast central (WCC) and west coast South Island (WCSI); divided by a line drawn between Farewell Spit and Stephens Island.

Data collected include length, weight, and maturity data for selected species, and the collection of snapper, giant stargazer, red gurnard and tarakihi otoliths for ageing. The trawl survey provides the first relative biomass estimates of the new time series and age, length, and maturity stage information that is used for stock assessments and fisheries management advice for key inshore species.

This was the first survey to be carried out on RV *Kaharoa II*, with previous surveys carried out on the RV *Kaharoa.* This voyage also served as an intercalibration between the two vessels with both fishing side by side on the WCSI to provide continuity in the time-series. The intercalibration results are presented in a separate report.

A total of 35 phase one stations were successfully completed in the WCC area with one phase two station. In the WCSI area, 64 stations were successfully completed, with 59 forming the basis for the intercalibration experiment.

Abundance estimates and other data on target species are presented in this report. Information on non-target species is available in the Trawl Survey Information Portal online at https://tsip.niwa.co.nz/home.

EXECUTIVE SUMMARY

Underwood, M.J.[1]; Devine, J.A.[1]; Jones, E.G.[1]; MacGibbon, D.J.[1]; Bian, R.[1]; Ballara, S.[1]; Walsh, C.[2] (2026). Inshore trawl survey from South Taranaki Bight to the west coast South Island, March–April 2025 (KHR2503/KHR2504).

***New Zealand Fisheries Assessment Report 2026/11.* 54 p.**

The first inshore trawl survey in a new time series from New Plymouth, south along the west coast of the North and South Islands to the Haast River mouth, and including Tasman Bay and Golden Bay, at depths from 10 to 400 m, was successfully completed using RV *Kaharoa II*. The survey took place from 9 March to 14 April 2025 and used a stratified two-phase design optimised for giant stargazer, red cod, red gurnard, snapper, spiny dogfish, and tarakihi.

The survey was split into two areas: west coast central (WCC) and west coast South Island (WCSI); divided by a line drawn between Farewell Spit and Stephens Island. This was the first survey to be carried out on RV *Kaharoa II*, with previous surveys carried out on the RV *Kaharoa.* This voyage also served as an intercalibration between the two vessels with both fishing side by side on the WCSI to provide continuity in the time-series. The intercalibration results are presented in a separate report.

A total of 35 phase one stations were successfully completed in the WCC area with one phase two station. In the WCSI area, 64 stations were successfully completed, with 59 forming the basis for the intercalibration experiment.

Data collected include length, weight, and maturity data for selected species, and the collection of snapper, giant stargazer, red gurnard, and tarakihi otoliths for ageing. The trawl survey provides the first relative biomass estimates of the new time series and age, length, and maturity stage information that is used for stock assessments and fisheries management advice for key inshore species.

Biomass estimates for the target species in the WCC strata (north of Farewell Spit) were: John dory, 94 t (coefficient of variation, CV, 23%); red gurnard, 191 t (56%); snapper, 1857 t (16%); spiny dogfish, 947 t (40%); and tarakihi, 11 t (51%). Biomass estimates for the target species in the WCSI strata were: John dory, 240 t (20%); red gurnard, 1076 t (21%); snapper, 4736 t (15%); spiny dogfish, 2554 t (44%); tarakihi, 441 t (16%); giant stargazer, 286 t (24%); and red cod, 401 t (57%).

Snapper were mainly distributed along the Kapiti Coast and in Tasman and Golden Bays. In the WCC area, 1+ snapper were caught in stratum I25 (Kapiti Coast, north of Kapiti Island) in 10–25 m, suggesting a potential nursery ground in addition to the known nursery grounds in Tasman and Golden Bays.

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1. INTRODUCTION

This report presents results from the first stratified random trawl survey using RV *Kaharoa II* at depths of 10–400 m off the west coast of New Zealand from Airedale Reef to Haast River mouth. A series of 17 trawl surveys have been conducted along the west coast of the South Island (WCSI) and in Tasman and Golden Bays (TBGB) using RV *Kaharoa* in 1992, 1994, 1995, 1997, 2000, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, and 2025 (Drummond & Stevenson 1995a, 1995b, 1996; Stevenson 1998, 2002, 2004, 2006, 2007, 2012, Stevenson & Hanchet 2010, MacGibbon & Stevenson 2013, Stevenson & MacGibbon 2015, 2018, MacGibbon 2019, MacGibbon et al. 2022, MacGibbon et al. 2024, MacGibbon et al. 2026). The WCSI survey was expanded in 2017 to include two new strata in 10–20 m in inner Tasman Bay and inner Golden Bay. These strata were added because snapper distribution in this area was found to extend shallower than the core strata (which start at 20 m). These strata were included in each survey since 2017.

The WCSI survey area was expanded in 2025 to include the South Taranaki Bight and Kapiti Coast, previously surveyed in October during the west coast North Island (WCNI) survey (Figure 1). A change to the timing of the WCNI survey was advised by the Inshore Working Group, with the recommendation that the survey should be carried out in the summer period when the availability of snapper is presumed to be less variable. This change in timing also allows sampling in the South Taranaki Bight and Kapiti strata to align more closely with the timing of the west coast South Island (WCSI) trawl survey, enabling joint monitoring of snapper in both SNA 8 and SNA 7 during the summer/autumn period. The strata south of New Plymouth along with two new strata were surveyed immediately before the start of the WCSI survey in late March and hereafter are referred to as the west coast central (WCC; Figure 1).

This change in timing for the WCC occurred at the same time as the replacement of RV *Kaharoa* with the new research vessel *Kaharoa II*. The change in vessel has provided an opportunity to change other aspects of the inshore trawl surveys that can be accounted for as part of an intercalibration exercise. A new trawl net design was adopted that uses more modern materials along with newer, more efficient trawl doors. The design process included a series of discussions with input from inshore fishers, Earth Sciences New Zealand scientists involved in the inshore surveys, Earth Sciences New Zealand vessel skippers, and net makers (Motueka Nets). The key objectives were to design a trawl that was suitable for the range of target species and sea floor conditions for all the ongoing inshore trawl surveys as well as being more aligned with modern commercial trawl net design and materials. As part of this process, the majority decision of science staff participating in the design process was to prioritise a design closer to the 2-panel South Island survey trawl rather than the 4-panel high-opening bottom trawl (HOBT) net used in the North Island surveys. This alignment also resulted in the codend mesh size being increased to match the South Island trawl surveys. Additional changes adopted include reducing the standard tow length to 1.5 n. mile and increasing the tow speed for all surveys to 3.4 knots. This speed will be measured as the speed through water (STW) rather than speed over ground (SOG). Standardising the tow speed in this way reduces variation in the speed the net is moving through the water under different tidal conditions, and the speed that fish have to swim at as they are herded in front of the net. This therefore reduces any variation in catch efficiency due to varying swimming endurance under different tidal flow conditions. These changes were decided by majority voting at a meeting of the Inshore Working Group on 14 October 2024. Prior to the start of the survey, the sweep length was increased from 55 m to 110 m to optimise the sweep angle of the new trawl (Jones et al. 2026). This decision was approved by Fisheries New Zealand on 5 March 2025. The change in timing for the WCC negates the need for an intercalibration since the 2025 survey is the start of an entirely new time series for this area.

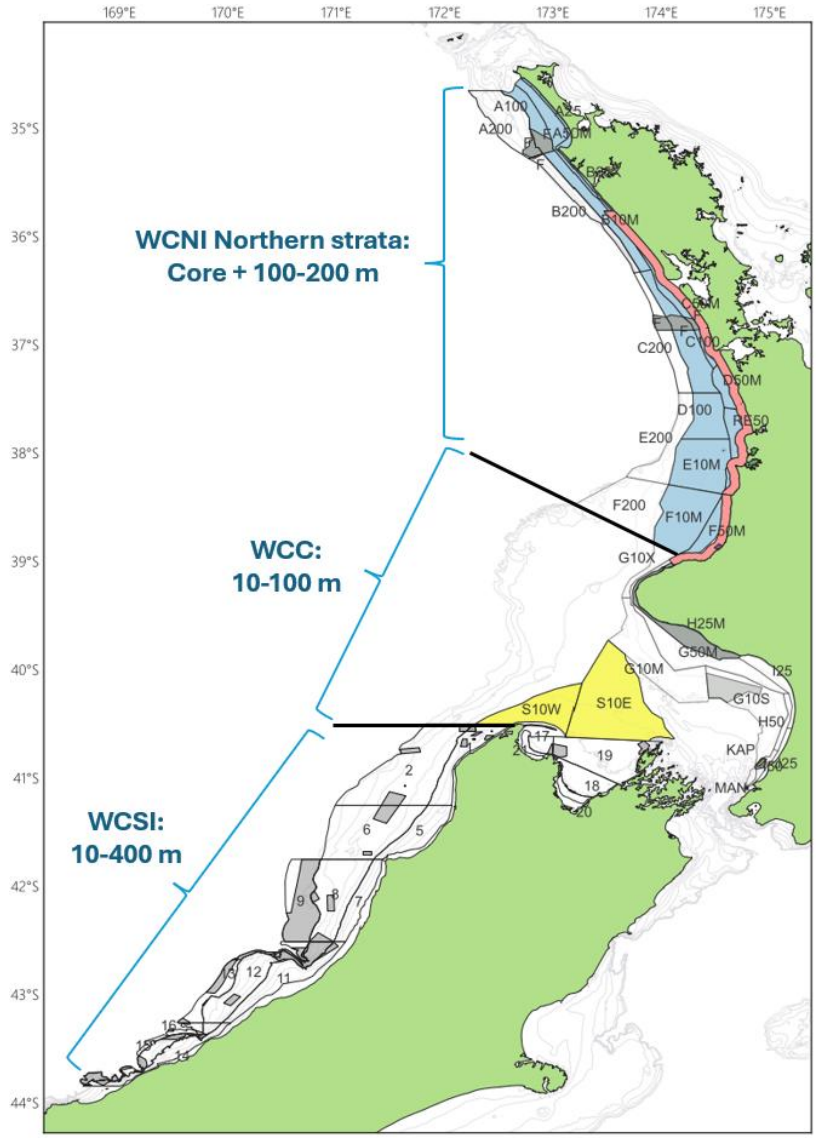


Figure 1: Existing inshore survey strata for the west coast North Island (WCNI) and west coast South Island (WCSI) surveys and the introduction of a new survey area; west coast central (WCC) area. Strata north of New Plymouth (strata A–F) form the WCNI survey in 2025. The South Taranaki Bight and Kapiti coast strata, previously part of the WCNI survey (strata G–J), have been recommended to be surveyed at the same time as the Tasman and Golden Bay strata of the WCSI survey. In 2025, the WCC area included the strata G–J and an additional two strata (strata S10E and S10W) covering the 50–100 m depth range between South Taranaki Bight and Tasman Bay. Foul or excluded areas are grey.

1.1 Project objectives

This research was carried out for Fisheries New Zealand research project INT2024-01: Inshore trawl surveys (WCNI, WCSI, ECSI).

Overall objective

To determine the relative abundance and distribution of inshore finfish species off the southern Taranaki Bight (STB), Tasman Bay and Golden Bay (TBGB), and west coast of the South Island (WCSI) in the 2024–25, 2026–27 and 2028–29 fishing years, focusing on red cod (*Pseudophycis bachus*; RCO), red gurnard (*Chelidonichthys kumu*; GUR), snapper (*Chrysophys auratus*; SNA), stargazer (*Kathetostoma giganteum*; GIZ), tarakihi (*Nemadactylus macropterus*; NMP), John dory (*Zeus faber*; JDO), spiny dogfish (*Squalus acanthias*; SPD), rig (*Mustelus lenticulatus*; SPO), and

school shark (*Galeorhinus galeus*; SCH). The TBGB and WCSI 2024–25 survey will be a dual survey conducted by two vessels as part of an intercalibration exercise, after which, only the new vessel will be used.

Specific project objectives

1. To determine the relative abundance and distribution of red cod, red gurnard, stargazer, snapper, tarakihi, John Dory and spiny dogfish off the west coast of the South Island from Farewell Spit to the Haast River mouth, and within Tasman Bay and Golden Bay by carrying out trawl surveys in March/April of 2025, 2027, and 2029. The target coefficients of variation (CV) of the biomass estimates for these species are as follows: red cod (20–25%), red gurnard (20%), snapper (20%), giant stargazer (20%), tarakihi (20%), and spiny dogfish (20%).
2. To collect the data and determine the length frequency, length-weight relationship and reproductive condition of red cod, red gurnard, snapper, giant stargazer, tarakihi, John Dory and spiny dogfish for the WCC survey, and to collect only length frequency information on the WCSI survey.
3. To collect otoliths from red gurnard, John dory, giant stargazer, tarakihi, snapper and red cod on the WCC survey, noting that otoliths were collected on the WCSI as reported in MacGibbon et al. (2026).
4. To collect the data to determine the length frequencies of all other Quota Management System (QMS) species.
5. To age snapper and tarakihi otoliths collected during the WCC survey, noting that these species were aged and reported for the WCSI (MacGibbon et al. 2026).
6. To identify collected benthic macro-invertebrates.
7. To present biomass trends and size composition information for all species for which the WCSI survey reliably monitors relative abundance trends.
8. Broader outcomes.
9. To carry out trawl inter-calibration between *Kaharoa* and *Kaharoa II* and estimate species-specific catchability ratios from the intercalibration.

The result of specific project objective 9 is presented in a separate Fisheries Assessment Report (Devine et al. 2026).

The result of objectives 1–8, carried out on the *Kaharoa,* are in a separate Fisheries Assessment Report (MacGibbon et al. 2026). Otoliths, individual weights, and reproductive data were collected for the WCSI and TBGB area on the *Kaharoa*, and not the *Kaharoa II*, as the *Kaharoa II* was conducting the intercalibration.

2. METHODS

2.1 Survey area and design

The survey was a two-phase stratified random trawl survey after Francis (1984). The survey area was divided into two areas by a line drawn between Farewell Spit and Stephens Island. The west coast central area (WCC; KHR2503) was north of Farewell Spit and covered depths of 10–100 m off the west coast of the North Island from New Plymouth to Mana Island and 50–100 m in the Cook Straight/Tasman Sea above Tasman Bay and Golden Bay (Figure 1). KHR2504 was south of Farewell Spit and covered depths 10–70 m within Tasman Bay and Golden Bay inside a line drawn between Farewell Spit and Stephens Island; 20–200 m off the west coast of the South Island from Cape Farewell to Karamea; 25–400 m from to Cape Foulwind and 20–400 m from Cape Foulwind to the Haast River mouth (Figure 1). The maximum depth off the west coast north of Karamea was limited to 200 m because of historically low catch rates of all species in the 200–400 m range.

The combined survey area of 41 011 km^2, including untrawlable ground along the west coast of the South Island, was divided into 28 strata by area and depth (
Table 1, Figure 1). Strata 1–21 were as defined for previous west coast South Island surveys (see MacGibbon et al. 2024, 2026, for latest surveys); strata G–J were used in previous west coast North Island surveys (Jones et al. 2024, 2026); and two strata in the 50–100 m depth range in Cook Strait/Tasman Sea were introduced in 2025 to join the two areas (S10E and S10W). Non-trawlable ground was identified before the voyage from data collected during previous trawl surveys in the area and was excluded from the random station generation.

Phase-one station allocation for strata 1–21 was optimised using the R (Version 4.5.1, R Core Team 2025) function *allocate* (Francis 2006) to achieve the target CVs of previous surveys on the RV *Kaharoa* (see MacGibbon et al. 2026). Without any trawl survey data for the new time of year or new strata (G10M – S10W), 3–5 phase-one stations were allocated to each stratum, informed by previous spring catch rates in the survey area from recent years (G10M–J25; 2018–22; Jones et al. 2022, 2024) and general allocation for new strata (S10E and S10W), giving a total of 98 phase-one stations over the two areas.

The WCC area, when it was part of the WCNI survey, would typically begin in the north (Airedale Reef near New Plymouth) before proceeding around the west coast of the North Island, while the WCSI area will begin in the Tasman Bay and Golden Bay strata before proceeding to the west coast of the South Island. To minimise any effect of fish movement on biomass estimation, if phase-two stations were needed for the WCC area, they would be conducted prior to moving into the Tasman Bay and Golden Bay strata. Allocation of phase-two stations for the four main target species in the WCC area (i.e., snapper, tarakihi, red gurnard, and John dory) were estimated using the NIWA *SurvCalc* program (Francis & Fu 2012). Phase two stations were allocated to strata with the highest variance for the target species where the CV was higher than the specified target in order of species priority (snapper, red gurnard, tarakihi, and John dory). The procedure for phase-two station allocation for the WCSI and TBGB area is described in MacGibbon et al. (2026).

Station positions were randomly generated using Earth Sciences NZ's custom software 'RandomStation' (Doonan & Rasmussen 2017). The stations were required to be a minimum of 5.6 km (3 nautical miles) apart.

2.2 Vessel, gear, and trawling procedure

The new research vessel *Kaharoa II* (36 m stern trawler, beam of 9.5 m, gross tonnage 499 t, engine power of 956 kW) and the newly designed two-panel wing trawl were used. The trawl has a headline length of 25.6 m and a fishing line length of 32.4 m, with mesh sizes of 150 mm in the wings and body of the trawl and 120 mm in the taper. The codend mesh was 60 mm, with a twine thickness of 6 mm and chaffing gear on the bottom panel. The net was fished with 110 m long sweeps, 55 m long bridles and 4.41 m^2 (883 kg) Thyboron trawl doors. Further details including the net plan are provided in Appendix 1.

All tows were conducted during daylight hours (generally between 06:00 and 19:00 NZST) at the stratified randomly allocated station positions. The gear was shot so that the midpoint of the tow would coincide as closely as possible with the generated random position. The direction of the tow was influenced by a combination of factors, including weather conditions, tides, depth contours, and the location of the next tow, but was usually in the direction of the next planned station.

A Marport net monitor on the headline provided headline height measurements, Marport doorspread sensors provided distance measurements between the trawl doors, and a ZebraTech bottom contact sensor was mounted in the centre of the ground rope. Additional RBR Solo3 depth sensors were mounted on the headline and the footrope during selected tows to allow an alternative estimation of the opening height of the net. An RBR turbidity sensor was also mounted behind the headline. As part

of the Māui dolphin mitigation plan, a Dolphin Dissuader Device (DDD) was also mounted on the headline of the net.

If the station was found to be in an area of foul ground or the depth was out of the stratum range, an area within 3.7 km of the station was searched for a replacement tow path. If the search was unsuccessful, the station was abandoned and the next alternative station within the stratum was chosen from the random station list. Standard tows were of 1.5 n. mile distance measured by GPS, at a speed through water of 3.4 knots. The tow was deemed to have started when the net monitor indicated that the net was stable on the bottom and was completed when hauling began. A warp length of 200 m was used for all tows less than 70 m depth. At greater depths, the warp to depth ratio decreased linearly to about 2.4:1 at 400 m.

2.3 Catch and biological sampling

The catch from each tow was sorted into species and weighed on electronic motion-compensating Marel scales to the nearest 0.1 kg. Organisms were identified to species where possible. Crustaceans, shellfish, and other invertebrate species not readily identified were placed in sealed plastic bags with a label noting the trip code and station number and frozen for later identification on shore.

Length, to the nearest whole centimetre (cm) below the actual length, and sex (where possible) were recorded for all species managed under the QMS and a selection of non-QMS species up to 200 fish per tow. For target species, more detailed biological data were collected on a sub-sample of up to 30 fish per tow. This included individual fish weight (grams), length to the nearest millimetre (mm), sex, and gonad stage. Otoliths were removed for later ageing from red cod, red gurnard, giant stargazer, John dory, snapper, and tarakihi. Because the vessel was conducting the intercalibration on the WCSI and TBGB area, only a randomly selected sub-sample of up to 200 fish of all species were measured and sexed; biological information and otoliths were collected on the *Kaharoa* (MacGibbon et al. 2026).

Middle depth (MD) maturity stages were used to stage teleost fish species while chondrichthyans were staged using the sharks and skates (SS) staging scale (Appendix 2).

All station and biological data were entered into the Fisheries New Zealand *trawl* database after final error checking had been carried out after the survey.

2.4 Trawl survey data analysis

Biomass estimates, population scaled length frequency distributions, and their associated CVs were estimated by the swept area method of Francis (1981, 1989) using R-SurvCalc, an updated version of the C++ trawl survey analysis program SurvCalc (Francis 2009) implemented in the R-programming language. Biomass was estimated for the whole WCC strata, core WCSI strata (strata 1–19) and, for snapper, the core WCSI plus strata 20 and 21. References to ‘biomass’ are to *relative* abundance estimates unless otherwise stated.

The following assumptions were made for calculating biomass estimates:

1. The area swept during each tow equalled the distance between the doors multiplied by the distance towed.
2. Vulnerability was 1.0. This assumes that all fish in the area swept were caught and there was no escapement.
3. Vertical availability was 1.0. This assumes that all fish in the water column were below the headline height and available to the net.
4. Areal availability was 1.0. This assumes that the fishstock being sampled was entirely within the survey area at the time of the survey.

5. Within the survey area, fish were evenly distributed over both trawlable and non-trawlable ground.

None of these assumptions are likely to be correct but were adopted for all the trawl survey time series of relative biomass (Stevenson & Hanchet 1999). Assumption 5 refers only to occasional foul ground encountered within the WCC strata as some areas of foul have been excluded from the survey area. This exclusion differs to some other survey time series, such as the South Island inshore trawl series, where the areas of foul are included in the stratum areas and used for scaling up biomass. Given the above conditions, the biomass estimates generated are classed as relative indices of abundance. Biomass values are also presented for recruited biomass. Recruited lengths were determined following past discussions with the commercial fishing industry and reflect the minimum lengths considered desirable for sale to the public; they are often the minimum legal sizes previously set for fishery management (but not all species have minimum legal sizes).

Length frequencies were scaled by the percentage of catch sampled, area swept, and stratum area. For the WCC, the geometric mean functional relationship was used to calculate the length-weight coefficients for species where sufficient length-weight data were collected on the 2025 survey. For other species, coefficients were chosen from the *rdb* database based on whether there were coefficients from previous surveys in the time series, or on the best match between the size range of the fish used to calculate the coefficients in *rdb* and the sample size range from this survey (Appendix 3). For the WCSI and TBGB, relationships reported in MacGibbon et al. (2026) were used.

Sex ratios were calculated using scaled population numbers and were expressed as the ratio of males to females.

2.5 Ageing methods and analysis – WCC area only

2.5.1 Otolith collection

Otolith collection was limited to the WCC survey area. Otoliths for the WCSI/TBGB survey area were collected on the research vessel *Kaharoa* and reported in MacGibbon et al. (2026). Up to 20 otolith pairs were collected from the biological sub-sample of snapper and tarakihi for each station in the WCC survey area where the species were caught in sufficient numbers. In addition, extra otoliths were selected (from within the randomly selected length frequency sample) to ensure that enough otoliths from large fish were collected.

2.5.2 Snapper age determination

Snapper otoliths were prepared using the break and burn technique (Chugunova 1963) and a standardised procedure for reading otoliths was followed, outlined in the age determination protocol for snapper (Walsh et al. 2014). The forced margin method was implemented to anticipate the otolith margin type (wide, line, narrow) *a priori* based on the month in which the fish was sampled to provide guidance in determining age. The theoretical birthdate for ageing snapper is 1 January following Paul (1976) and, to be consistent with past trawl survey snapper ageing, otoliths were aged as age groups (i.e., 0+, 1+) as of the collection date, March 2025.

Otoliths were read using a single reader method that incorporated an audit of the primary otolith reader by a second experienced otolith reader. Both readers read a random subset of otoliths from the full set. Success or failure of the primary reader was determined by how well their initial readings matched the final-agreed ages as derived from a double-reading-conferring process.

2.5.3 Tarakihi age determination

Tarakihi otoliths were prepared and read in accordance with the age determination protocol for tarakihi (Walsh et al. 2016). This included thin-section preparation of the otoliths and application of the forced margin method to anticipate the otolith margin type (wide, line, narrow) *a priori*, based on the month in which the fish were sampled, to provide guidance in determining age. Determining the maximum dorsal-ventral width of the year one zone was used to ensure accurate counts of successive opaque zones. The theoretical "birthday" for tarakihi is 1 May (Walsh et al. 2016).

As for snapper, otoliths were read using a single reader method that incorporated an audit of the primary otolith reader by a second experienced otolith reader.

2.5.4 Catch-at-length and -age analysis

Scaled length frequency distributions were estimated by the area-swept method (Francis 1981, 1989) using an updated version of Earth Sciences NZ's catch-at-length-and-age software, CALA (Francis & Bian 2011). This updated version had been implemented in the R-programming language, instead of the C++ program used previously, and was applied to the age data and catch rates calculated using SurvCalc to produce separate age-length keys for male, female, and all fish (all fish included some unsexed fish). A subsample of 500 available otoliths were aged and used to produce the age-length key.

The age-length key derived from the age data collected in the WCC area was assumed to be representative of the March period in the WCC. The main assumption of an age-length key is that the sample was taken randomly with respect to age from within each length interval (Southward 1976) and this assumption was met.

2.6 Benthic macro-invertebrate collection and identification

Benthic invertebrates were weighed and identified at sea to the lowest known taxonomic level. Unidentified specimens were retained for later identification ashore. Specimens were frozen and, on return, were held in the appropriate facilities depending on the location of capture; frozen samples collected outside 12 n. mile were required to be listed under a biosecurity permit and stored at an approved biosecure freezer once landed. These samples were processed by Earth Sciences New Zealand's National Invertebrate Collection team, with all specimens recorded in the SPECIFY database and distributed to specialist taxonomists for identification to species, where possible (certain groups do not have specialist taxonomists in New Zealand). On completion, both SPECIFY and *trawl* (where feasible) databases were updated with identifications.

2.7 Broader outcomes and additional data collection

The project committed to supporting women in science through their inclusion in all parts of the project and building capacity and capability in the research sector through mentoring and training. Data collection and collaboration that was in addition to the specific objectives was also undertaken as part of our commitment to broader outcomes:

- Physical data (temperature and salinity) using a net-mounted Seabird Microcat CTD datalogger.
- Water clarity data collected using a Secchi disc deployed after each trawl station.
- Turbidity data collected from the first trial of using a net-mounted turbidity sensor.
- Fisheries acoustic data recorded on *Kaharoa II's* hull-mounted Simrad EK80 multifrequency echosounders.
- Tissue samples and otoliths for ecological and genetic-based population studies of kingfish (*Seriola lalandi lalandi*) and John dory being carried out by PhD students at Victora University.
- Collection of prey species of Māui dolphins to investigate the presence of *Toxoplasma* parasite eggs in gills and gut (Massey University).

Educational resources collected during the survey were utilised for two outreach programmes in a local New Zealand school (Goodwood School, Cambridge) to help young students discover more about science. Information on trawl survey methods, fish identification, and fish ageing were included in the outreach activities.

Environmental data
Water temperature profiles at each station were recorded by a calibrated Seabird Microcat CTD (conductivity, temperature, depth) unit attached just behind the headline of the net, but only data on surface and bottom temperatures are stored in the *trawl* database. Surface temperatures were taken at a depth of 5 m below the surface. Bottom temperatures were taken at about 4.5 m above the sea floor because that is the approximate height of the CTD off the bottom (i.e., the approximate headline height of the trawl). Full temperature profiles are stored in the *ctd* database and uploaded to the World Ocean Database hosted by NOAA.

Acoustic data
Acoustic data were continuously collected from the surface to the seabed using the *Kaharoa II* Simrad EK80 multifrequency (18, 38, 70, 120, and 200 kHz) echosounders. All 38 kHz data were collected with a transducer power output of 2000 W. Transmitted pulse length was 1.024 s with a ping interval of 0.5 s (i.e., ping rate of 2 pings per second). A logbook was used to keep record of acoustic files and related activities, enabling the acoustic data to be partitioned into data collected during steaming and trawling activities. All acoustic data were uploaded to the FNZ *acoustic* database on completion of the survey. The echosounder system was calibrated during this voyage, on the WCSI survey in April 2025 following standard procedures (Demer et al. 2015).

3. RESULTS

3.1 Timetable

RV *Kaharoa II* departed New Plymouth on 9 March 2025 and began that day in stratum G10X (off New Plymouth). It then completed most of the stations off the North Island before completing the stations in the two new strata. The last station in west coast central area was completed on 19 March before unloading fish and taking on new ice and fish bins at Talley's Nelson on 20 March.

The RV *Kaharoa II* met with RV *Kaharoa* in Nelson on 21 March for the intercalibration and the WCSI and TBGB survey. It began the WCSI and TBGB area on 22 March in stratum 19 (outer Tasman Bay). Offloading of fish occurred at Talley's Nelson on 25 and 28 March, and again on 8 and 13 April. *Kaharoa II* departed Nelson on 13 April and arrived in Wellington the following day for demobilisation.

3.2 Station and tow data

A total of 35 phase-one stations were completed for the WCC area (
Table 1). One phase-two station was completed in stratum S10E (Figure 2). Eight gear trial stations were completed comparing 55 m and 110 m sweep lengths, which were reported with the west coast North Island survey results (Jones et al. 2026).

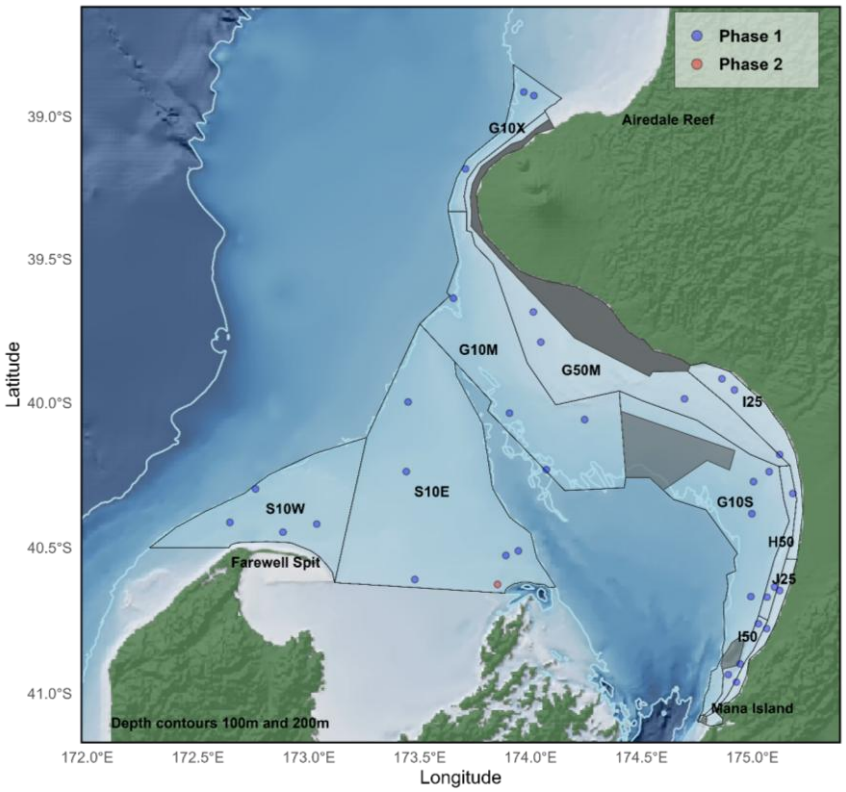
For the WCSI and TBGB area, a total of 53 stations were completed in the core area that were valid for use for biomass estimation, with a further 6 completed in the 10−20 m strata in TBGB (
Table 1, Figure 2). Five extra stations were completed, which were also included for biomass estimation; these stations were allocated to collect additional length information for the intercalibration. Tows for gear investigation were conducted in Tasman Bay and included towing at speed through water of 3 knots (instead of 3.4) and shortening (15 cm) each side of the ground gear to determine the effect on gurnard catch; modifications reverted to original rigging after each gear trial.

A summary of gear and tow parameters by stratum depth range are given in Table 2 and individual station data are given in Appendix 4. Headline height ranged from 4.0 to 5.0 m and doorspread ranged between 89.2 and 127.2 m for depths up to 100 m (Table 2, Appendix 4). While headline heights remained within a similar range for depths between 100 to 400 m, doorspread increased with depth despite minimising the amount of warp that was out while still maintaining good contact with the bottom, as evidenced from the other sensors on the net. Measurements of headline height and doorspread, together with observations that the doors and other bottom-contacting components of the trawl gear were polishing well (i.e., from contact with the seabed), indicated that the gear was operating correctly. Overall, gear parameters were consistent between the WCC and the WCSI/TBGB areas in similar depth ranges

Table 1: Stratum depth ranges, area, non-trawlable area, and number of successful phase one and phase two biomass stations, extra stations, and gear trial stations for the WCC and WCSI/TBGB areas.

Stratum	Depth(m)	Area (km^2)	Non-trawlable area (km^2)	No. phase-1 (phase-2) stations	No. extra stations	No. gear trial stations
G10M	50–100	2 911	–	4	–	–
G10S	50–100	1 939	–	4	–	1
G10X	50–100	475	–	3	–	–
G50M	25–50	2 044	–	3	–	–
H50	25–50	234	–	3	–	1
I25	10–25	576	–	3	–	–
I50	25–50	147	–	3	–	–
J25	10–25	218	–	3	–	–
S10E	50–100	4 678	–	5 (1)	–	6
S10W	50–100	1 813	–	4	–	–
1	20–100	1 343	102	3	–	–
2	100–200	4 302	300	5	–	–
5	25–100	1 224	–	3	–	–
6	100–200	3 233	238	3	1	–
7	25–100	927	–	3	–	–
8	100–200	2 354	214	3	1	–
9	200–400	1 877	1 456	3	–	–
11	25–100	1 438	63	5	–	–
12	100–200	2 054	501	5	–	–
13	200–400	1 101	466	2	–	–
14	25–100	851	36	3	1	–
15	100–200	881	373	2	–	–
16	200–400	319	35	2	–	–
17	20–33	307	27	3	–	–
18	20–42	947	30	3	–	1
19	20–70	2 436	193	5	–	1
20	10–20	217	–	3	2	–
21	10–20	165	–	3	–	–
Total WCC (G10M–S10W)	10–100	15 035	–	35	–	8
Total WCSI & TBGB core (1–19)	20–400	25 594	4 034	53	3	2
Total WCSI & TBGB core + 10–20 m	10–400	25 976	4 034	59	5	2

a)



b)

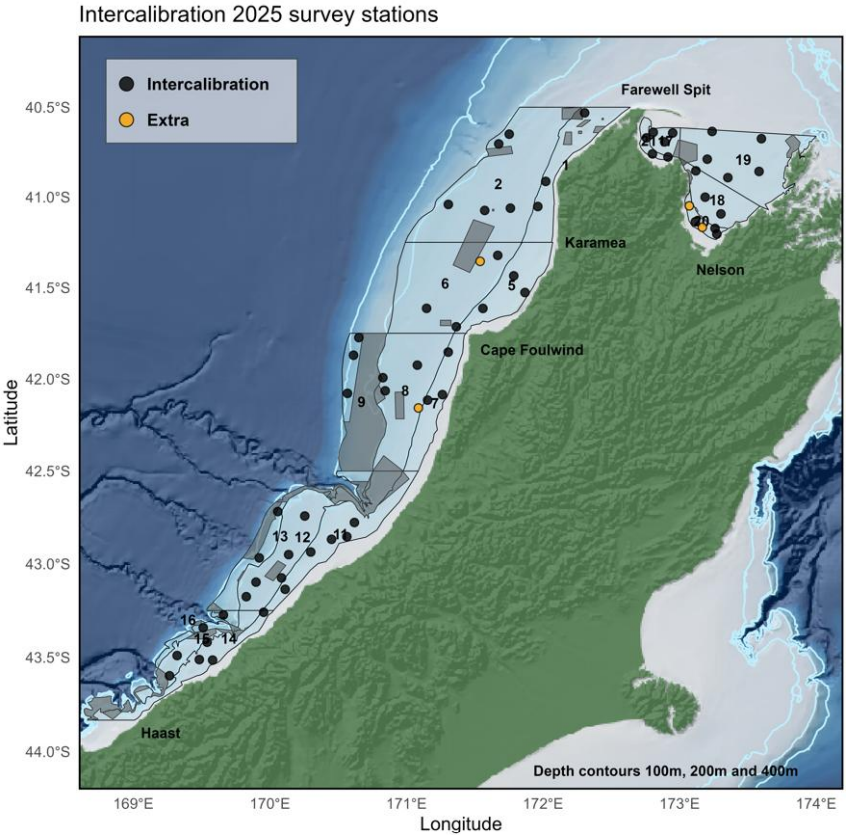


Figure 2: Survey area showing stratum boundaries and names for the: a) 2025 west coast central area; and b) west coast South Island and Tasman and Golden Bays inshore trawl area; with start points of valid biomass stations. Phase 1 (blue circles), Phase 2 (red circles), intercalibration (black circles), and extra (orange circles) station positions. Foul or excluded ground (grey shaded regions).

Table 2: Gear parameters for valid biomass stations by stratum depth range for the West coast central, Tasman Bay and Golden Bay, and west coast South Island (n, number of stations; s.d., standard deviation).

	West coast central					Tasman & Golden Bays					WCSI				
	Depth range	*n*	Mean	s.d.	Range	Depth range	*n*	Mean	s.d.	Range	Depth range	*n*	Mean	s.d.	Range
	10–25 m	6				10–20 m	8				20–100 m				
Headline height (m)			4.6	0.28	4.1–4.8			4.6	0.19	4.3–4.9		18	4.7	0.13	4.4–4.9
Doorspread (m)			103.2	6.38	95.1–110.3			98.4	5.57	91.1–106.0			110.5	8.10	100.2–127.2
Distances (n. miles)			1.5	0.04	1.4–1.5			1.4	0.20	1.0–1.6			1.5	0.11	1.1–1.6
Warp:depth ratio			10.2	2.74	5.7–13.3			11.6	0.70	10.5–12.9			3.9	1.22	2.9–7.0
	25–50 m	9				20–70 m					100–200 m				
Headline height (m)			4.5	0.27	4–4.8		11	4.6	0.17	4.4–4.9		20	4.6	0.23	4.1–5.1
Doorspread (m)			107.9	3.89	99.6–112			105.7	2.94	99.7–108.5			139.0	8.56	120.7–152.4
Distances (n. miles)			1.5	0.07	1.3–1.5			1.5	0.04	1.5–1.6			1.5	0.10	1.2–1.5
Warp:depth ratio			4.9	0.91	3.3–6.1			5.1	1.27	3.4–7.4			2.9	0.34	1.6–3.4
	50–100 m	21									200–400 m				
Headline height (m)			4.7	0.17	4.3–5							7	4.6	0.23	4.2–4.9
Doorspread (m)			112.9	9.03	89.2–125.5								156.7	5.38	147.5–160.6
Distances (n. miles)			1.5	0.03	1.4–1.6								1.5	0.02	1.5–1.6
Warp:depth ratio			3.0	0.12	2.8–3.2								2.6	0.26	2.3–3.0

3.3 Catch composition

Species codes, common names, scientific names, and catch weights of all taxa caught during the survey are given in Appendix 5. Benthic macro-invertebrate taxa identified ashore are given in Appendix 6.

In the WCC area, a total of about 9.7 t of fish and invertebrates were caught from the 36 valid biomass tows, averaging 270.4 kg per tow. Amongst the fish catch, 11 chondrichthyan and 28 teleost species were recorded. Another 22.6 t were recorded from the WCSI and TBGB area from 64 tows considered valid for biomass estimation, which consisted predominantly of 57 teleost species and 11 chondrichthyans.

The most abundant species by weight was snapper with 3.2 t caught (32.7% of the total catch) in the WCC area, and 10.5 t in the WCSI and TBGB (Appendix 5). The top five species, making up 81% of the total catch weight in the WCC area, were snapper, trevally, porcupine fish, spiny dogfish and yellowtail jack mackerel. Five of the seven target species — John dory, red gurnard, snapper, spiny dogfish, and tarakihi — were caught in multiple stations in the WCC area and made up 41% of the total catch. Red gurnard, porcupine fish, snapper and trevally occurred in over 70% of the tows. Snapper, yellowtail jack mackerel, spiny dogfish, gurnard and barracouta were the top five species in the WCSI and TBGB areas, making up 77% of the total catch. All target species were caught in multiple stations in the WCSI and TBGB areas and occurred in over 34% of the tows.

Of the species caught, a summary of the length frequency and biological samples taken is given in Table 3. Length data were collected in the WCC area from 39 different species, totalling 7718 fish from 395 samples. More detailed biological examinations were carried out on 20 different species totalling 329 samples of 2964 individual fish. Otoliths were collected from 101 John dory, 212 red gurnard, 773 snapper, and 25 tarakihi in the WCC area. Length data were collected in the WCSI and TBGB area from 76 different species, totalling 23 901 fish from 919 samples. Otolith data for the WCSI and TBGB area are reported in MacGibbon et al. (2026).

A variety of pelagic (e.g., jellyfish) and benthic macroinvertebrates formed part of the catch (Appendix 5). The number of invertebrate species does not likely reflect biodiversity in the survey area because the gear is not designed to collect them. A total of 24 and 27 macroinvertebrate ITUs (Individual Taxonomic Units) were recorded in the trawl database for the WCC and WCSI/TBGB areas respectively; most were not identified to species onboard, with 183 and 31 (WCC and WCSI/TBGB, respectively) invertebrate samples retained and registered in Earth Sciences New Zealand's SPECIFY database for taxonomists to identify. A list of identified invertebrates from the survey is provided in Appendix 6.

Information on non-target species will be made available in the Trawl Survey Information Portal online, at https://tsip.niwa.co.nz/home.

Table 3: Number of biological and length frequency records for all teleost and chondrichthyan species for west coast central (KHR2503) and west coast South Island and Tasman Bay/Golden Bay (KHR2504) areas. No. of samples refers to the number of stations on which fish were sampled. Measurement methods; 1, fork length; 2, total length; 5, pelvic length; G, chimaera length. †, Biological data includes length and weight and usually one or more of the following: gonad/maturity stage, otoliths. Species codes are given in Appendix 5.

		KHR2503 Length frequency data		KHR2503 Biological data (†)			KHR2504 Length frequency data	
Species code	Measurement method	No. of samples	No. of fish	No. of samples	No. of fish	No. of otolith pairs	No. of samples	No. of fish
ANC	1	–	–	–	–	–	10	210
ATT	1	7	390	6	87	–	16	402
BAR	1	21	214	15	78	–	44	507
BCO	2	1	1	1	1	–	2	7
BOA	1	3	5	3	5	–	–	–
BRA	5	2	3	2	3	–	–	–
BRI	2	–	–	–	–	–	1	1
BRZ	2	–	–	–	–	–	1	2
BTA	5	–	–	–	–	–	1	1
CAR	2	10	26	7	13	–	1	1
CBI	2	–	–	–	–	–	5	12
CBO	2	–	–	–	–	–	1	36
CCX	2	–	–	–	–	–	5	248
CDO	2	–	–	–	–	–	20	758
COL	2	–	–	–	–	–	1	45
CUC	1	5	29	4	28	–	27	1 661
EGR	5	8	31	8	31	–	–	–
ELE	1	–	–	–	–	–	4	23
EMA	1	6	27	5	26	–	7	21
ERA	5	3	3	3	3	–	–	–
ESO	2	–	–	–	–	–	7	31
EUC	2	–	–	–	–	–	4	47
FHD	2	–	–	–	–	–	1	6
FRO	1	1	2	1	2	–	20	315
GIZ	2	1	1	1	1	–	24	97
GSH	G	3	17	3	17	–	19	108
GUR	1	35	336	32	220	212	43	2 783
HAK	2	–	–	–	–	–	6	81
HBA	2	–	–	–	–	–	14	863
HOK	2	–	–	–	–	–	12	658
HPC	2	–	–	–	–	–	11	47
JAV	2	–	–	–	–	–	3	44
JDO	2	33	129	30	104	101	36	160
JGU	1	–	–	–	–	–	4	12
JMA	1	–	–	–	–	–	1	25
JMD	1	20	666	15	160	–	33	1 129
JMN	1	24	1 028	19	471	–	42	3 652
KIN	1	14	47	14	47	–	8	14
LDO	2	–	–	–	–	–	1	4

Species code	Measurement method	KHR2503 Length frequency data		KHR2503 Biological data (†)			KHR2504 Length frequency data	
		No. of samples	No. of fish	No. of samples	No. of fish	No. of otolith pairs	No. of samples	No. of fish
LEA	2	21	181	13	82	–	7	199
LFB	2	1	4	1	4	–	–	–
LIN	2	–	–	–	–	–	9	23
LSK	5	–	–	–	–	–	1	1
LSO	2	6	6	3	3	–	20	69
MMU	3	–	–	–	–	–	2	7
MOK	1	5	33	4	32	–	–	–
NMP	1	11	25	11	25	25	37	519
NSD	2	4	7	4	7	–	15	45
OPA	1	–	–	–	–	–	2	3
PCO	2	–	–	–	–	–	1	1
PIL	1	2	6	1	1	–	4	8
RBT	1	–	–	–	–	–	1	1
RCO	2	–	–	–	–	–	27	691
RHY	1	–	–	–	–	–	1	99
RMU	1	–	–	–	–	–	1	1
RSK	5	4	4	4	4	–	9	13
RSO	1	–	–	–	–	–	25	321
SCG	1	5	8	NA	NA	–	35	838
SCH	2	9	15	9	15	–	27	121
SCO	2	–	–	–	–	–	1	1
SDO	2	1	3	1	3	–	12	108
SFL	2	–	–	–	–	–	11	35
SNA	1	43	2 448	37	820	773	48	4 278
SPA	1	–	–	–	–	–	1	1
SPD	2	22	777	17	237	–	42	1 669
SPM	1	–	–	–	–	–	4	15
SPO	2	16	38	15	37	–	35	175
SPZ	2	–	–	–	–	–	3	7
SRH	1	–	–	–	–	–	1	2
SSH	2	–	–	–	–	–	1	1
SSI	1	1	1	NA	NA	–	11	54
SSK	5	3	3	3	3	–	9	10
STY	2	1	2	1	2	–	4	6
SWA	1	5	7	3	5	–	9	18
TOD	2	–	–	–	–	–	1	1
TRE	1	34	1 170	30	363	–	21	201
TUR	2	–	–	–	–	–	1	1
WAR	1	3	24	2	23	–	12	43
WIT	2	1	1	1	1	–	29	291
YBF	2	–	–	–	–	–	2	2
YBO	2	–	–	–	–	–	1	10
YEM	1	–	–	–	–	–	1	1

3.4 Target species

3.4.1 Snapper

Snapper were caught in 89% of stations across the west coast central area in 2025. For stations that caught snapper, catch rates ranged from 3.5–2787 kg per km^2, with the highest catch rate coming from stratum H50 (25–50 m, Kapiti Coast). Mean catch rates by stratum are shown in Appendix 7. Stratum H50 also had the highest mean catch rate at 1123 kg per km^2, followed by stratum I25 (10–25 m, Kapiti Coast), and stratum I50 (25–50 m, Kapiti Coast). Lower catches were recorded in the 50–100 m strata. In TBGB, mean catch rates ranged from 552–5040 kg per km^2, and on the west coast South Island, snapper had much lower catches, particularly in the southern strata. Snapper were found in 69% of the stations on the WCSI and TBGB and were caught in every station in TBGB. The geographic distribution of snapper catch rates is shown in Figure 3.

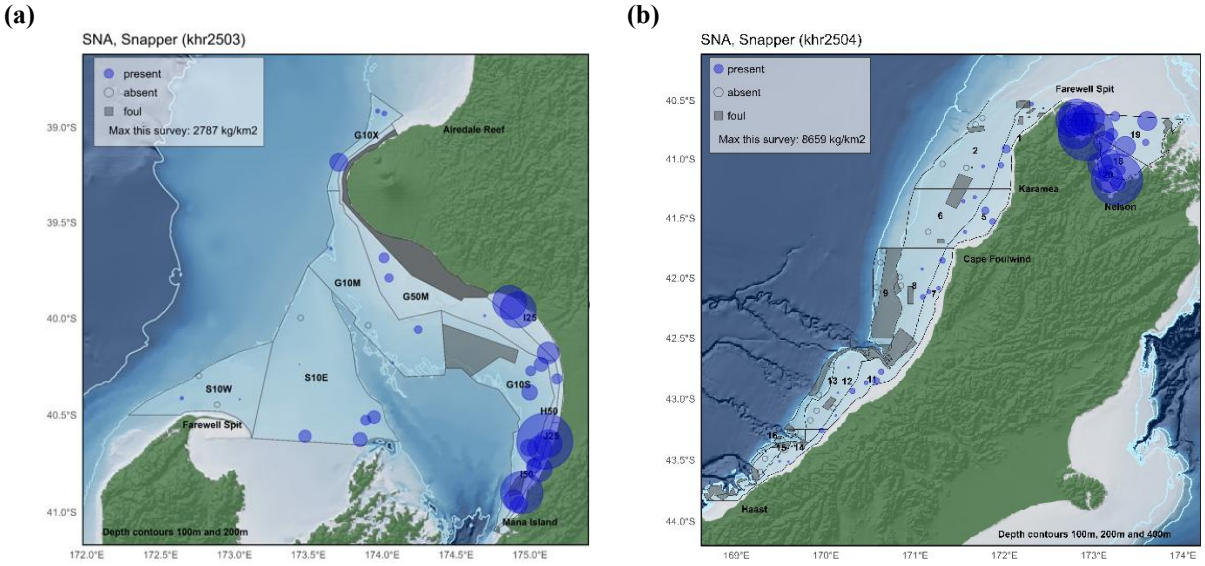


Figure 3: Catch rates (kg km^{-2}) and distribution of snapper in the: (a) west coast central; (b) west coast South Island and Tasman Bay/Golden Bay areas core + strata 20 and 21.

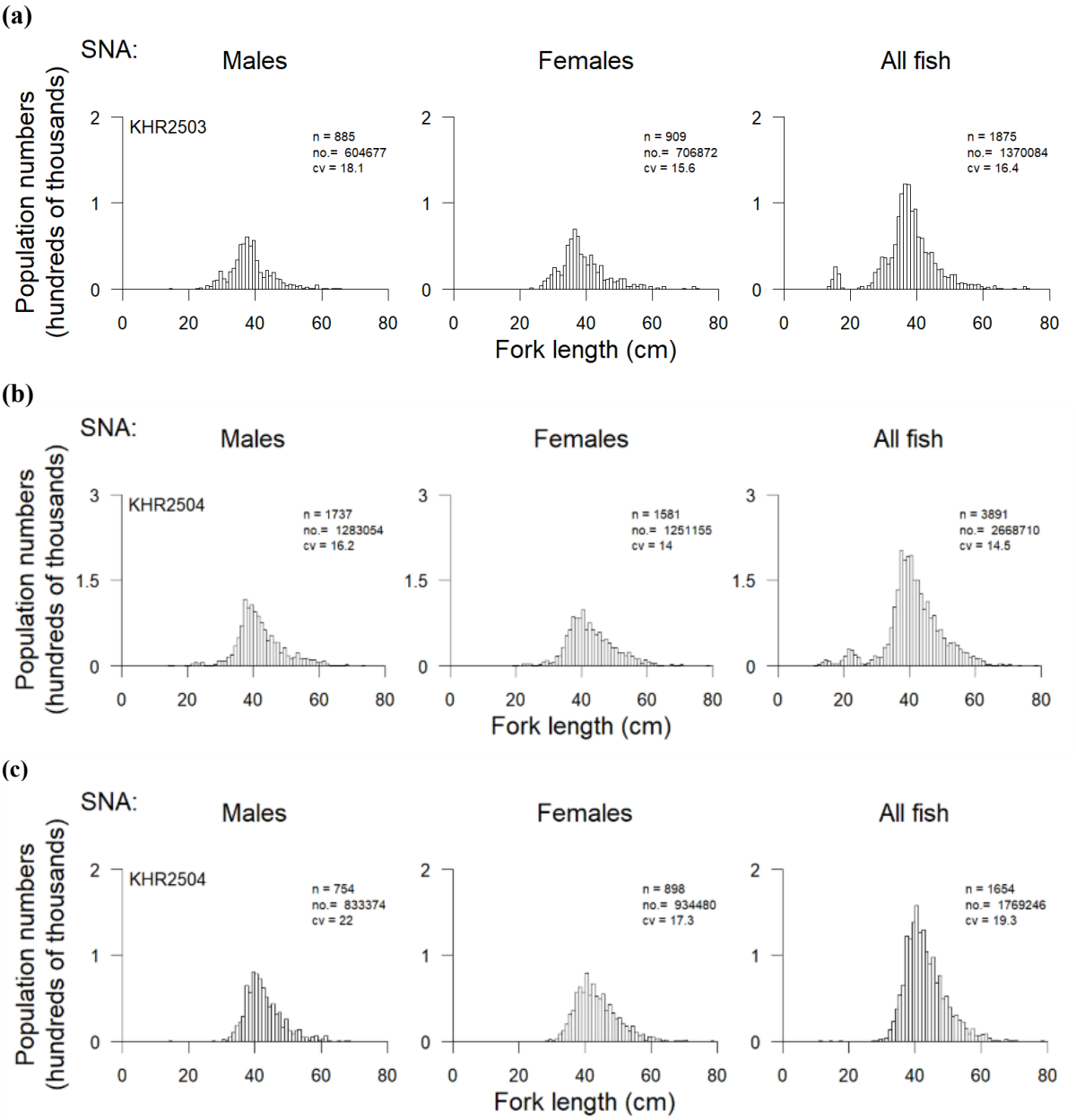


Figure 4: Scaled population length frequencies for snapper in the: (a) west coast central (KHR2503); (b) the west coast South Island and Tasman Bay/Golden Bay (KHR2504) areas core + strata 20 and 21; and (c) core-only area. n = number of fish measured, no. = scaled population number, CV = coefficient of variation. 'All fish' includes any unsexed fish.

The length range of snapper caught across the WCC area was 14–74 cm, with multiple modal peaks, the main being at 36–37 cm, with a smaller peak around 16 cm (Figure 4a). The age frequency distribution in 2025 for WCC showed a distinct cohort of 1+ snapper around 15–17 cm in length (Figure 5; Appendix 8). These 1+ snapper were almost entirely found in stratum I25. Previous surveys in the WCC area have reported 0+ snapper in October (equivalent to 1+ snapper in March) in stratum I25 as well as around Kapiti Island (Jones et al. 2024). Juvenile snapper settlement in this area has previously been reported as absent (Fisheries New Zealand 2025). The WCC sex ratio was even but slightly biased towards females (1.03:1).

The length range of snapper caught across the WCSI/TBGB area was 12–79 cm, with multiple modal peaks, the main being at 37–40 cm, with a smaller peak around 22 cm (Figure 4b). The sex ratio was even but slightly biased towards males (1.10:1).

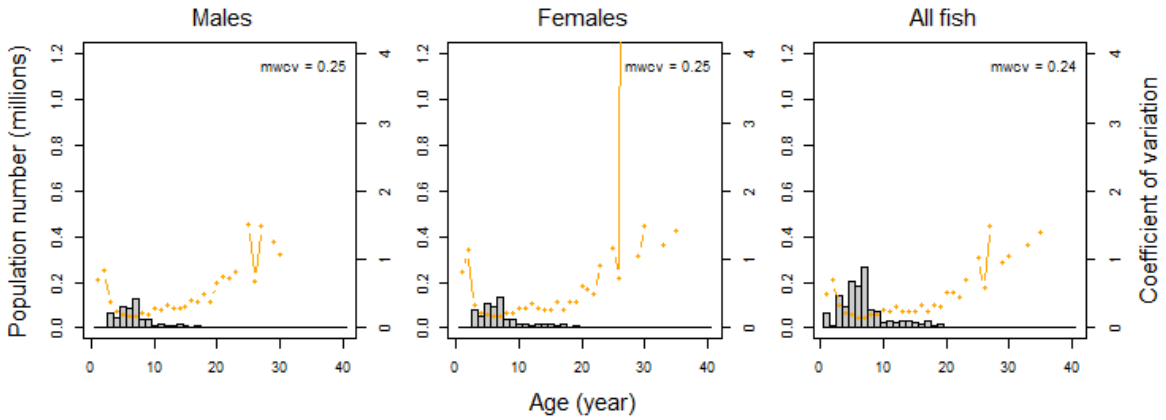


Figure 5: Scaled population numbers at age (histograms) and CV (yellow lines) for snapper from the 2025 west coast central area. NB: 'All fish' includes unsexed fish.

Gonad stage development at given length intervals is shown in Appendix 9. Snapper of both sexes under 30 cm were all immature or resting. Above this length, most fish of both sexes were resting. Nine males over 30 cm were maturing and five were ripe. Three females over 30 cm were maturing and one was fully spent. The small number of snapper in spawning condition is not surprising given that snapper spawn in summer and the survey took place in autumn.

The total biomass estimate for snapper in the WCC area was 1857 t (CV 16%; Table 4). Stratum I25 accounted for 26% of the total estimated biomass (Appendix 10). The recruited biomass (> 25 cm) of snapper in 2025 west coast central area accounted for 1849 t (CV 16%) or 99.7% of the total biomass (Table 4).

Total biomass in the WCSI and TBGB core + strata 20 and 21 was 4736 t (CV 15%) and biomass was 3376 t (CV 18%) in the core-only area (Table 4). Strata 20 and 21 accounted for 29% of the biomass; the highest biomass was in stratum 19 (1345 t). Most of the biomass was adult snapper, including in strata 20 and 21 (Table 4)

Table 4: Relative biomass estimates (t) and CVs of target species for the west coast central (KHR2503) and west coast South Island and Tasman and Golden Bays areas (KHR2504). Size of recruited fish are in MacGibbon et al. (2026, table 8). Species codes are given in Appendix 5. Recruited length of snapper, John dory, and tarakihi is 25 cm, giant stargazer and red gurnard, 30 cm, red cod, 40 cm. See MacGibbon et al. (2026) for adult length cut-offs.

Species	WCC						WCSI & TBGB									
Code	Biomass	CV	Recruited biomass	CV	Pre-recruited biomass	CV	Core Biomass	CV	Recruited core biomass	CV	Adult core biomass	CV	Core + strata 20 & 21 biomass	CV	Recruited core + strata 20 & 21 biomass	CV	Adult core + strata 20 & 21 biomass	CV
SNA	1 857	16	1 849	16	8	57	3 376	18	3 376	18	3 376	18	4 736	15	4 736	15	4 736	15
GIZ	4	100	–	–	–	–	286	24	282	24	260	24	–	–	–	–	–	–
RCO	–	–	–	–	–	–	401	57	143	43	74	51	–	–	–	–	–	–
JDO	94	23	94	23	0	0	240	20	239	20	237	20	–	–	–	–	–	–
GUR	191	56	161	50	29	90	1 076	21	776	16	776	16	–	–	–	–	–	–
SPD	947	40	–	–	–	–	2 554	44	–	–	1 677	45	–	–	–	–	–	–
NMP	11	51	9	56	2	56	441	16	415	17	409	17	–	–	–	–	–	–

3.4.2 Giant stargazer

Giant stargazer were rarely caught in the WCC with only one individual caught (45 cm male) in 2025 (Figure 6a). Low numbers of giant stargazer off the southern part of the North Island have also been observed during the previous west coast North Island surveys in October (Jones et al. 2022, 2024). Giant stargazer were in 39% of the tows on the WCSI, but no giant stargazer were caught in strata 17–19 in Tasman and Golden Bays (Appendix 10). Highest catch rates were in the southernmost strata of the WCSI survey area (Figure 6b). Biomass of giant stargazer in the core strata of the WCSI survey area was 286 t (CV 24%), of which most fish were recruited fish (Table).

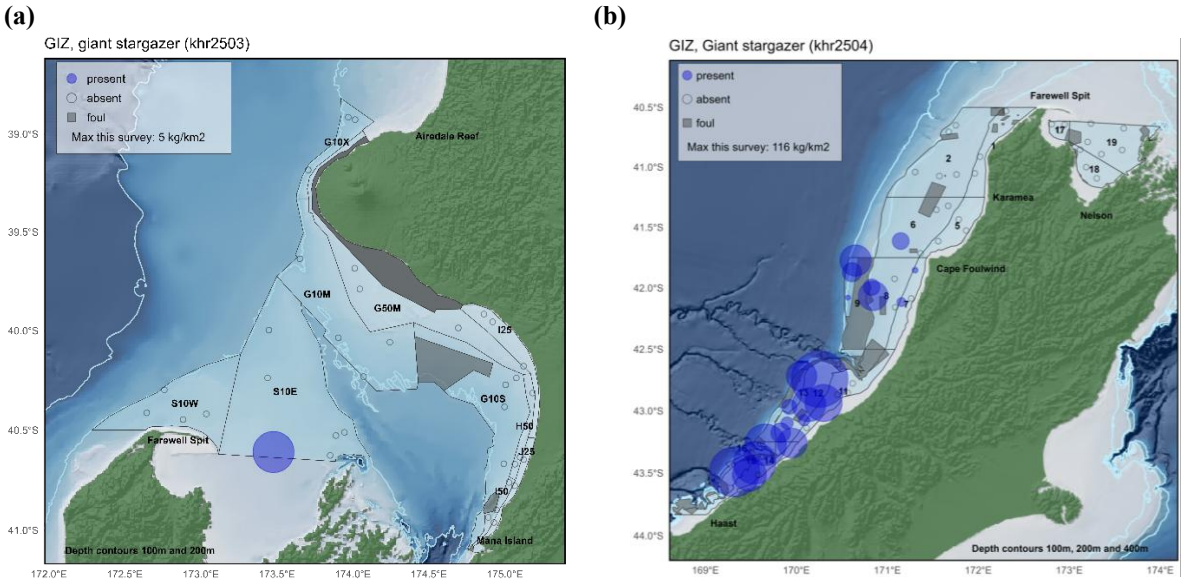


Figure 6: Catch rates (kg km^{-2}) and distribution of giant stargazer in the: (a) west coast central; and (b) west coast South Island and Tasman Bay/Golden Bay areas.

The length frequency distribution was relatively broad, from 17 to 73 cm (Figure 7). Most of the fish over 60 cm were female, and the sex ratio was skewed towards females at 0.76:1. For information on maturity status of giant stargazer on the WCSI, see MacGibbon et al. (2026).

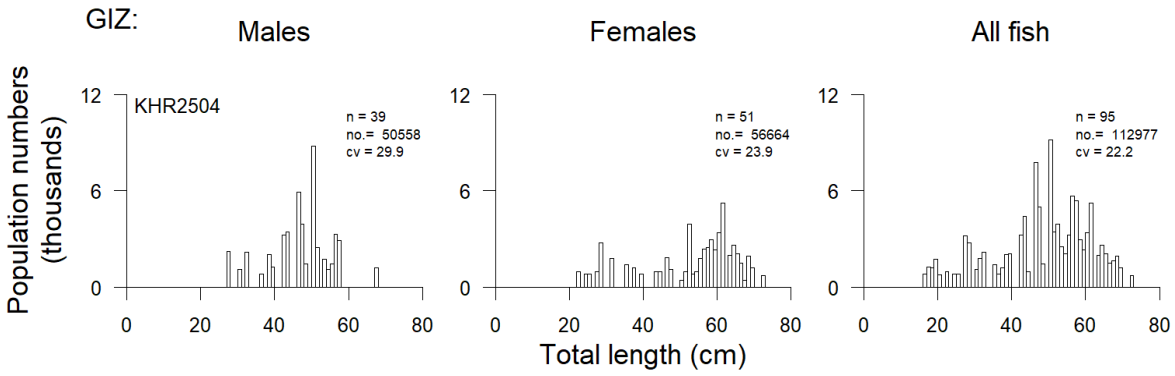


Figure 7: Scaled population length frequencies for giant stargazer in the west coast South Island and Tasman Bay/Golden Bay (KHR2504) areas. n = number of fish measured, no. = scaled population number, CV = coefficient of variation. 'All fish' includes any unsexed fish.

3.4.3 Red cod

No red cod were caught in the WCC area. Few red cod have been caught in previous WCNI surveys (0.1% of the total catch, 4% occurrence in 2022; Jones et al. 2024). On the WCSI and TBGB, red cod was caught in 45% of the tows, but only 1% of those in TBGB. Catch rates were highest in the 25–100 m strata (Figure 8). Biomass was estimated to be 401 t (CV 57%), of which 36% was recruited biomass and 18% were adult fish (Table 4). The red cod length frequency distribution was largely made up of 0+ (under 24 cm) and 1+ (24–35 cm) fish (Figure 9). Most of the fish over 40 cm were female and the sex ratio slightly favoured males at 1.06:1.

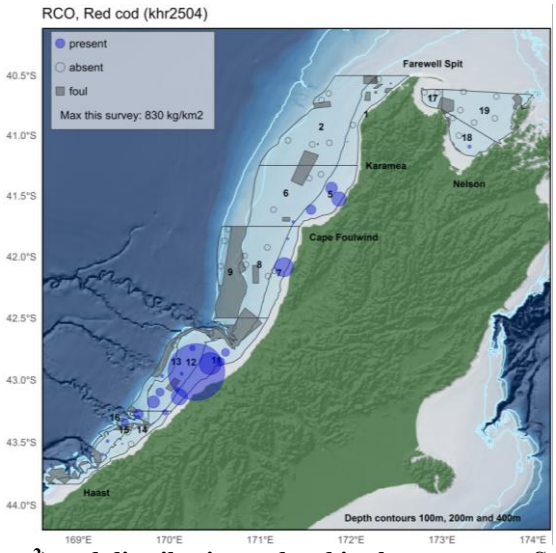


Figure 8: Catch rates (kg km^{-2}) and distribution red cod in the west coast South Island and Tasman Bay/Golden Bay areas.

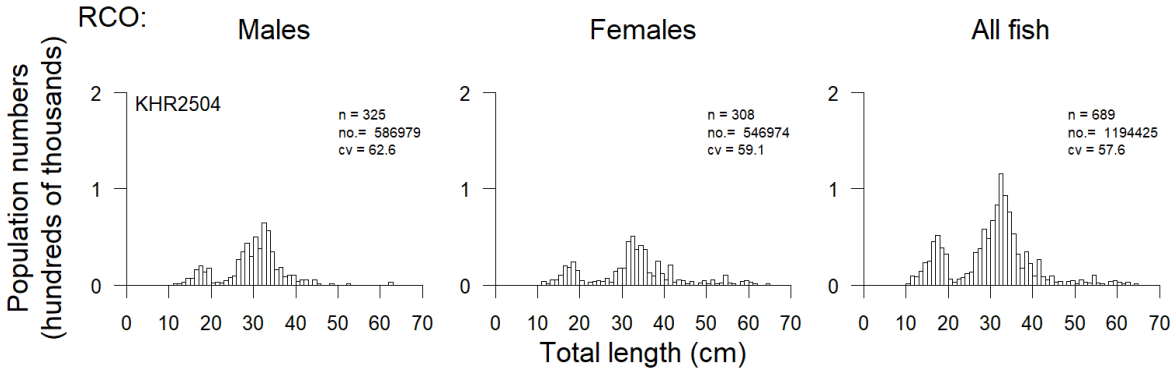


Figure 9: Scaled population length frequencies for red cod in the west coast South Island and Tasman Bay/Golden Bay (KHR2504) areas. n = number of fish measured, no. = scaled population number, CV = coefficient of variation. 'All fish' includes any unsexed fish.

3.4.4 John dory

John dory were caught in 67% of stations in 2025 for the WCC area, all stations in TBGB, and 50% of the stations on the WCSI and TBGB. For stations that caught John dory in the WCC area, catch rates ranged from 1.7–27.9 kg per km^2, with the highest catch rate coming from stratum S10E (north of Tasman Bay and stratum I50 (25–50 m, Kapiti coast; Figure 10a). Mean catch rates by stratum indicated that stratum G10X had the highest mean catch rate in 2025, followed by stratum I50 (Appendix 7). On the WCSI, catch rates were highest at depth less than 200 m and in the

northernmost strata, while catch rates in TBGB were relatively consistently high (Figure 10b, Appendix 7).

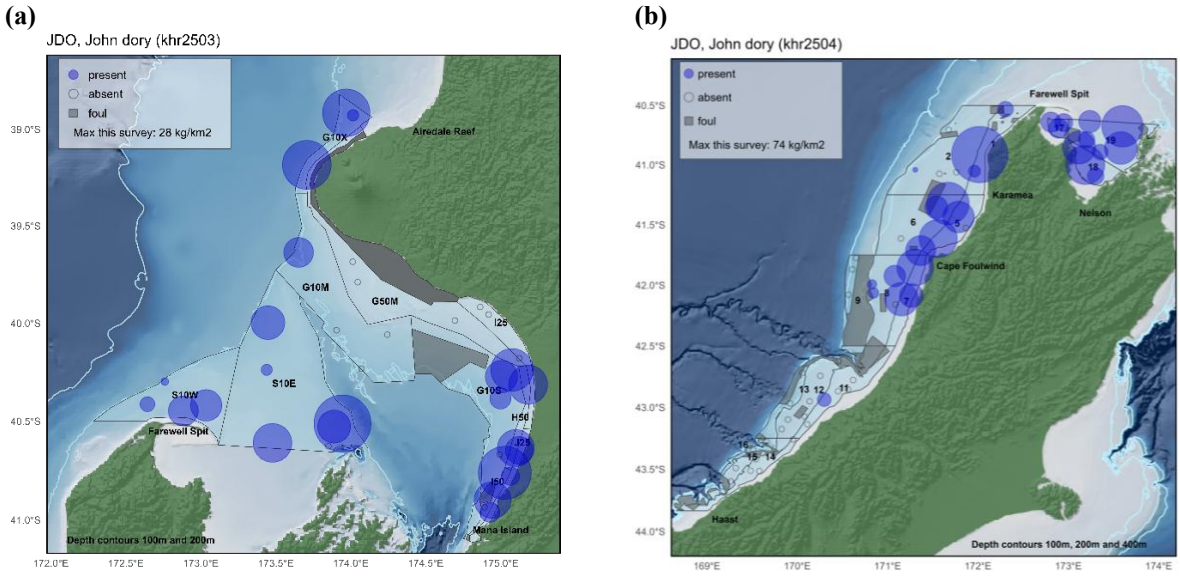


Figure 10: Catch rates (kg km^{-2}) and distribution John dory in the: (a) west coast central; and (b) west coast South Island and Tasman Bay/Golden Bay areas.

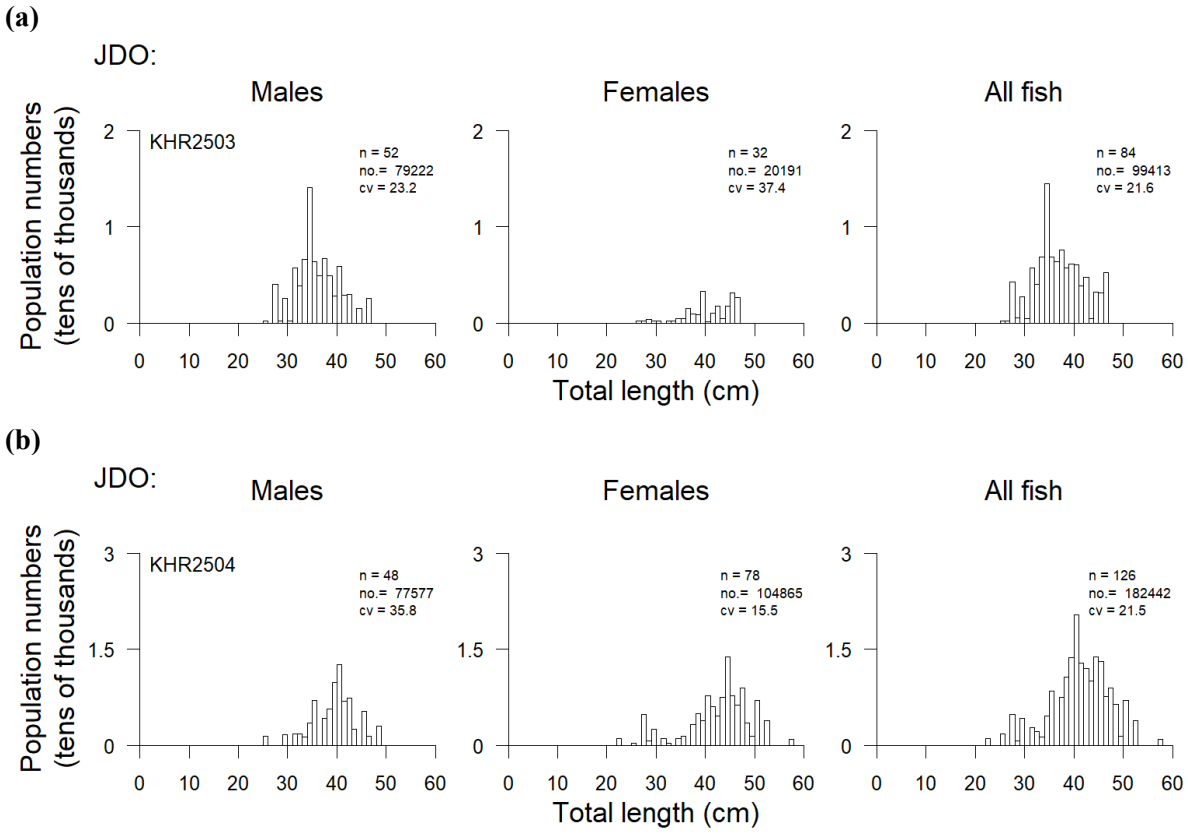


Figure 11: Scaled population length frequencies for John dory in the: (a) west coast central (KHR2503); and (b) the west coast South Island and Tasman Bay/Golden Bay (KHR2504) areas. n = number of fish measured, no. = scaled population number, CV = coefficient of variation. 'All fish' includes any unsexed fish.

The length range of John dory caught across the WCC area was 17–49 cm, with a modal peak at 34 cm, while on the WCSI and TBGB, fish were slightly larger, between 23–58 cm (Figure 11). A small mode of likely 1+ fish (23–31 cm) were present on the WCSI and TBGB, but most fish were 40–50 cm in length and were likely to be the 3+ age group (Figure 11; MacGibbon et al. 2026). The male:female sex ratio favoured males at 1.6:1 in the WCC area but favoured females in the WCSI and TBGB (0.62:1). Gonad stage development at given length intervals for the WCC area are shown in Appendix 9. Female John dory less than 30 cm were immature or resting, while males were resting or maturing. Most John dory above 30 cm were maturing or ripe. No pre-recruited John dory were caught in the 2025 WCC or WCSI and TBGB survey areas; therefore, the recruited biomass (> 25 cm) accounted for 100% of the total biomass in each area (Table).

3.4.5 Red gurnard

Red gurnard were caught at 72% of the WCC stations and at 44% of the WCSI and TBGB stations in 2025 (Figure 12). For stations that caught red gurnard, the catch rates on the WCC ranged from 0.3–136.8 kg per km^2 with the highest catch rate coming from stratum S10E (50–100 m, north of Tasman Bay). The highest mean catch rate by stratum came from the new stratum S10E (24.2 kg per km^2, near Tasman Bay), followed by stratum I25 (10–25 m) and stratum G10S (50–100 m), both along the Kapiti coast (Appendix 7). The larger mean catch rate in stratum S10E is mainly from a single station. On the WCSI, mean catch rates were highest in the 25–100 m strata (Figure 12, Appendix 7).

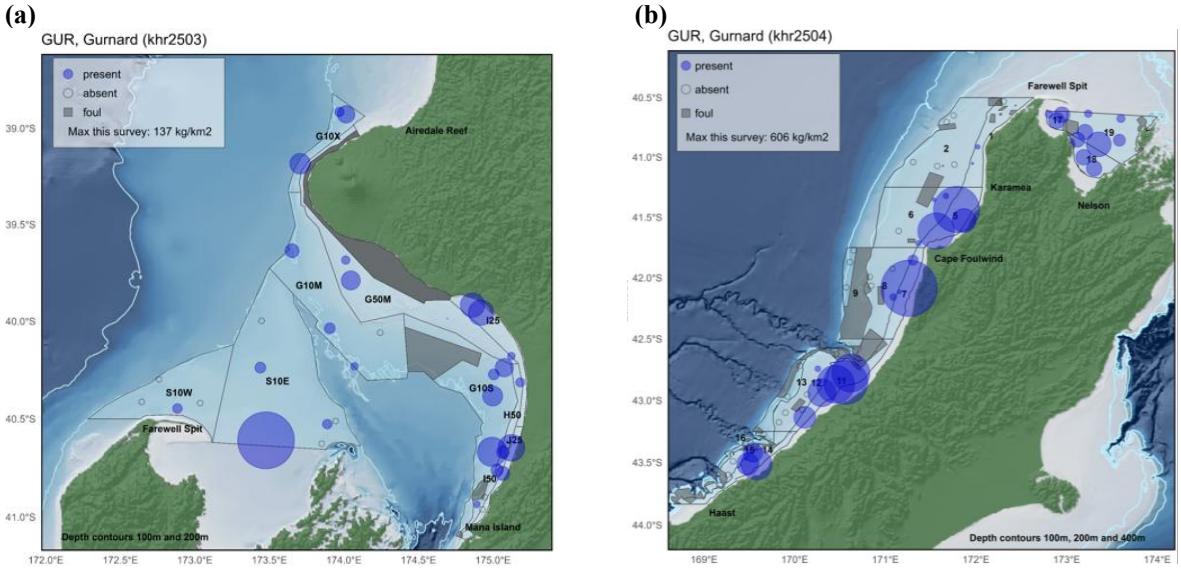


Figure 12: Catch rates (kg km^{-2}) and distribution of red gurnard in the: (a) west coast central; and (b) west coast South Island and Tasman Bay/Golden Bay areas.

The length range of red gurnard caught across the WCC area was 14–48 cm and 13–50 cm on the WCSI and TBGB. The WCC distribution had multiple modal peaks, the main one being at 29–31 cm, with a smaller peak around 40 cm, while the WCSI and TBGB had a unimodal distribution that was slightly skewed towards small fish (around 25 cm, Figure 13). The male:female sex ratio favoured males at 1.7:1 on the WCC and 1.5:1 on the WCSI and TBGB.

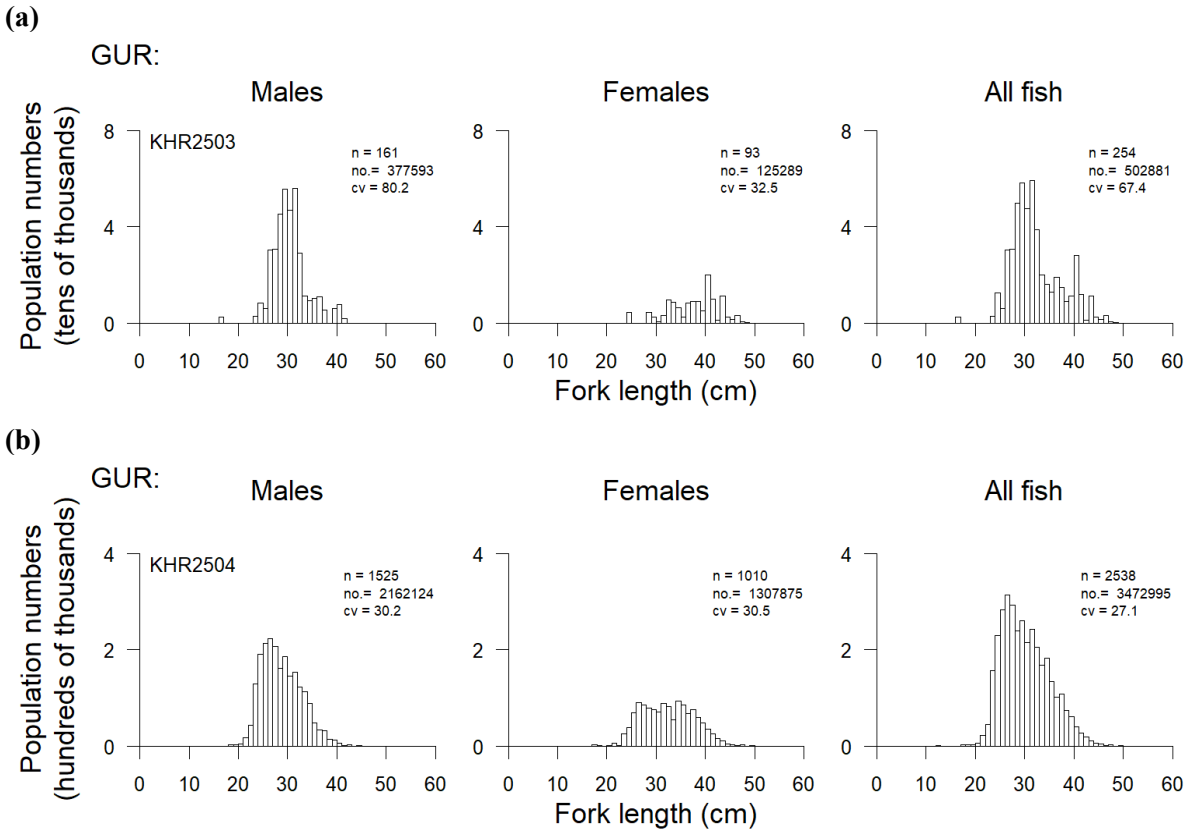


Figure 13: Scaled population length frequencies for red gurnard in the: (a) west coast central (KHR2503); and (b) the west coast South Island and Tasman Bay/Golden Bay (KHR2504) areas. n = number of fish measured, no. = scaled population number, CV = coefficient of variation. 'All fish' includes any unsexed fish.

Most male red gurnard below 30 cm were maturing or resting in the WCC area (Appendix 9). Above 30 cm, a full range of development was seen except for no immature, partially spent or spent males. Red gurnard have a long spawning period and ripe individuals can be found in the Hauraki Gulf throughout the year (Fisheries New Zealand 2025), which supports finding fish of all developmental stages on this survey.

The total biomass estimate for red gurnard in the WCC area was 191 t (CV 56%), while it was approximately five times higher off the WCSI and in TBGB (1076 t, CV 21%; Table 4). The recruited biomass (> 30 cm) of red gurnard in 2025 WCC area accounted for 161 t (CV 50%) or 84.3% of the total biomass, while it was 72% of the total biomass in the WCSI and TBGB area (Table 4).

3.4.6 Spiny dogfish

Spiny dogfish were caught only in the deeper strata of the WCC area (50–100 m) and were present in 44% of stations, while they were mainly off the WCSI in the 25–200 m strata (Figure 14). For stations that caught spiny dogfish on the WCC, catch rates ranged from 3.7–675.0 kg per km^2 with the highest catch rate in stratum S10W (50–100 m, north of Farewell Spit). Stratum S10W (50–100 m, north of Farewell Spit) had the highest mean catch rate, followed by stratum G10X (50–100 m, north of Cape Egmont) and stratum S10E (25–100 m, north of Tasman Bay) (Appendix 7). No spiny dogfish were caught in the shallow strata (10–50 m) of the WCC area and very few in TBGB (Figure 14).

The size of spiny dogfish caught across the WCC area ranged from 52 to 73 cm for males, with a broader size range of 52–82 cm for females (Figure 15). Size frequencies peaked between 60–62 cm in males and a higher number of females at 56 cm, with few fish larger than 80 cm. Spiny dogfish

were both smaller and larger on the WCSI and TBGB, where they ranged between 28–93 cm, There was an absence of juvenile spiny dogfish (< 50 cm) in the WCC area compared to the WCSI and TBGB area. Overall, there were slightly more males than females, with a sex ratio of 1:0.95 on the WCC, while males greatly outnumbered the females on WCSI and TBGB at 2.4:1.

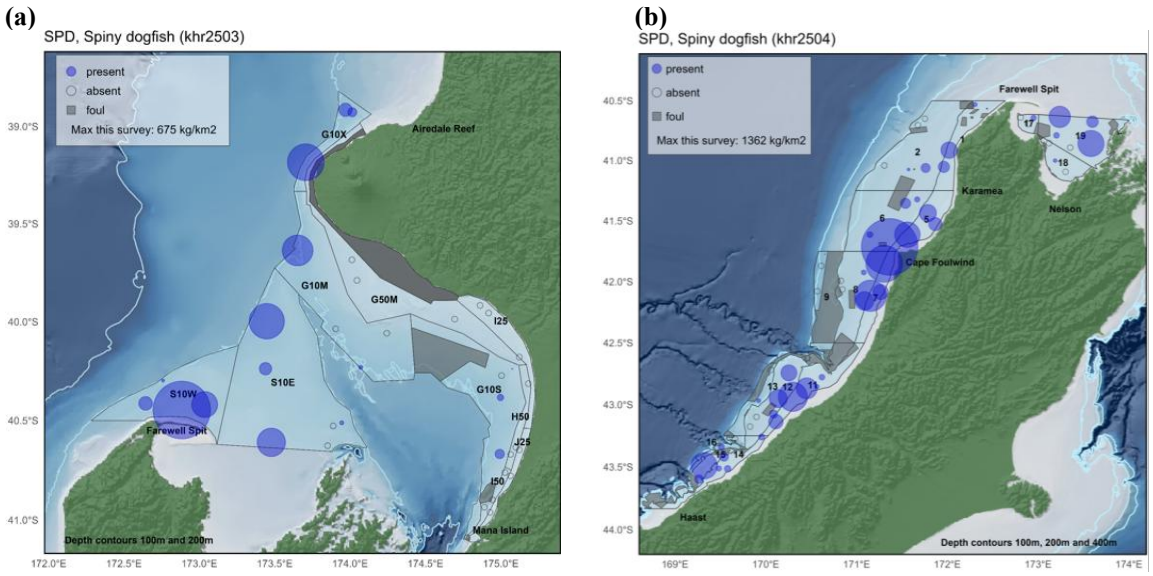


Figure 14: Catch rates (kg km^{-2}) and distribution of spiny dogfish in the: (a) west coast central; and (b) west coast South Island and Tasman Bay/Golden Bay areas.

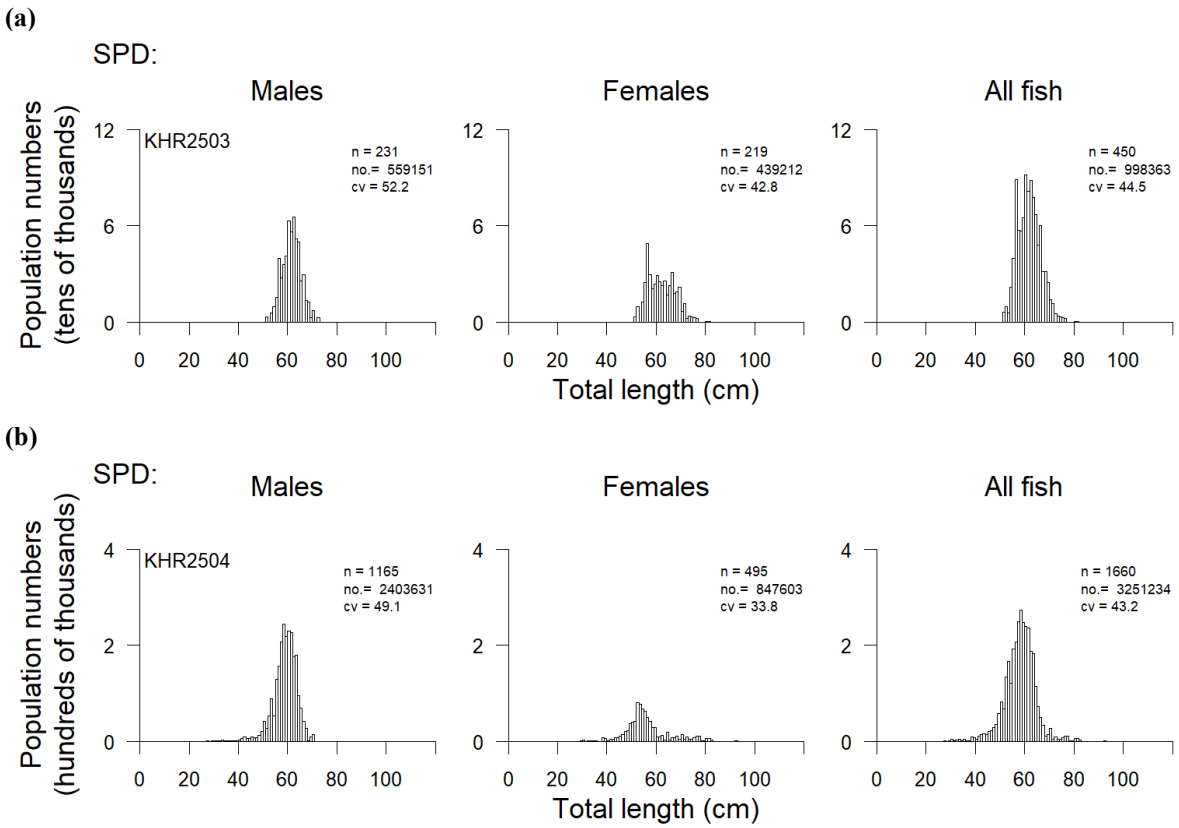


Figure 15: Scaled population length frequencies for spiny dogfish in the: (a) west coast central (KHR2503); and (b) the west coast South Island and Tasman Bay/Golden Bay (KHR2504) areas. n = number of fish measured, no. = scaled population number, CV = coefficient of variation. 'All fish' includes any unsexed fish.

A small sample (n = 150) of mainly male spiny dogfish was assessed for maturity and reproductive status in the WCC area (Appendix 9). Most males were mature, with the smallest mature male at 56 cm. Of the small number of females assessed, most were larger than 60 cm and maturing or mature, with both stages 4 and 5 present in the WCC strata. The smallest stage 3 mature female was 64 cm and the smallest pregnant female was 66 cm.

The total biomass estimate for spiny dogfish in the WCC area was 947 t (CV 40%) and 2554 t (CV 44%) for the WCSI and TBGB area (Table). Biomass estimates can be treated as recruited estimates based on the size at recruitment used for the east coast trawl survey of 50 cm (Beentjes et al. 2022). Size at 50% maturity is reported as 58 cm for males and 73 cm for females from the east coast of the South Island (Hanchet 1988).

3.4.7 Tarakihi

A total of 25 tarakihi were caught throughout the WCC area and were present in 22% of stations (mainly in the deeper strata of 50–100 m), while they were in 63% of the stations in the WCSI and TBGB area, but more abundant further south (Figure 16). For stations that caught tarakihi on the WCC, catch rates ranged from 0.3–15.1 kg per km^2. Strata G10X (north of Cape Egmont) and G10S (Kapiti coast) had the highest mean catch rate in the WCC area, while catch rates were highest in depths greater than 100 m on the WCSI (Appendix 7).

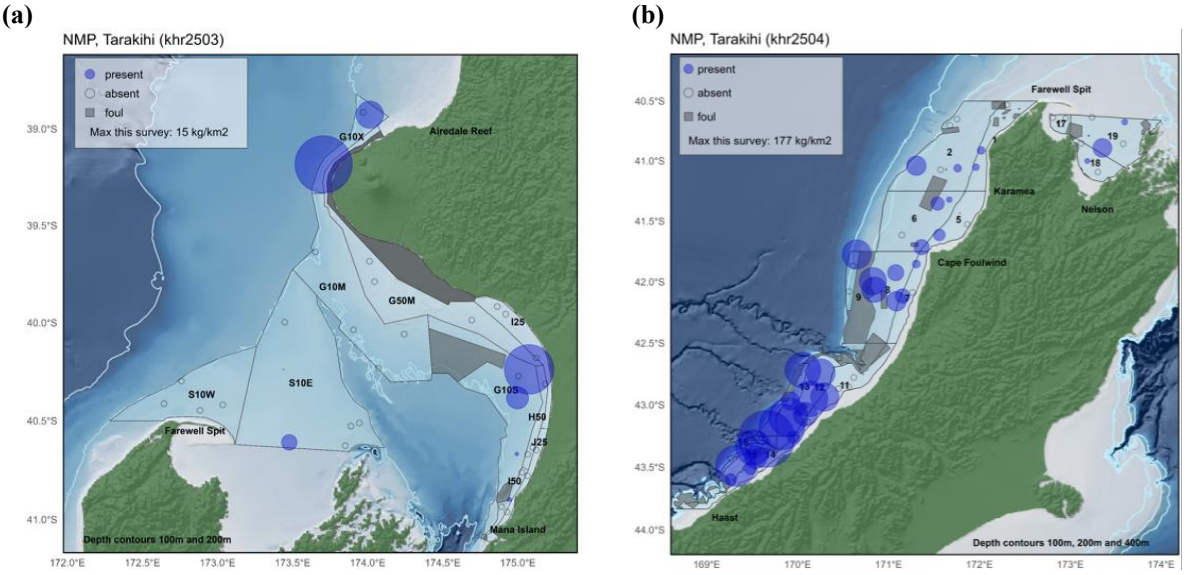


Figure 16: Catch rates (kg km^{-2}) and distribution of tarakihi in the: (a) west coast central; and (b) west coast South Island and Tasman Bay/Golden Bay areas.

The size of tarakihi ranged from 12–50 cm on the WCC (not shown) and WCSI and TBGB (Figure 17). Most of the 24 tarakihi from the WCC area assessed for maturity and reproductive were immature and under 30 cm (Appendix 9). Ages ranged from 1–33 years, with most tarakihi between 1–4 years old (75%).

The total biomass estimate for tarakihi in the WCC area was 11 t (CV 51%) and 441 t (CV 16%) on the WCSI and TBGB area (Table 4). The recruited biomass (> 25 cm) accounted for 9 t (CV 56%) or 81.8% of the WCC total biomass and nearly all the WCSI and TBGB biomass was recruited fish (Table 4).

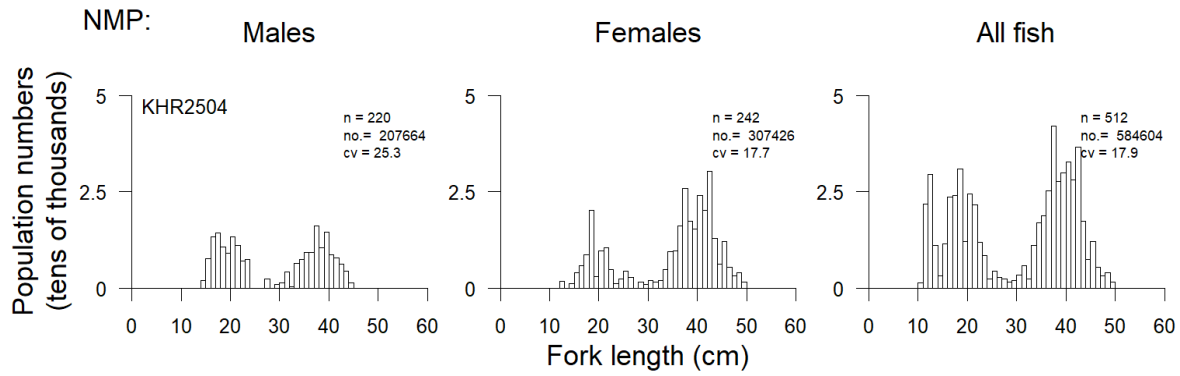


Figure 17: Scaled population length frequencies for tarakihi in the west coast South Island and Tasman Bay/Golden Bay area (KHR2504). n = number of fish measured, no. = scaled population number, CV = coefficient of variation. 'All fish' includes any unsexed fish.

3.5 Other species

Information on non-target species is available in the Trawl Survey Information Portal online, at https://tsip.niwa.co.nz/home.

4. SUMMARY

The 2025 March–April RV *Kaharoa II* bottom trawl survey in the west coast central and west coast South Island and TBGB areas were successfully completed. This was the first survey in these areas to be carried out on RV *Kaharoa II*, with previous surveys carried out on the RV *Kaharoa.* The results show that the survey on the new vessel can continue to monitor the target species as well as adults and/or pre-recruits and juveniles of several other species.

This was the first year that the WCC area was surveyed in March instead of October as in previous years. Juvenile snapper (1+) caught along the Kapiti coast were observed in the same stratum in previous surveys (0+ in 2022; Jones et al. 2024), indicating that this area may be a nursery ground for snapper. This stratum may provide important information on future recruitment and evidence of recent settlement.

Biomass estimates for the target species in the west coast central strata (north of Farewell Spit) were: John dory, 94 t (CV 23%); red gurnard, 191 t (56%); snapper, 1857 t (16%); spiny dogfish, 947 t (40%); and tarakihi, 11 t (51%). Biomass estimates for the target species in the west coast South Island strata were: John dory, 240 t (20%); red gurnard, 1076 t (21%); snapper, 4736 t (15%); spiny dogfish, 2554 t (44%); tarakihi, 441 t (16%); giant stargazer, 286 t (24%); and red cod, 401 t (57%).

No biomass time series was reported for the WCC area as the 2025 survey was the start of an entirely new time series due to the change in timing (from October to March) and the use of a new vessel (RV *Kaharoa II*). The biomass time series for the WCSI/TBGB area is reported in MacGibbon et al. (2026).

5. FULFILMENT OF BROADER OUTCOMES

5.1 Acoustic and oceanographic data

Acoustic data were continuously collected by RV *Kaharoa II* on the Simrad EK80 multifrequency echosounder during the survey. The quality of these data was generally high given the favourable weather conditions during most of the survey. These data are archived in the Fisheries New Zealand *acoustic* database.

To correct for the speed of sound through water at differing temperatures and salinities and to provide profiles of temperature and salinity throughout the survey area, data on salinity, temperature, and depth using a net mounted CTD were collected. These data are stored in the Fisheries New Zealand *CTD* database.

A net-mounted turbidity sensor was also trialled on the survey to gain more oceanographic data during trawling.

5.2 Building capacity and capability in the research sector

Both trawl voyages had a female science lead, and female staff as part of the seagoing team including a junior member of ESNZ's Te Kuwaha team. The wider inshore trawl survey project (INT2024-01) and improved facilities onboard the new RV *Kaharoa II* has supported female participation and leadership of inshore trawl surveys with three out of four voyage leads in the 2025 survey series being women.

In support of building capacity and collaboration in the wider research sector, the survey team undertook extensive sampling for multiple additional projects. These included:

- Collection of tissue samples from 129 John dory and 53 kingfish for Victoria University of Wellington PhD genetics projects;
- Prey species thought to be important for Māui dolphins collected from 59 different stations;
- Samples for shark reproductive studies;
- Collection of otoliths from rare species for the continued construction of the otolith identification atlas for educational and research purposes;

Educational resources collected during the survey were utilised for two outreach programmes in a local New Zealand school (Goodwood School, Cambridge) to help young students discover more about science. Information on trawl survey methods, fish identification, and fish ageing were included in the outreach activities.

6. ACKNOWLEDGEMENTS

This project was funded by Fisheries New Zealand under project INT2024-01. We thank the skipper of RV *Kaharoa II*, Chris Whalan, and his crew for their active cooperation and enthusiastic assistance during the trawl survey. Scientific staff who participated in the west coast central area were Jeremy Yeoman, Darren Stevens, Mel Hayden, Adrian Aarsen, Louis Olsen, Lewis Wilkie. Scientific staff who participated in the west coast South Island area were Richard O'Driscoll, Jason Hamill, Mike Beentjes. Thanks also to the National Invertebrate Collection team, especially Sadie Mills, Diana Macphearson and Michelle Kelly, for identification of invertebrate specimens that could not be identified at sea. Thanks to Dane Buckthought, Matt Smith and Oliver Evans for otolith preparation, auditing and data management. We were appreciative of the logistical support during the survey provided by Talley's Group Ltd (Nelson division), and Simon Wadsworth and the NIWA Vessels team. We are grateful to Darren Stevens (Earth Sciences New Zealand) and Marc Griffiths (Fisheries New Zealand) for reviews of this report.

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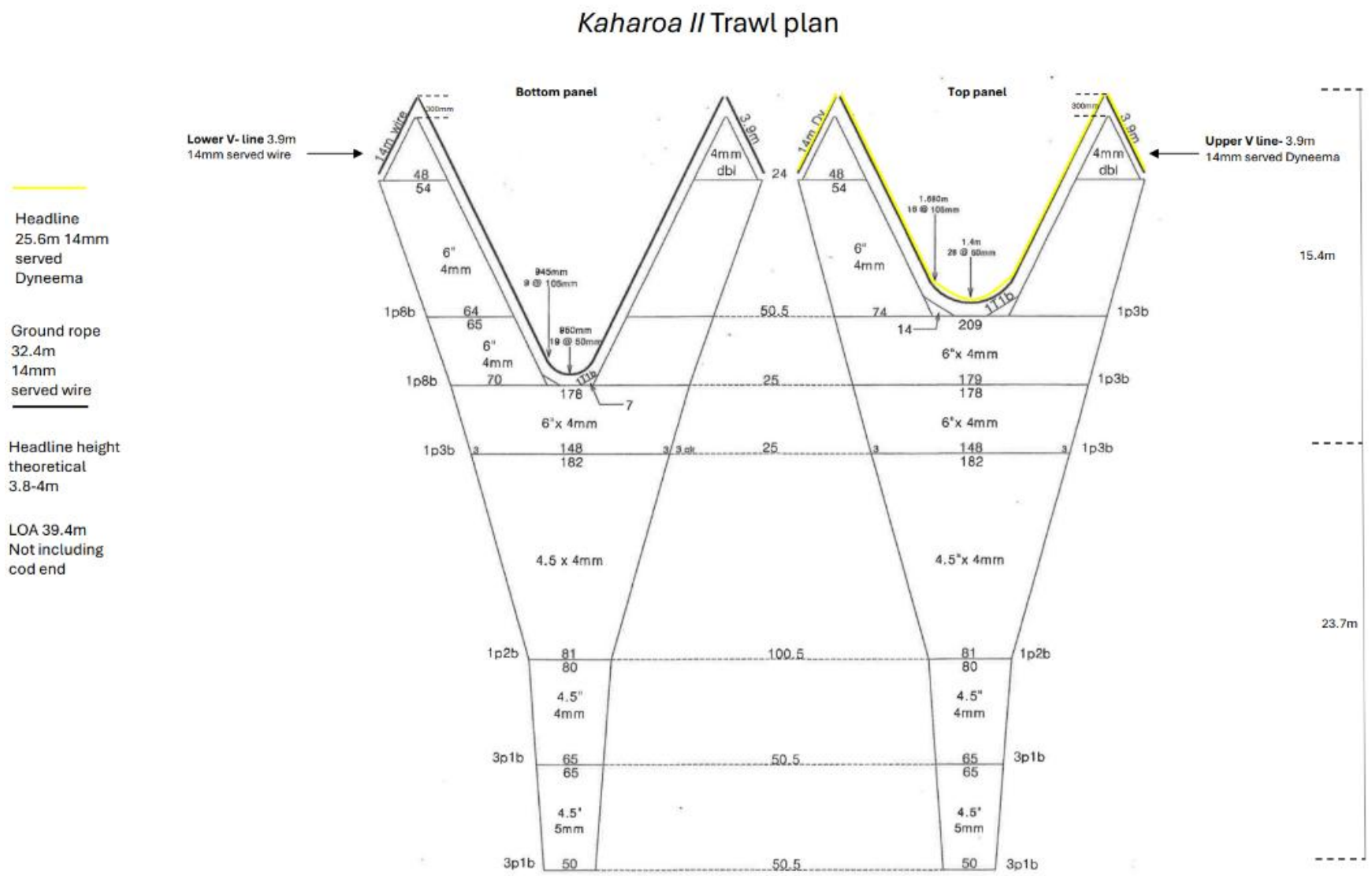
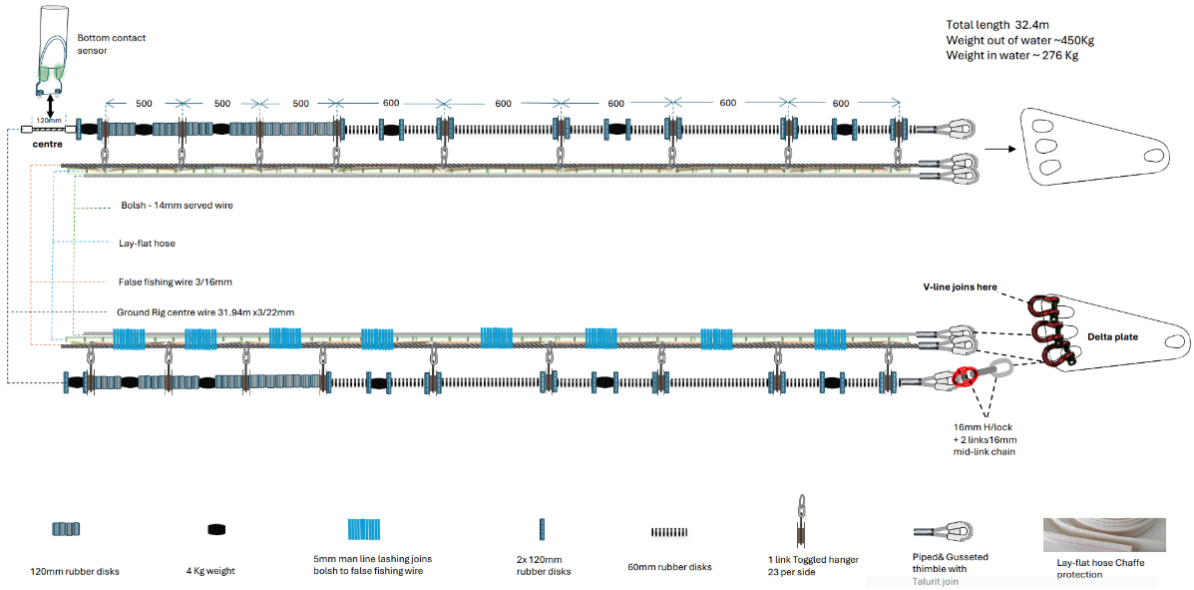
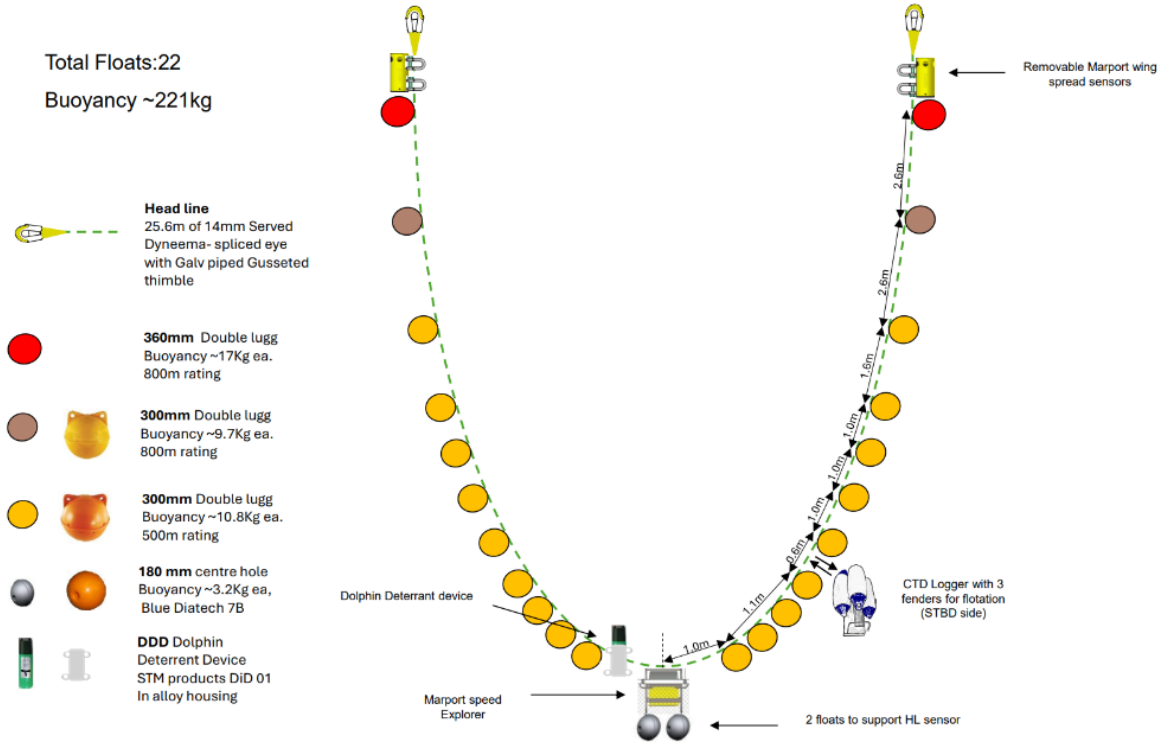
APPENDIX 1: *Kaharoa II* trawl net plan



Kaharoa II Ground rig



R.V. *Kaharoa II* Trawl float plan



APPENDIX 2: Maturity stages for teleosts and chondrichthyans

Teleost middle depths stage scale

Gonad stage		Males	Females
1	Immature	Testes small and translucent; threadlike or narrow membranes.	Ovaries small and translucent. No developing oocytes.
2	Resting	Testes thin and flabby; white or transparent.	Ovaries developed, but no developing eggs visible.
3	Ripening	Testes firm and well developed, but milt is present.	Ovaries contain visible developing eggs, but no hyaline eggs present.
4	Ripe	Testes large, well developed; milt is present and flows when testis is cut, but not when body is squeezed.	Some or all eggs hyaline, but eggs not extruded when body is squeezed.
5	Running ripe	Testis is large, well formed; milt flows easily under pressure on the body.	Eggs flow freely from the ovary when cut or the body is pressed.
6	Partially spent	Testis somewhat flabby and may be slightly bloodshot, but milt still flows freely under pressure on the body.	Ovary partially deflated, often bloodshot. Some hyaline and ovulated eggs present and flowing from a cut ovary or when the body is squeezed.
7	Spent	Testis is flabby and bloodshot. No milt in most of testes, but there may be some remaining near the lumen. Milt not easily expressed, even when present.	Ovary bloodshot; ovary wall may appear thick and white. Some residual ovulated eggs may be present but will not flow when body is squeezed.

Shark and skate stage scale

Males

1. Immature (claspers shorter than the pelvic fins)
2. Maturing (claspers at least as long as the pelvic fins but soft)
3. Mature (claspers longer than the pelvic fins and hard and firm)

Females

1. Immature (no eggs visible in the ovary larger than about 2 mm in diameter)
2. Maturing (ovary contains eggs greater than 2 mm in diameter but no yolk apparent)
3. Mature (yolked eggs in the ovary, uterus small and firm)
4. Ripe (‘candle’ of eggs in the uterus, no embryos visible)
5. Running Ripe (embryos visible in the uterus)
6. Spent (no embryos in the ovary, ovary flabby and may be bloodshot. Yolked eggs may be present in the ovary)

APPENDIX 3: Length-weight relationship parameters

Parameters used to scale length frequencies and calculate length class biomass estimates for the west coast central area. n = sample size. Data source: "WCNI" refers to all *Kaharoa* and *Kaharoa II* WCNI surveys combined; "WCNI & WCSI" refers to all WCNI *Kaharoa* and *Kaharoa II* surveys and west coast South Island *Kaharoa* surveys combined. Parameters used for the west coast South Island area are reported in MacGibbon et al. (2026).

WEST COAST CENTRAL AREA

Species	α	β	n	Length range	Data source
Snapper	0.051509	2.763413	817	14.9–74.3	KHR2503
Red gurnard	0.010187	2.995898	216	17.6–49.2	KHR2503
John dory	0.005273	3.321806	1 823	10.0–54.6	WCNI &KHR2503
Tarakihi	0.020486	2.960631	1 785	12.9–53.0	WCNI & KHR2503
Trevally	0.048562	2.739644	325	25.9–52.8	KHR2503
Kahawai	0.020981	2.890950	423	15.1–58.3	WCNI & KHR2503
Greenback jack mackerel	0.018555	2.873411	279	5.4–42.8	KHR2503
Yellowtail jack mackerel	0.016303	2.910903	1 386	4.9–52.4	WCNI & KHR2503
Barracouta	0.010698	2.792741	427	10.6–100.5	WCNI & KHR2503
School shark	0.002060	3.185431	4 374	29.7–179.0	WCNI & WCSI & KHR2503
Rig	0.002318	3.133464	2 360	29.0–147.0	WCNI & WCSI & KHR2503
Spiny dogfish	0.000431	3.527728	8 897	27.0–98.9	WCNI & WCSI & KHR2503
Giant stargazer	0.004996	3.310085	2 175	9.3–76.9	WCNI & WCSI & KHR2503

APPENDIX 4: Station details.

WEST COAST CENTRAL AREA

Note: * = stations not suitable for biomass estimation (i.e., gear performance > 3 or extra stations).

			Start of tow			End of tow		Gear depth (m)		Distance trawled	Headline	Doorspread	Surface temp.	Bottom temp.	Warp length	Gear	Extra
Station	Stratum	Date	Time	° ' S	° ' E	° ' S	° ' E	Min.	Max.	(n. miles)	height (m)	(m)	° C	° C	(m)	performance	stations
1*	G10X	09-Mar-25	1447	38 57.02	173 59.77	38 55.93	174 01.09	85	88	1.49	5.5	121	20.1	14.6	270	3	
2	G10X	09-Mar-25	1610	38 55.57	174 00.89	38 56.68	173 59.68	88	91	1.45	5	115.4	20	14.6	255	1	
3	G10X	09-Mar-25	1727	38 54.81	173 58.18	38 55.87	173 56.74	95	98	1.54	4.7	123	20	14.5	285	1	
4	G10X	10-Mar-25	628	39 11.03	173 42.39	39 12.28	173 41.27	91	97	1.52	4.6	119.7	16.1	14.6	283	2	
5	G10M	10-Mar-25	1023	39 38.15	173 39.13	39 39.19	173 37.76	97	100	1.48	4.5	123.3	18.7	14.4	288	1	
6	S10E	10-Mar-25	1335	39 59.81	173 26.85	40 01.12	173 25.93	89	91	1.48	4.3	120.2	18.4	14	285	2	
7	S10E	10-Mar-25	1551	40 14.26	173 26.36	40 14.56	173 28.37	76	77	1.56	4.6	109.2	18.8	15.8	230	2	
8	G50M	11-Mar-25	632	39 41.04	174 00.75	39 42.41	174 01.35	37	38	1.44	4.7	107.3	19.5	16.3	200	1	
9	G50M	11-Mar-25	819	39 47.34	174 02.77	39 48.75	174 03.52	41	43	1.52	4.8	108.8	18.8	15.9	200	2	
10	G10M	11-Mar-25	1114	40 02.13	173 54.30	40 03.25	173 55.59	98	99	1.49	4.8	125.5	18.7	14.2	295	2	
11	G10M	11-Mar-25	1332	40 03.47	174 14.62	40 03.45	174 16.58	73	75	1.5	4.6	105.3	19.1	15	217	1	
12	I50	12-Mar-25	622	40 53.94	174 56.72	40 55.27	174 55.81	60	69	1.49	4.8	99.6	19.2	17.1	200	1	
13	I50	12-Mar-25	848	40 56.13	174 53.49	40 57.53	174 52.97	50	54	1.45	4.6	104.8	18.3	16.7	200	1	
14	J25	12-Mar-25	1027	40 57.67	174 55.69	40 56.34	174 56.34	14	16	1.41	4.5	98.7	19	18.3	200	1	
15	I50	12-Mar-25	1255	40 45.68	175 01.64	40 44.52	175 02.35	40	41	1.27	4.7	107	19.1	17.2	200	2	
16	J25	12-Mar-25	1439	40 46.68	175 03.89	40 45.33	175 04.69	16	19	1.47	4.5	106.1	19.5	19.3	200	1	
17	J25	13-Mar-25	622	40 38.85	175 07.41	40 37.49	175 08.15	24	24	1.47	4.1	110.3	19	18.1	200	1	
18	H50	13-Mar-25	823	40 40.21	175 03.97	40 38.81	175 04.51	44	45	1.45	4	112	19	16.8	200	1	
19	H50	13-Mar-25	1008	40 38.13	175 06.02	40 36.79	175 06.80	32	33	1.46	4.3	110	19	17.7	200	1	
20*	H50	13-Mar-25	1212	40 38.54	175 05.12	40 37.16	175 05.45	36	38	1.4	4.6	93.1	19.4	17.9	200	1	Gear trial
21*	G10S	13-Mar-25	1441	40 40.20	174 58.38	40 38.89	174 59.16	81	82	1.43	4.5	97.9	18.9	15	240	1	Gear trial
22	G10S	13-Mar-25	1608	40 40.09	174 59.59	40 38.74	175 00.31	77	77	1.45	4.5	106.3	18.8	15.1	220	1	
23	G10S	14-Mar-25	625	40 22.99	174 59.88	40 21.46	174 59.93	88	89	1.53	4.7	117.5	19.3	14.7	260	1	
24	G10S	14-Mar-25	746	40 16.35	175 00.31	40 14.90	175 00.02	76	79	1.46	4.8	112.2	19.3	15	226	1	
25	G10S	14-Mar-25	920	40 14.29	175 04.54	40 15.74	175 04.58	60	65	1.45	4.8	101.8	19.2	15.3	200	1	
26	H50	14-Mar-25	1141	40 18.79	175 10.97	40 17.31	175 10.90	33	34	1.48	4.3	112	19.4	16.2	200	1	
27	I25	14-Mar-25	1351	40 10.72	175 07.38	40 09.61	175 06.03	33	35	1.51	4.8	109.7	19.8	15.5	200	1	
28	I25	14-Mar-25	1627	39 57.31	174 55.16	39 56.11	174 53.96	18	20	1.51	4.8	95.1	20.1	19.3	200	1	
29*	I25	15-Mar-25	623	39 54.49	174 53.68	39 55.50	174 55.15	15	16	1.51	4.4	103.5	19.8	19.7	200	4	
30*	G10M	15-Mar-25	1641	40 11.02	174 16.97	40 11.82	174 18.65	92	93	1.51	4.6	119.4	18.7	14.8	285	3	

APPENDIX 4: **WCC AREA CONTINUED.**

			Start of tow			End of tow		Gear depth (m)		Distance trawled	Headline	Doorspread	Surface temp.	Bottom temp.	Warp length	Gear	Extra
Station	Stratum	Date	Time	° ' S	° ' E	° ' S	° ' E	Min.	Max.	(n. miles)	height (m)	(m)	° C	° C	(m)	performance	stations
31	S10E	16-Mar-25	739	40 31.61	173 53.32	40 32.81	173 54.49	80	82	1.49	4.7	110.1	18.6	17.4	240	1	
32	S10E	16-Mar-25	912	40 30.67	173 56.69	40 31.73	173 58.16	87	89	1.54	4.8	111.8	18.6	15.5	252	1	
33	S10E	16-Mar-25	1258	40 36.57	173 28.67	40 36.03	173 26.75	63	63	1.55	4.8	105.7	19.1	15.1	200	1	
34*	S10E	16-Mar-25	1442	40 37.42	173 28.93	40 36.88	173 27.06	60	62	1.51	4.8	93.3	19.3	15.1	200	1	Gear trial
35	S10W	17-Mar-25	636	40 24.79	172 38.63	40 24.39	172 40.55	86	89	1.51	4.6	119.3	17.8	13.9	273	1	
36	S10W	17-Mar-25	823	40 17.87	172 45.58	40 16.93	172 47.21	92	95	1.55	4.6	119.8	17.7	13.9	285	1	
37	S10W	17-Mar-25	1113	40 26.80	172 53.00	40 26.86	172 55.00	69	69	1.52	4.9	106.3	15.7	13.9	210	1	
38	S10W	17-Mar-25	1311	40 25.13	173 02.14	40 25.13	173 04.14	69	72	1.52	4.7	106	16.4	14	220	2	
39	I25	18-Mar-25	630	39 54.98	174 51.77	39 54.22	174 50.07	18	19	1.5	4.8	99.1	19.3	19.3	200	1	
40	G50M	18-Mar-25	828	39 59.16	174 41.64	40 00.12	174 43.16	40	41	1.5	4.6	109.4	18.6	18.4	200	1	
41	G10M	18-Mar-25	1628	40 13.88	174 04.26	40 14.14	174 06.21	99	100	1.51	4.5	122.5	18.5	14.6	280	1	
42	S10E	19-Mar-25	705	40 37.59	173 51.05	40 37.58	173 49.04	69	71	1.52	4.9	89.2	18.5	17.4	200	1	
43*	S10E	19-Mar-25	849	40 38.23	173 50.91	40 38.25	173 48.91	69	71	1.51	4.6	92.3	18.5	17.3	220	2	Gear trial
44*	S10E	19-Mar-25	1058	40 34.27	173 36.74	40 34.83	173 38.58	70	71	1.5	4.7	94.4	18.4	15.5	230	2	Gear trial
45*	S10E	19-Mar-25	1245	40 34.77	173 35.98	40 35.34	173 37.83	69	70	1.51	4.6	100.8	18.4	15.5	200	1	Gear trial
46*	S10E	19-Mar-25	1444	40 38.14	173 28.99	40 37.70	173 27.08	61	62	1.51	4.7	107	18.7	15.2	200	1	Gear trial
47*	S10E	19-Mar-25	1622	40 38.89	173 28.99	40 38.41	173 27.10	59	61	1.51	4.4	95.2	18.7	15.6	200	1	Gear trial

WCSI AND TBGB AREA

ET = extra tow; GT = gear trial

			Start tow			End tow			Gear depth (m)									
Station	Stratum	Date	Time	Latitude (S °)	Longitude (E °)	Time	Latitude (S °)	Longitude (E °)	Min.	Max.	Gear perf.	Distance (n. mile)	Headline height (m)	Wing-spread (m)	Door-spread (m)	Warp (m)	Surface temp. (°C)	Bottom temp. (°C)
1	19	22-03-2025	711	40 40.53	173 35.97	739	40 41.91	173 35.22	54	59	1	1.49	4.8	20.9	103.9	200	18.2	15.5
2	19	22-03-2025	1015	40 51.46	173 34.95	1042	40 52.66	173 33.72	57	61	1	1.51	4.9	15.6	107.2	200	18.5	16.9
3	19	22-03-2025	1226	40 53.52	173 21.23	1252	40 52.33	173 20.05	43	48	1	1.48	4.6	17.1	108.5	200	19.3	17.5
4	19	22-03-2025	1501	40 47.37	173 12.18	1527	40 46.02	173 11.47	45	45	1	1.45	4.6	16.9	107.9	200	19.4	16.9
5	19	23-03-2025	653	40 38.11	173 14.31	721	40 39.65	173 14.62	49	52	1	1.55	4.8	16.1	104.9	200	18.5	15.4
6	18	23-03-2025	929	40 51.25	173 07.17	957	40 52.04	173 09.02	36	37	1	1.60	4.5	16.4	108.2	200	19.1	17.5
7	18	23-03-2025	1159	41 00.02	173 11.25	1226	41 01.05	173 12.80	32	34	1	1.55	4.5	NA	107.9	200	19.6	17.6
8	18	23-03-2025	1431	41 05.58	173 18.18	1458	41 06.38	173 19.95	34	35	1	1.55	4.5	16.5	108.3	200	19.4	17.7
9[GT]	18	23-03-2025	1617	41 04.32	173 18.79	1646	41 05.02	173 20.54	36	37	1	1.49	4.8	16.2	103.7	200	19.5	17.6
10[ET]	20	24-03-2025	751	41 10.02	173 10.02	814	41 10.85	173 11.45	15	16	1	1.35	4.6	15.4	104.7	200	19.9	19.8
11	20	24-03-2025	950	41 10.39	173 15.60	1014	41 10.46	173 17.43	18	20	1	1.37	4.7	18.0	106.0	200	19.8	19.5
12[ET]	20	24-03-2025	1538	41 02.91	173 04.30	1602	41 01.64	173 03.92	17	18	1	1.30	4.9	16.8	97.7	200	19.9	19.2

APPENDIX 4: **WCSI AND TBGB AREA CONTINUED.**

ET = extra tow; GT = gear trial; * = not valid for biomass estimation

			Start tow			End tow			Gear depth (m)									
Station	Stratum	Date	Time	Latitude (S °)	Longitude (E °)	Time	Latitude (S °)	Longitude (E °)	Min.	Max.	Gear perf.	Distance (n. mile)	Headline height (m)	Wing-spread (m)	Door-spread (m)	Warp (m)	Surface temp. (°C)	Bottom temp. (°C)
13	20	25-03-2025	659	41 12.26	173 16.39	725	41 11.88	173 14.39	17	18	1	1.55	4.4	16.5	100.4	200	20.3	19.6
14	20	25-03-2025	901	41 08.18	173 06.97	927	41 07.08	173 05.51	17	17	1	1.55	4.7	NA	100.9	200	19.7	19.4
15	17	26-03-2025	651	40 41.59	172 53.44	719	40 42.21	172 55.33	31	33	1	1.56	4.7	17.2	102.3	200	18.9	17.6
16	17	26-03-2025	913	40 38.62	172 56.99	942	40 38.59	172 54.97	34	35	1	1.53	4.4	16.5	104.3	200	18.8	17.6
17	21	26-03-2025	1332	40 40.26	172 45.44	1358	40 41.69	172 45.40	17	17	1	1.43	4.7	16.8	91.1	200	19.2	18.5
18*	21	27-03-2025	722	40 46.37	172 55.00	736	40 46.50	172 54.25	20	21	3	0.58	NA	NA	NA	NA	18.1	19.0
19	21	27-03-2025	948	40 45.61	172 48.10	1014	40 44.76	172 46.41	18	18	1	1.53	4.5	20.2	92.7	200	19.1	18.7
20	17	27-03-2025	1218	40 38.40	172 48.46	1241	40 39.39	172 50.00	26	28	1	1.53	4.4	18.8	99.7	200	19.0	17.6
21	21	27-03-2025	1513	40 46.64	172 54.91	1528	40 46.85	172 53.68	16	17	1	0.95	4.3	20.4	93.6	200	19.3	19.1
22 GT	19	28-03-2025	1558	40 51.56	173 21.57	1627	40 50.48	173 20.13	46	47	1	1.53	4.8	17.5	103.7	200	20.0	17.7
23 ET	6	29-03-2025	706	41 21.29	171 32.38	738	41 19.94	171 33.32	133	134	1	1.52	4.8	18.2	120.7	330	18.0	13.5
24	6	29-03-2025	931	41 19.32	171 40.12	1000	41 17.98	171 41.11	123	126	2	1.53	4.7	16.0	134.6	365	17.6	13.5
25	5	29-03-2025	1148	41 26.08	171 47.15	1215	41 27.32	171 45.87	56	58	1	1.56	4.7	15.9	107.2	200	18.0	14.4
26	5	29-03-2025	1403	41 31.58	171 52.08	1430	41 32.86	171 50.97	35	35	1	1.52	4.7	15.5	105.0	200	17.4	15.8
27	9	30-03-2025	712	41 46.42	170 39.09	747	41 47.93	170 39.11	317	319	2	1.51	4.7	19.6	159.3	750	19.1	11.8
28	9	30-03-2025	911	41 52.20	170 36.74	942	41 53.72	170 36.74	377	381	1	1.51	4.7	23.9	160.5	890	19.1	11.0
29	9	30-03-2025	1152	42 04.69	170 34.10	1221	42 06.21	170 34.08	366	369	1	1.52	4.6	19.5	160.6	850	18.8	11.5
30	8	30-03-2025	1448	42 03.86	170 50.65	1524	42 02.44	170 50.14	191	192	2	1.46	4.9	19.0	131.4	500	18.3	13.2
31	8	30-03-2025	1622	41 59.57	170 49.66	1652	41 58.10	170 49.98	190	192	1	1.48	4.7	19.3	144.4	535	19.0	13.1
32	12	31-03-2025	654	42 44.57	170 15.33	725	42 43.27	170 16.24	137	138	1	1.46	4.9	19.9	136.9	405	17.0	13.6
33	13	31-03-2025	937	42 43.13	170 03.46	1008	42 44.46	170 02.54	265	268	1	1.49	4.9	20.0	150.5	720	18.7	12.4
34*	13	31-03-2025	1207	42 54.84	170 00.14	1223	42 55.42	169 59.94	246	249	3	0.59	NA	NA	NA	NA	NA	NA
35*	13	31-03-2025	1402	42 57.77	169 54.25	1426	42 58.36	169 53.04	311	315	3	1.06	NA	NA	NA	NA	17.1	11.6
36	12	31-03-2025	1610	43 05.89	169 53.90	1640	43 07.26	169 53.12	175	178	1	1.48	4.7	20.2	148.9	525	17.0	13.3
37	12	01-04-2025	658	43 10.57	169 49.63	728	43 11.73	169 49.12	185	187	1	1.21	4.8	25.0	141.6	555	17.5	13.0
38	16	01-04-2025	858	43 16.41	169 39.58	930	43 17.01	169 37.64	231	253	1	1.53	4.7	22.5	147.5	720	17.4	12.8
39	16	01-04-2025	1116	43 20.52	169 30.70	1145	43 21.18	169 28.78	264	267	1	1.54	4.4	20.2	159.8	735	16.4	12.8

APPENDIX 4: **WCSI AND TBGB AREA CONTINUED.**

ET = extra tow; GT = gear trial; * = not valid for biomass estimation

			Start tow			End tow			Gear depth (m)									
Station	Stratum	Date	Time	Latitude (S °)	Longitude (E °)	Time	Latitude (S °)	Longitude (E °)	Min.	Max.	Gear perf.	Distance (n. mile)	Headline height (m)	Wing-spread (m)	Door-spread (m)	Warp (m)	Surface temp. (°C)	Bottom temp. (°C)
40*	16	01-04-2025	1430	43 25.46	169 15.18	1449	43 26.16	169 14.05	406	430	3	1.07	4.1	19.6	157.6	1000	17.0	11.1
41	15	01-04-2025	1612	43 29.42	169 19.23	1638	43 28.51	169 20.20	131	132	1	1.15	5.1	18.6	130.9	410	17.0	13.4
42 ET	14	02-04-2025	646	43 25.16	169 32.41	714	43 26.08	169 30.77	80	81	1	1.50	4.9	NA	109.5	260	16.3	14.3
43*	14	02-04-2025	917	43 30.49	169 35.78	924	43 30.72	169 35.31	32	32	4	0.41	4.8	NA	58.7	200	16.3	15.8
44	14	02-04-2025	1016	43 30.87	169 34.82	1041	43 31.81	169 33.28	33	35	1	1.45	4.7	NA	100.2	200	16.3	15.7
45	14	02-04-2025	1159	43 30.71	169 28.99	1224	43 31.87	169 27.68	66	68	1	1.49	4.7	NA	103.4	200	16.3	14.7
46	15	02-04-2025	1408	43 35.87	169 15.90	1434	43 37.22	169 14.91	121	123	1	1.52	4.6	NA	136.4	200	17.0	13.4
47	13	04-04-2025	643	42 58.09	169 55.34	708	42 58.90	169 53.57	274	276	1	1.52	4.2	20.1	158.8	760	17.0	13.4
48	12	04-04-2025	953	42 57.03	170 08.24	1019	42 58.29	170 07.05	138	139	1	1.53	4.1	18.8	144.3	420	16.6	13.6
49	12	04-04-2025	1147	43 04.53	170 05.13	1210	43 05.86	170 04.09	115	118	2	1.53	4.6	17.6	136.8	391	17.2	14.1
50	11	04-04-2025	1333	43 08.20	170 06.70	1356	43 09.37	170 05.35	56	60	1	1.52	4.4	15.2	104.3	200	17.2	16.8
51	14	04-04-2025	1558	43 15.57	169 57.26	1619	43 16.76	169 55.92	75	77	2	1.53	4.6	16.2	112.6	250	17.4	16.4
52	11	05-04-2025	659	42 56.20	170 17.95	726	42 54.96	170 19.15	82	84	2	1.51	4.8	16.4	114.7	250	17.2	14.4
53	11	05-04-2025	928	42 52.10	170 27.08	955	42 51.30	170 28.87	42	45	1	1.53	4.8	15.8	104.0	200	16.9	15.9
54	11	05-04-2025	1145	42 51.23	170 33.82	1211	42 50.81	170 35.83	27	30	1	1.53	4.7	15.7	103.9	200	17.0	16.8
55	11	05-04-2025	1352	42 46.67	170 37.14	1418	42 46.25	170 39.04	45	46	1	1.45	4.7	16.0	103.0	200	17.4	16.3
56	5	06-04-2025	656	41 36.82	171 33.61	724	41 37.91	171 32.14	72	73	1	1.54	4.7	16.9	106.7	210	17.4	15.2
57*	6	06-04-2025	915	41 42.57	171 22.09	919	41 42.71	171 21.98	110	110	4	0.16	4.6	24.7	126.4	330	17.3	15.3
58	6	06-04-2025	1021	41 42.85	171 21.91	1051	41 44.21	171 21.05	107	109	1	1.50	4.6	18.4	124.4	330	17.4	13.9
59	7	06-04-2025	1253	41 51.19	171 18.36	1321	41 52.61	171 17.73	83	85	1	1.49	4.7	16.1	117.1	255	17.4	15.1
60	7	06-04-2025	1502	42 05.10	171 15.80	1521	42 06.07	171 15.23	45	46	1	1.05	4.7	16.4	106.3	200	16.9	15.9
61	7	06-04-2025	1624	42 06.90	171 09.30	1651	42 08.36	171 08.64	88	90	1	1.53	4.5	19.0	124.6	270	17.6	14.5
62	2	07-04-2025	712	41 02.43	171 18.40	742	41 01.13	171 19.32	179	180	1	1.47	4.7	19.2	147.5	525	19.0	13.8
63	1	10-04-2025	703	40 31.89	172 18.31	731	40 31.20	172 20.18	91	95	1	1.58	4.5	21.9	119.1	270	16.5	14.0
64	2	10-04-2025	1228	40 39.01	171 45.15	1258	40 37.92	171 46.50	179	181	1	1.49	4.5	22.5	152.4	530	18.3	13.9
65	2	10-04-2025	1432	40 42.27	171 40.55	1502	40 43.45	171 39.32	191	192	1	1.50	4.6	19.2	150.1	570	18.5	13.8
66*	8	11-04-2025	651	42 25.71	170 58.90	706	42 25.04	170 59.21	113	113	4	0.70	4.4	20.6	130.9	330	16.7	13.2

APPENDIX 4: **WCSI AND TBGB AREA CONTINUED.**

ET = extra tow; GT = gear trial; * = not valid for biomass estimation

			Start tow			End tow			Gear depth (m)									
Station	Stratum	Date	Time	Latitude (S °)	Longitude (E °)	Time	Latitude (S °)	Longitude (E °)	Min.	Max.	Gear perf.	Distance (n. mile)	Headline height (m)	Wing-spread (m)	Door-spread (m)	Warp m)	Surface temp. (°C)	Bottom temp. (°C)
67 ET	8	11-04-2025	928	42 09.46	171 05.26	956	42 08.09	171 05.97	115	116	1	1.46	4.4	17.8	130.8	330	16.5	13.5
68	8	11-04-2025	1139	41 55.46	171 04.78	1209	41 54.09	171 05.54	158	160	1	1.48	4.4	19.4	144.3	475	16.6	13.3
69	6	11-04-2025	1431	41 36.80	171 08.85	1458	41 35.30	171 09.07	150	152	1	1.50	4.5	19.2	143.3	450	18.2	13.4
70	2	12-04-2025	657	41 04.43	171 34.40	724	41 03.06	171 35.24	135	137	2	1.50	4.4	18.9	143.9	405	17.7	13.8
71	2	12-04-2025	915	41 03.67	171 45.68	942	41 02.24	171 46.29	127	128	1	1.50	4.4	18.4	135.6	375	16.9	13.7
72	1	12-04-2025	1135	41 03.12	171 57.73	1200	41 01.57	171 57.73	92	94	2	1.54	4.4	17.5	127.2	315	16.9	13.9
73	1	12-04-2025	1342	40 54.78	172 01.20	1410	40 53.42	172 02.04	90	91	1	1.50	4.7	17.6	119.8	270	16.6	14.3

APPENDIX 5: Catch summary in descending order by weight

West coast central area

* = less than 0.1%.

Species code	Common name	Scientific name	Catch (kg)	% of total catch	No. of stations	% occurrence	Depth (m) Min.	Depth (m) Max.
SNA	Snapper	*Pagrus auratus*	3184.6	32.7	32	88.9	14	100
TRE	Trevally	*Pseudocaranx georgianus*	2105.1	21.6	27	75	14	99
POP	Porcupine fish	*Allomycterus jaculiferus*	1640.1	16.8	33	91.7	18	100
SPD	Spiny dogfish	*Squalus acanthias*	585.6	6	16	44.4	60	100
JMN	Yellowtail jack mackerel	*Trachurus novaezelandiae*	407	4.2	19	52.8	14	100
BAR	Barracouta	*Thyrsites atun*	318.1	3.3	15	41.7	40	100
ONG	Sponges	*Porifera*	250.2	2.6	22	61.1	14	100
JMD	Greenback jack mackerel	*Trachurus declivis*	179.3	1.8	15	41.7	50	100
KIN	Kingfish	*Seriola lalandi*	167.2	1.7	8	22.2	18	98
GUR	Gurnard	*Chelidonichthys kumu*	117.4	1.2	26	72.2	16	100
MOK	Moki	*Latridopsis ciliaris*	109.9	1.1	4	11.1	50	82
SPO	Rig	*Mustelus lenticulatus*	83.5	0.9	12	33.3	14	97
JDO	John dory	*Zeus faber*	76.9	0.8	24	66.7	14	100
ATT	Kahawai	*Arripis trutta*	72.6	0.7	6	16.7	14	45
EGR	Eagle ray	*Myliobatis tenuicaudatus*	64.7	0.7	7	19.4	14	69
SCH	School shark	*Galeorhinus galeus*	46.2	0.5	6	16.7	76	91
WOD	Wood	*Wood*	43.4	0.4	6	16.7	14	71
CAR	Carpet shark	*Cephaloscyllium isabellum*	36.9	0.4	7	19.4	40	100
BRA	Short-tailed black ray	*Dasyatis brevicaudata*	35.4	0.4	2	5.6	18	34
ERA	Electric ray	*Torpedo fairchildi*	29.3	0.3	3	8.3	40	91
GSH	Ghost shark	*Hydrolagus novaezealandiae*	24.3	0.2	3	8.3	89	100
NSD	Northern spiny dogfish	*Squalus griffini*	24	0.2	4	11.1	73	97
LEA	Leatherjacket	*Meuschenia scaber*	22.5	0.2	14	38.9	18	99
SSK	Smooth skate	*Dipturus innominatus*	20.8	0.2	3	8.3	91	100
SQU	Arrow squid	*Nototodarus sloanii & N. gouldi*	13.3	0.1	21	58.3	14	100
SEO	Seaweed		11.3	0.1	7	19.4	18	100
NMP	Tarakihi	*Nemadactylus macropterus*	10.8	0.1	8	22.2	60	97
RSK	Rough skate	*Zearaja nasuta*	10.3	0.1	4	11.1	60	89
WAR	Common warehou	*Seriolella brama*	7.3	0.1	1	2.8	63	63
COZ	Bryozoan	*Bryozoa*	4.7	*	6	16.7	18	100
FRO	Frostfish	*Lepidopus caudatus*	3.7	*	1	2.8	91	97
BOA	Sowfish	*Paristiopterus labiosus*	3.5	*	2	5.6	32	71
LFB	Longfinned boarfish	*Zanclistius elevatus*	2.7	*	1	2.8	73	75
SCC	Sea cucumber	*Stichopus mollis*	2.6	*	8	22.2	32	89
LSO	Lemon sole	*Pelotretis flavilatus*	2	*	4	11.1	32	77
EMA	Blue mackerel	*Scomber australasicus*	2	*	5	13.9	24	65
BSQ	Broad squid	*Sepioteuthis australis*	1.9	*	4	11.1	18	65
CUC	Cucumber fish	*Paraulopus nigripinnis*	1.6	*	7	19.4	63	100
GIZ	Giant stargazer	*Kathetostoma giganteum*	1.6	*	1	2.8	63	63
FLL	Fragments shell		1.4	*	6	16.7	32	89
PIL	Pilchard	*Sardinops sagax*	1.3	*	2	5.6	89	97
HDR	Hydroid	*Hydrozoa*	0.7	*	6	16.7	40	100
SWA	Silver warehou	*Seriolella punctata*	0.6	*	3	8.3	77	91
POL	Polychaete	*Polychaeta*	0.6	*	2	5.6	73	79
ZFP	Rubbish fishing plastics		0.5	*	4	11.1	50	99
GOC	Gorgonian coral	*Gorgonacea*	0.4	*	3	8.3	40	89
EGC	Egg case		0.4	*	4	11.1	73	99
BCO	Blue cod	*Parapercis colias*	0.4	*	1	2.8	60	69
SCA	Scallop	*Pecten novaezelandiae*	0.4	*	1	2.8	40	41
SCG	Scaly gurnard	*Lepidotrigla brachyoptera*	0.3	*	3	8.3	50	100
GAS	Gastropods	*Gastropoda*	0.3	*	3	8.3	76	98

APPENDIX 5: WCC area continued.

* = less than 0.1%.

Species code	Common name	Scientific name	Catch (kg)	% of total catch	No. of stations	% occurrence	Depth (m) Min.	Depth (m) Max.
OCT	Octopus	*Pinnoctopus cordiformis*	0.3	*	3	8.3	14	69
ASC	Sea squirt	*Ascidiacea*	0.2	*	1	2.8	60	65
OPH	Ophiuroid (brittle star)		0.2	*	2	5.6	73	79
ASH	Circular saw shell	*Astraea heliotropium*	0.2	*	2	5.6	73	100
BRN	Barnacle	*Cirripedia*	0.2	*	2	5.6	14	100
STY	Spotty	*Notolabrus celidotus*	0.2	*	1	2.8	18	19
NUD	Nudibranchs	*Nudibranchia*	0.2	*	1	2.8	63	63
SSI	Silverside	*Argentina elongata*	0.1	*	1	2.8	97	100
SSQ	Bobtail squid	*Sepioloidea spp.*	0.1	*	1	2.8	97	100
CBD	Coral rubble - dead		0.1	*	1	2.8	76	79
APD	Seamice	*Aphroditidae*	0.1	*	1	2.8	60	65
ASR	Asteroid (starfish)		0.1	*	1	2.8	33	35
NTM	Camouflage crab	*Notomithrax minor*	0.1	*	1	2.8	76	79
COE	Coelenterata	*Coelenterata*	0.1	*	1	2.8	80	82
SDO	Silver dory	*Cyttus novaezealandiae*	0.1	*	1	2.8	99	100
BIV	Bivalves unidentified	*Bivalvia*	0.1	*	1	2.8	73	75
ROK	Rocks, stones		0.1	*	1	2.8	60	69
ZHO	Rubbish household other		0.1	*	1	2.8	80	82
NCA	Hairy red swimming crab	*Nectocarcinus antarcticus*	0.1	*	1	2.8	40	41
JFI	Jellyfish		0.1	*	1	2.8	14	16
CCM	Eleven-arm seastar	*Coscinasterias muricata*	0.1	*	1	2.8	44	45
CRB	Crab		0.1	*	1	2.8	32	33
EHI	Echiurans	*Echiura*	0.1	*	1	2.8	32	33

WCSI and TBGB area

* = less than 1%

Species code	Common Name	Scientific Name	Catch (kg)	% total catch	No. of stations	% occur.	Min. depth	Max. depth
SNA	Snapper	*Pagrus auratus*	10 490.8	46	44	69	15	160
JMN	Yellowtail jack mackerel	*Trachurus novaezelandiae*	3 523.0	16	38	59	15	160
SPD	Spiny dogfish	*Squalus acanthias*	1 670.6	7	40	62	27	319
GUR	Gurnard	*Chelidonichthys kumu*	966.3	4	40	62	15	138
BAR	Barracouta	*Thyrsites atun*	838.2	4	42	66	15	319
RSO	Gemfish	*Rexea solandri*	522.6	2	23	36	72	381
RCO	Red cod	*Pseudophycis bachus*	415.8	2	26	41	17	276
NMP	Tarakihi	*Nemadactylus macropterus*	415.3	2	35	55	32	319
JMD	Greenback jack mackerel	*Trachurus declivis*	393.9	2	32	50	17	276
SPO	Rig	*Mustelus lenticulatus*	334.2	1	32	50	15	267
GIZ	Giant stargazer	*Kathetostoma giganteum*	262.9	1	22	34	66	381
TRE	Trevally	*Pseudocaranx georgianus*	262.7	1	20	31	15	61
FRO	Frostfish	*Lepidopus caudatus*	253.1	1	19	30	56	276
SQU	Arrow squid	*Nototodarus sloanii* & *N. gouldi*	225.9	1	48	75	17	381
JDO	John dory	*Zeus faber*	192.5	1	33	52	15	192
POP	Porcupine fish	*Allomycterus jaculiferus*	149.0	1	13	20	36	192
GSH	Ghost shark	*Hydrolagus novaezealandiae*	146.0	1	18	28	56	276

APPENDIX 5: WCSI and TBGB area continued.

* = less than 1%

Species code	Common Name	*Scientific Name*	Catch (kg)	% total catch	No. of stations	% occur.	Min. depth	Max. depth
SCH	School shark	*Galeorhinus galeus*	144.6	1	26	41	17	267
KIN	Kingfish	*Seriola lalandi*	130.6	1	8	12	18	95
CUC	Cucumber fish	*Paraulopus nigripinnis*	114.9	1	26	41	56	381
ATT	Kahawai	*Arripis trutta*	100.7	*	15	23	15	60
EGR	Eagle ray	*Myliobatis tenuicaudatus*	97.7	*	10	16	15	34
NSD	Northern spiny dogfish	*Squalus griffini*	97.5	*	14	22	90	381
CAR	Carpet shark	*Cephaloscyllium isabellum*	91.1	*	21	33	33	381
ELE	Elephant fish	*Callorhinchus milii*	90.9	*	4	6	27	46
RHY	Common roughy	*Paratrachichthys trailli*	74.6	*	1	2	274	276
HBA	Bigeye sea perch	*Helicolenus barathri*	59.7	*	13	20	107	381
SSK	Smooth skate	*Dipturus innominatus*	53.2	*	9	14	88	381
THR	Thresher shark	*Alopias vulpinus*	48.0	*	1	2	36	37
HOK	Hoki	*Macruronus novaezelandiae*	47.8	*	10	16	56	276
LEA	Leatherjacket	*Meuschenia scaber*	37.9	*	6	9	32	61
WOD	Wood		36.6	*	16	25	17	123
RSK	Rough skate	*Zearaja nasuta*	34.1	*	9	14	33	369
WAR	Common warehou	*Seriolella brama*	30.2	*	12	19	15	187
CDO	Capro dory	*Capromimus abbreviatus*	27.9	*	19	30	75	381
WIT	Witch	*Arnoglossus scapha*	23.2	*	27	42	27	381
SCG	Scaly gurnard	*Lepidotrigla brachyoptera*	20.7	*	32	50	32	268
ERA	Electric ray	*Torpedo fairchildi*	20.2	*	2	3	17	381
LIN	Ling	*Genypterus blacodes*	14.7	*	8	12	72	267
CON	Conger eel	*Conger* spp.	13.7	*	2	3	33	35
LSO	Lemon sole	*Pelotretis flavilatus*	13.5	*	18	28	15	91
SEV	Broadnose sevengill shark	*Notorynchus cepedianus*	10.4	*	1	2	34	35
CCX	Small banded rattail	*Coelorinchus parvifasciatus*	10.2	*	4	6	185	276
HAK	Hake	*Merluccius australis*	9.8	*	6	9	43	84
SFL	Sand flounder	*Rhombosolea plebeia*	9.1	*	9	14	15	37
SDO	Silver dory	*Cyttus novaezealandiae*	9.0	*	12	19	115	369
ESO	N.Z. sole	*Peltorhamphus novaezeelandiae*	7.3	*	7	11	17	60
HEX	Sixgill shark	*Hexanchus griseus*	6.3	*	2	3	56	73
HPC	Sea perch	*Helicolenus percoides*	5.7	*	11	17	90	319
CBI	Two saddle rattail	*Coelorinchus biclinozonalis*	4.9	*	5	8	92	276
TUR	Turbot	*Colistium nudipinnis*	4.4	*	1	2	33	35
PTU	Sea pens	Pennatulacea	3.8	*	4	6	179	267
BCO	Blue cod	*Parapercis colias*	3.5	*	2	3	31	48

APPENDIX 5: WCSI and TBGB area continued.

* = less than 1%

Species code	Common Name	*Scientific Name*	Catch (kg)	% total catch	No. of stations	% occur.	Min. depth	Max. depth
EMA	Blue mackerel	*Scomber australasicus*	3.3	*	7	11	15	61
CCM	Eleven-arm seastar	*Coscinasterias muricata*	3.2	*	7	11	15	28
OCT	Octopus	*Pinnoctopus cordiformis*	3.0	*	1	2	54	59
SCC	Sea cucumber	*Stichopus mollis*	3.0	*	7	11	16	139
JGU	Spotted gurnard	*Pterygotrigla picta*	2.9	*	4	6	274	381
GLS	Glass sponges	Hexactinellida	2.6	*	2	3	43	59
SPZ	Spotted stargazer	*Genyagnus monopterygius*	2.5	*	2	3	16	18
FLL	Fragments shell		2.4	*	10	16	15	61
CRM	Airy finger sponge	*Callyspongia* cf. *ramosa*	2.3	*	18	28	15	381
ANC	Anchovy	*Engraulis australis*	2.1	*	11	17	33	109
SWA	Silver warehou	*Seriolella punctata*	2.0	*	9	14	56	132
SSH	Slender smooth-hound	*Gollum attenuatus*	1.9	*	1	2	377	381
ASC	Sea squirt	Ascidiacea	1.6	*	11	17	15	134
EUC	Eucla cod	*Euclichthys polynemus*	1.5	*	3	5	317	381
HDR	Hydroid	Hydrozoa	1.5	*	12	19	17	381
JFI	Jellyfish		1.4	*	5	8	42	85
SSI	Silverside	*Argentina elongata*	1.3	*	11	17	83	276
BSQ	Broad squid	*Sepioteuthis australis*	1.2	*	3	5	17	48
PIL	Pilchard	*Sardinops sagax*	1.2	*	3	5	15	37
LSK	Softnose skate (longtail skate)	*Arhynchobatis asperrimus*	1.1	*	1	2	317	319
BRZ	Brown stargazer	*Xenocephalus armatus*	1.0	*	1	2	137	138
GAS	Gastropods	Gastropoda	1.0	*	10	16	15	138
ONG	Sponges	Porifera	1.0	*	4	6	34	94
BRI	Brill	*Colistium guntheri*	0.9	*	1	2	33	35
SBN	Stalked barnacle	Scalpellidae	0.9	*	8	12	137	381
PAG	Pagurid	Paguroidea	0.8	*	4	6	17	319
SCA	Scallop	*Pecten novaezelandiae*	0.7	*	5	8	31	45
JAV	Javelin fish	*Lepidorhynchus denticulatus*	0.7	*	2	3	264	276
PRK	Prawn killer	*Ibacus alticrenatus*	0.6	*	6	9	137	381
YBF	Yellowbelly flounder	*Rhombosolea leporina*	0.6	*	2	3	15	18
STY	Spotty	*Notolabrus celidotus*	0.5	*	3	5	16	35
ZFP	Rubbish fishing plastics		0.5	*	4	6	17	152
PDL	Penis worms	Priapulida	0.4	*	2	3	16	28
SAL	Salps		0.4	*	2	3	317	381
SPM	Sprat	*Sprattus muelleri*	0.4	*	4	6	33	77
EGC	Egg case		0.3	*	3	5	54	181
GVO	Golden volute	*Provocator mirabilis*	0.3	*	2	3	121	137

APPENDIX 5: WCSI and TBGB area continued

* = less than 1%

Species code	Common Name	*Scientific Name*	Catch (kg)	% total catch	No. of stations	% occur.	Min. depth	Max. depth
KWH	Knobbed whelk	*Austrofucus glans*	0.3	*	3	5	45	123
JMA	Jack mackerel	*Trachurus declivis*	0.3	*	1	2	57	61
RMU	Red mullet	*Upeneichthys lineatus*	0.3	*	1	2	32	34
UNI	Unidentified		0.3	*	1	2	34	35
ASH	Circular saw shell	*Astraea heliotropium*	0.2	*	2	3	133	181
ASR	Asteroid (starfish)	*NANA*	0.2	*	2	3	17	18
MMU	Pearlside	*Maurolicus australis*	0.2	*	2	3	190	369
OPA	Opalfish	*Hemerocoetes* spp.	0.2	*	2	3	121	132
PSI	Geometric star	*Psilaster acuminatus*	0.2	*	2	3	131	192
RBT	Redbait	*Emmelichthys nitidus*	0.2	*	1	2	185	187
TOD	Dark toadfish	*Neophrynichthys latus*	0.2	*	1	2	274	276
ZOP	Rubbish other use plastics		0.2	*	1	2	17	17
ANT	Anemones	Anthozoa	0.1	*	1	2	274	276
CEP	Red bandfish	*Cepola haastii*	0.1	*	1	2	92	94
CRB	Crab		0.1	*	1	2	123	126
FMA	Fusitriton magellanicus	*Fusitriton magellanicus*	0.1	*	1	2	265	268
HTU	Quill worm	*Hyalinoecia tubicola*	0.1	*	1	2	366	369
PCO	Ahuru	*Auchenoceros punctatus*	0.1	*	1	2	33	35
SDR	Spiny seadragon	*Solegnathus spinosissimus*	0.1	*	1	2	175	178
SEO	Seaweed		0.1	*	1	2	17	17
SIP	Unsegmented worms	Sipuncula	0.1	*	1	2	32	34
SPA	Slender sprat	*Sprattus antipodum*	0.1	*	1	2	35	35
YEM	Yellow-eyed mullet	*Aldrichetta forsteri*	0.1	*	1	2	17	17

APPENDIX 6: Benthic macro-invertebrates retained and identified ashore

West coast central area

Initial code	Phylum: Class	Order	Family	Scientific name	Expert ID code	No. of stations
LEH	Annelida: Clitellata			*Hirudinea*	LEH	1
BRN	Arthropoda: Thecostraca	Balanomorpha	Balanidae	*Notomegabalanus decorus*	NOD	3
BRN	Arthropoda: Thecostraca	Calanticomorpha	Calanticidae	*Calantica spinilatera*	BRN	1
ONG	Bryozoa:			*Bryozoa ?*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Adeonidae	*Adeonellopsis macewindui*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Aeteidae	*Aetea*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Arachnopusiidae	*Arachnopusia unicornis*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Bitectiporidae	*Bitectipora mucronifera*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Bitectiporidae	*Schizosmittina*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Bugulidae	*Dimetopia cornuta cf.*	COZ	3
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Calloporidae	*Crassimarginatella cucullata*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Calloporidae	*Valdemunitella huttoni cf.*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Candidae	*Bugulopsis monotrypa*	COZ	3
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Candidae	*Emma triangula*	COZ	3
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Catenicellidae	*Catenicella*	COZ	2
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Catenicellidae	*Orthoscuticella fissurata*	COZ	4
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Catenicellidae	*Pterocella scutella*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Catenicellidae	*Scalicella crystallina*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Cellariidae	*Cellaria immersa*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Cellariidae	*Cellaria tenuirostris*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Celleporaria agglutinans*	CAG	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Celleporina hemiperistomata*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Celleporina proximalis*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Celleporina sinuata*	COZ	2
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Galeopsis polyporus*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Galeopsis porcellanicus*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Osthimosia amplexa*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Osthimosia cyclops*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Crepidacanthidae	*Crepidacantha crinispina*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Exochellidae	*Exochella conjuncta*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Microporellidae	*Microporella agonistes*	COZ	2
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Microporidae	*Micropora*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Phidoloporidae	*Rhynchozoon*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Romancheinidae	*Escharella spinosissima*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Romancheinidae	*Hippomenella vellicata*	HVE	3
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Scruparidae	*Scruparia ambigua*	COZ	2
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Smittinidae	*Parasmittina aotea*	COZ	1
COZ	Bryozoa: Gymnolaemata	Cheilostomata	Smittinidae	*Smittina torques*	COZ	1
ONG	Bryozoa: Gymnolaemata	Cheilostomata	Cellariidae	*Cellaria immersa*	COZ	1
ONG	Bryozoa: Gymnolaemata	Cheilostomata	Celleporidae	*Celleporina sinuata*	COZ	1
COZ	Bryozoa: Stenolaemata	Cyclostomata	Annectocymidae	*Annectocyma cf. major*	ECB	1
COZ	Bryozoa: Stenolaemata	Cyclostomata	Cinctiporidae	*Cinctipora elegans*	CEL	1
COZ	Bryozoa: Stenolaemata	Cyclostomata	Crisiidae	*Bicrisia edwardsiana*	ECB	2
COZ	Bryozoa: Stenolaemata	Cyclostomata	Crisiidae	*Crisia*	ECB	2
COZ	Bryozoa: Stenolaemata	Cyclostomata	Diaperoeciidae	*Diaperoecia purpurascens*	ECB	2
COZ	Bryozoa: Stenolaemata	Cyclostomata	Lichenoporidae	*Disporella pristis*	ECB	1
COZ	Bryozoa: Stenolaemata	Cyclostomata	Oncousoeciidae	*Microeciella suborbicularis*	ECB	2
COZ	Bryozoa: Stenolaemata	Cyclostomata	Theonoidae	*Telopora lobata*	ECB	2
COZ	Bryozoa: Stenolaemata	Cyclostomata	Tubuliporidae	*Exidmonea*	ECB	1
COZ	Bryozoa: Stenolaemata	Cyclostomata	Tubuliporidae	*Tubulipora*	ECB	3
ECB	Bryozoa: Stenolaemata	Cyclostomata	Densiporidae	*Favosipora candida*	ECB	1
ECB	Bryozoa: Stenolaemata	Cyclostomata	Diaperoeciidae	*Diaperoecia purpurascens*	ECB	1
ECB	Bryozoa: Stenolaemata	Cyclostomata	Diaperoeciidae	*Diaperoforma aff. californica*	ECB	1
COE	Chordata: Ascidiacea	Aplousobranchia	Didemnidae	*Leptoclinides novaezelandiae*	ASC	1
ONG	Chordata: Ascidiacea	Stolidobranchia	Styelidae	*Styelidae*	ASC	1
ONG	Chordata: Ascidiacea			*Ascidiacea*	ASC	3
ONG	Cnidaria:			*Cnidaria*	CNI	1
GOC	Cnidaria: Hydrozoa	Leptothecata	Plumulariidae	*Nemertesia elongata*	NEE	9
GOC	Cnidaria: Hydrozoa	Leptothecata	Plumulariidae	*Plumulariidae ?*	HDR	1
GOC	Cnidaria: Hydrozoa	Leptothecata	Sertulariidae	*Amphisbetia fasciculata*	HDF	1
HDR	Cnidaria: Hydrozoa	Leptothecata	Aglaopheniidae	*Aglaophenia*	HDF	1
HDR	Cnidaria: Hydrozoa	Leptothecata	Aglaopheniidae	*Aglaophenia hystrix ?*	HDF	2
HDR	Cnidaria: Hydrozoa	Leptothecata	Lafoeidae	*Cryptolaria prima*	CRT	3
HDR	Cnidaria: Hydrozoa	Leptothecata	Sertulariidae	*Symplectoscyphus*	HDR	1
ONG	Cnidaria: Hydrozoa			*Hydrozoa indet.*	HDR	1

APPENDIX 6: CONTINUED

West coast central area

Initial code	Phylum: Class	Order	Family	Scientific name	Expert ID code	No. of stations
BIV	Mollusca: Bivalvia	Arcida	Arcidae	*Barbatia novaezealandiae*	BBN	1
BIV	Mollusca: Bivalvia	Arcida	Glycymerididae	*Tucetona laticostata*	DCK	1
BIV	Mollusca: Bivalvia	Pectinida	Pectinidae	*Mesopeplum convexum*	MCO	1
NUD	Mollusca: Gastropoda	Nudibranchia	Doridiidae	*Doridiidae*	NUD	1
ONG	Porifera: Demospongiae	Axinellida	Axinellidae	*Axinella cf. sp. 9*	DSO	1
ONG	Porifera: Demospongiae	Dendroceratida	Dictyodendrillidae	*Dictyodendrilla cf. sp. 2*	DSO	1
ONG	Porifera: Demospongiae	Dictyoceratida	Irciniidae	*Ircinia akaroa cf.*	IRC	1
ONG	Porifera: Demospongiae	Dictyoceratida	Thorectidae	*Semitaspongia glebosa cf.*	DSO	1
ONG	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia cf. sp. 21*	DSO	3
ONG	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia sp. 11*	DSO	2
ONG	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia sp. 12*	DSO	11
ONG	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Dactylia cf. sp. 1*	DSO	1
ONG	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Dactylia indet.*	DSO	1
ONG	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Dactylia varia*	DPA	22
ONG	Porifera: Demospongiae	Haplosclerida	Petrosiidae	*Neopetrosia sp. 11*	DSO	1
ONG	Porifera: Demospongiae	Poecilosclerida	Acarnidae	*Iophon minor*	IOM	6
ONG	Porifera: Demospongiae	Poecilosclerida	Acarnidae	*Iophon proximum cf.*	DSO	1
ONG	Porifera: Demospongiae	Poecilosclerida	Chondropsidae	*Psammoclema sp. 7*	DSO	3
ONG	Porifera: Demospongiae	Poecilosclerida	Crellidae	*Crella incrustans*	CIC	5
ONG	Porifera: Demospongiae	Suberitida	Halichondriidae	*Ciocalypta penicillus*	DSO	2
ONG	Porifera: Demospongiae	Suberitida	Suberitidae	*Suberites australiensis*	DSO	1
ONG	Porifera: Demospongiae	Tethyida	Tethyidae	*Tethya burtoni*	TBU	1
ONG	Porifera: Demospongiae	Tetractinellida	Ancorinidae	*Ecionemia alata*	EAL	2
ONG	Porifera: Demospongiae	Tetractinellida	Ancorinidae	*Stelletta purpurea cf.*	SLT	1
ONG	Porifera: Demospongiae	Tetractinellida	Ancorinidae	*Stryphnus ariena cf.*	DSO	1
ONG	Porifera: Demospongiae	Tetractinellida	Ancorinidae	*Stryphnus levis*	SLV	3
ONG	Porifera: Demospongiae	Tetractinellida	Ancorinidae	*Stryphnus novaezealandiae*	DSO	2
ONG	Porifera: Demospongiae	Verongiida	Pseudoceratinidae	*Pseudoceratina sp. 1*	PSD	4

APPENDIX 6: CONTINUED

WCSI and TBGB area.

Initial code	Phylum: Class	Order	Family	Scientific name	Expert ID code	No. of stations
PDL	Annelida: Polychaeta	Echiuroidea	Urechidae	*Urechis novaezealandiae*	EHI	1
HTU	Annelida: Polychaeta	Eunicida	Onuphidae	*Hyalinoecia*	ONU	1
UNI	Annelida: Polychaeta	Sabellida	Sabellidae	*Acromegalomma*	SBL	2
PAG	Arthropoda: Malacostraca	Decapoda	Diogenidae	*Areopaguristes setosus*	PAG	1
CRB	Arthropoda: Malacostraca	Decapoda	Majidae	*Notomithrax ursus*	NTO	1
PAG	Arthropoda: Malacostraca	Decapoda	Paguridae	*Diacanthurus rubricatus*	DIR	1
CRB	Arthropoda: Malacostraca	Decapoda	Porcellanidae	*Petrolisthes novazelandiae ?*	CRB	1
WOD	Arthropoda: Thecostraca	Balanomorpha	Balanidae	*Notomegabalanus ?*	BRN	1
SBN	Arthropoda: Thecostraca	Scalpellomorpha	Scalpellidae	*Graviscalpellum pedunculatum*	GPE	1
ONG	Chordata: Ascidiacea	Aplousobranchia	Polyclinidae	*Polyclinum*	ASC	1
UNI	Chordata: Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa bicornuta*	CNB	1
ASC	Chordata: Ascidiacea	Stolidobranchia	Styelidae	*Cnemidocarpa bicornuta*	CNB	1
ASC	Chordata: Ascidiacea	Stolidobranchia	Styelidae	*Styela clava*	SYC	1
ANT	Cnidaria: Hexacorallia	Actiniaria		*Actiniaria*	ANT	1
HDR	Cnidaria: Hydrozoa	Anthoathecata	Solanderiidae	*Solanderia*	HDR	1
HDR	Cnidaria: Hydrozoa	Leptothecata	Plumulariidae	*Nemertesia elongata*	NEE	2
PTU	Cnidaria: Octocorallia	Scleralcyonacea	Funiculinidae	*Funiculina quadrangularis*	FQU	1
ASR	Echinodermata: Asteroidea	Paxillosida	Astropectinidae	*Astropecten polyacanthus*	APC	1
ASR	Echinodermata: Asteroidea	Valvatida	Asterinidae	*Patiriella regularis*	PRE	1
ECN	Echinodermata: Echinoidea	Spatangoida	Loveniidae	*Echinocardium cordatum*	LOV	1
GAS	Mollusca: Gastropoda	Littorinimorpha	Struthiolariidae	*Struthiolaria papulosa*	LOF	1
ASH	Mollusca: Gastropoda	Littorinimorpha	Xenophoridae	*Xenophora neozelanica*	GAS	1
GAS	Mollusca: Gastropoda	Neogastropoda	Prosiphonidae	*Austrofusus glans*	GAS	2
GAS	Mollusca: Gastropoda	Neogastropoda	Tudiclidae	*Aeneator otagoensis*	GAS	1
CRM	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia sp. 12*	DSO	1
GLS	Porifera: Demospongiae	Haplosclerida	Callyspongiidae	*Dactylia varia*	DPA	1
ONG	Porifera: Demospongiae	Suberitida	Suberitidae	*Suberites australiensis*	DSO	2

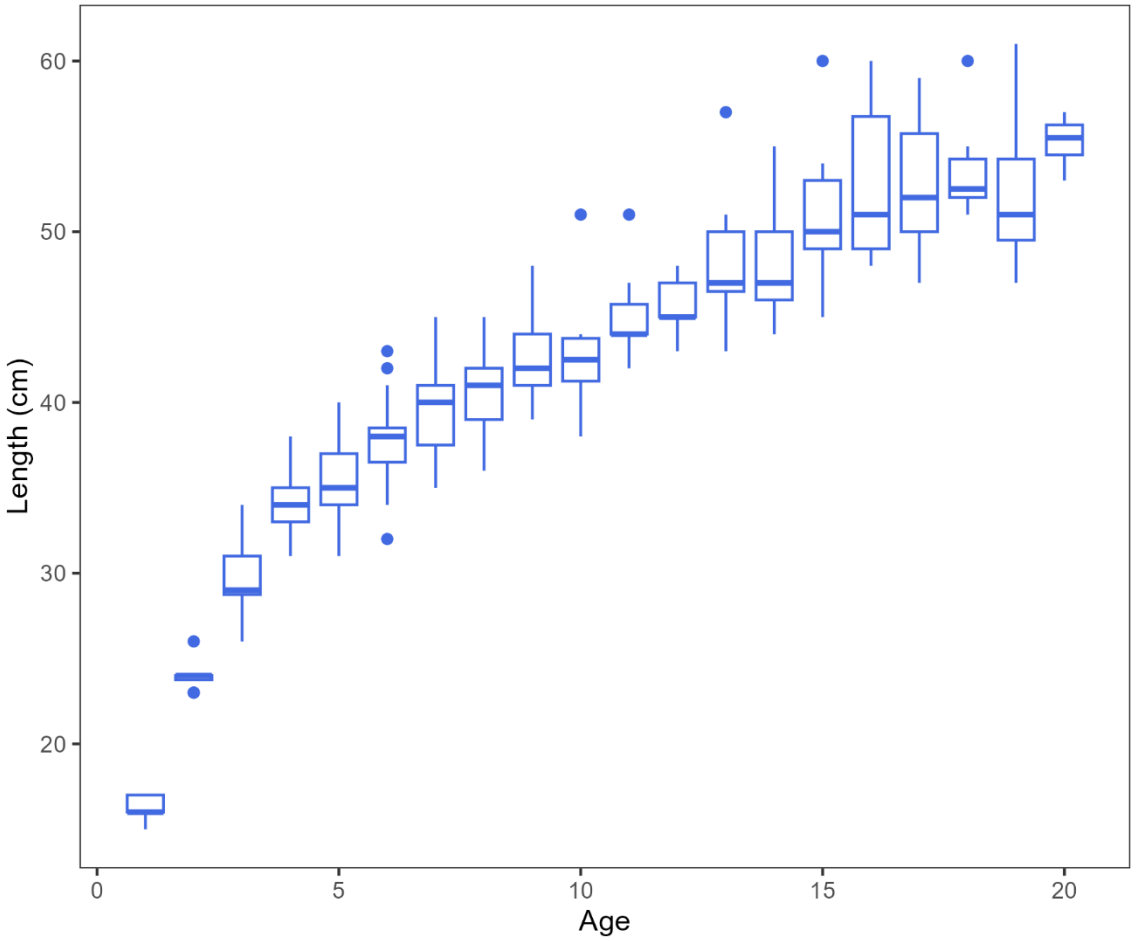
APPENDIX 7: Mean catch rates (kg km^{-2}) by stratum for the target species.

Species codes are given in Appendix 5.

	Species code						
Stratum	**SNA**	**GUR**	**JDO**	**NMP**	**SPD**	**GIZ**	**RCO**
G10M	14.5	3.7	2.1	–	48.9	–	–
G10S	166.9	17.4	7.8	3.5	8.0	–	–
G10X	99.3	11.0	14.3	6.2	108.4	–	–
G50M	46.8	5.9	–	–	–	–	–
H50	1 123.3	3.2	9.3	–	–	–	–
I25	837.7	17.6	–	–	–	–	–
I50	693.0	2.6	12.2	0.1	–	–	–
J25	468.7	12.4	5.5	–	–	–	–
S10E	84.1	24.2	10.8	0.3	75.1	0.9	–
S10W	3.2	0.9	5.9	–	213.2	–	–
1	86.4	2.0	29.0	1.7	54.0	–	0.1
2	4.1	–	1.0	4.6	6.7	–	–
5	77.0	252.8	19.7	2.4	150.5	–	33.0
6	13.5	3.7	19.6	5.7	355.5	3.5	0.3
7	48.6	209.3	24.6	4.6	354.3	4.2	29.2
8	17.1	2.0	5.2	27.0	36.7	11.9	–
9	–	–	–	15.1	0.4	20.0	–
11	59.9	228.1	1.2	8.5	126.0	10.4	208.0
12	2.7	1.2	–	68.2	51.0	39.0	11.8
13	–	–	–	43.0	2.7	24.0	0.8
14	17.0	84.8	–	10.6	16.6	36.3	1.5
15	–	–	–	48.9	157.3	48.4	1.4
16	–	–	–	122.4	6.3	32.3	16.4
17	2 604.0	33.9	10.2	–	3.3	–	–
18	811.8	42.3	23.7	0.4	1.6	–	0.6
19	552.2	41.1	19.0	4.1	105.7	–	–
20	2 433.7	–	–	–	–	–	–
21	5 040.3	–	–	–	–	–	–

APPENDIX 8: Snapper age-length data for the west coast central area.

Boxplots of the distribution of fish lengths within each age class. The middle line represents the median length for each age class. Upper and lower lines of the box represent the 25th and 75th percentiles, and whiskers indicate the 95% confidence interval. Only the first 20 years are shown with older fish excluded from these plots due to low sample size.



APPENDIX 9: Number of individuals at each reproductive stage for the seven target species sampled in the west coast central area.

–; no data. Stages are given in Appendix 2. No reproductive stages were recorded for the west coast South Island area. Small fish of undetermined sex were not included.

	Male gonad stages							Female gonad stages							
Length (cm)	1	2	3	4	5	6	7	1	2	3	4	5	6	7	Total
Giant stargazer															
11–20	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
21–30	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
31–40	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
41–50	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
51–60	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
61–70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
> 70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Total	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
John dory															
< 21	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
21–30	–	4	4	–	–	–	–	1	4	–	–	–	–	–	13
31–40	–	8	22	14	–	–	–	–	4	5	3	2	–	–	58
41–50	–	2	7	4	–	–	–	–	–	14	3	3	–	–	33
> 50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Total	0	14	33	18	0	0	0	1	8	19	6	5	0	0	104
Red cod															
< 20	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
21–30	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
31–40	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
41–50	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
51–60	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
> 60	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red gurnard															
< 21	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1
21–30	2	3	7	2	–	–	–	2	3	1	–	–	–	–	20
31–40	–	13	42	12	17	–	–	1	21	21	5	–	–	1	133
> 40	–	4	2	2	1	–	–	–	3	37	8	3	3	–	63
Total	3	20	51	16	18	0	0	3	27	59	13	3	3	1	217
Snapper															
< 21	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
21–30	15	5	–	–	–	–	–	13	15	–	–	–	–	–	48
31–40	1	175	3	1	–	–	–	2	190	2	–	–	–	–	374
41–50	–	106	6	2	–	–	–	–	120	1	–	–	–	–	235
51–60	–	22	–	2	–	–	–	–	51	–	–	–	–	–	75
61–70	–	7	–	–	–	–	–	–	12	–	–	–	–	1	20
> 70	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2
Total	16	315	9	5	–	–	–	15	390	3	–	–	–	1	754

APPENDIX 9: continued

	Male gonad stages							Female gonad stages							
Length (cm)	1	2	3	4	5	6	7	1	2	3	4	5	6	7	Total
Tarakihi															
< 11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
11–20	3	–	–	–	–	–	–	9	–	–	–	–	–	–	12
21–30	2	–	–	–	–	–	–	2	–	–	–	–	–	–	4
31–40	–	–	–	3	–	–	–	–	2	–	–	–	–	–	5
> 40	–	–	–	–	–	–	–	–	1	2	–	–	–	–	3
Total	5	–	–	3	–	–	–	11	3	2	–	–	–	–	24
Spiny dogfish															
< 31	–	–	–					–	–	–	–	–	–		0
31–40	–	–	–					–	–	–	–	–	–		0
41–50	–	–	–					–	–	–	–	–	–		0
51–60	–	1	3					–	1	–	–	–	–		5
61–70	–	–	98					2	14	12	1	4	1		132
71–80	–	–	2					–	1	6	–	3	–		13
> 80	–	–	–					–	–	–	–	–	1		1
Total	0	1	103					2	16	18	1	7	2		150

APPENDIX 10: Estimated biomass (t) and CV (%) by stratum for the seven target species for west coast central and west coast South Island areas.

Species codes are given in Appendix 5; bolded codes indicate the target species. Stratum depth ranges are given in Table 1. + indicates less than or equal to 0.5 t. Strata 20 and 21 are only applicable to snapper.

	Species code						
Stratum	**SNA**	**GUR**	**JDO**	**NMP**	**SPD**	**GIZ**	**RCO**
G10M	42	11	6	–	142	–	–
	(75)	(45)	(100)	–	(96)	–	–
G10S	324	34	15	7	16	–	–
	(20)	(37)	(44)	(75)	(51)	–	–
G10X	47	5	7	3	51	–	–
	(85)	(37)	(41)	(73)	(75)	–	–
G50M	96	12	–	–	–	–	–
	(47)	(75)	–	–	–	–	–
H50	263	1	2	–	–	–	–
	(75)	(57)	(41)	–	–	–	–
I25	483	10	–	–	–	–	–
	(26)	(44)	–	–	–	–	–
I50	102	+	2	+	–	–	–
	(64)	(69)	(57)	(100)	–	–	–
J25	102	3	1	–	–	–	–
	(28)	(70)	(20)	–	–	–	–
S10E	394	113	51	1	351	4	–
	(33)	(93)	(37)	(79)	(58)	(100)	–
S10W	6	2	11	–	387	–	–
	(67)	(100)	(32)	–	(73)	–	–
1	116	3	39	2	72	–	–
	(45)	(59)	(78)	(52)	(55)	–	–
2	18	–	4	20	29	–	–
	(100)	–	(61)	(85)	(89)	–	–
5	94	309	24	3	184	–	40
	(39)	(34)	(52)	(93)	(40)	–	(25)
6	44	12	63	18	1 149	11	1
	(48)	(37)	(46)	(51)	(94)	(100)	(100)
7	45	194	23	4	328	4	27
	(29)	(95)	(21)	(69)	(39)	(51)	(99)
8	40	5	12	64	86	28	–
	(79)	(100)	(50)	(22)	(93)	(68)	–
9	–	–	–	28	1	38	–
	–	–	–	(100)	(100)	(48)	–
11	86	328	2	12	181	15	299
	(33)	(22)	(100)	(100)	(51)	(100)	(75)
12	6	3	–	140	105	80	24
	(61)	(100)	–	(22)	(53)	(52)	(49)
13	–	–	–	47	3	26	1
	–	–	–	(60)	(100)	(51)	(100)
14	15	72	–	9	14	31	1
	(65)	(44)	–	(56)	(24)	(38)	(92)
15	–	–	–	43	139	43	1
	–	–	–	(86)	(82)	(90)	(5)
16	–	–	–	39	2	10	5
	–	–	–	(45)	(100)	(100)	(30)
17	799	10	3	–	1	–	–
	(20)	(35)	(5)	–	(100)	–	–
18	769	40	22	–	2	–	1
	(38)	(3)	(35)	–	(100)	–	(100)
19	1 345	100	46	10	257	–	–
	(37)	(47)	(34)	(88)	(52)	–	–
20	528	–	–	–	–	–	–
	(53)	–	–	–	–	–	–
21	832	–	–	–	–	–	–
	(36)	–	–	–	–	–	–