Seafloor Community Classification: Group descriptions

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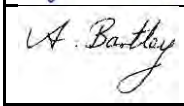	Formatting checked by:	Alison Bartley
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Executive summary

In New Zealand, ongoing work to improve scientific inputs to decision-making associated with implementing marine protection is supported by a MPA research programme funded by the Department of Conservation's Biodiversity 2018 Programme and with the advice of an interagency MPA Science Advisory Group. DOC commissioned the development of a fit-for-purpose, numerical environmental classification of the marine environment, to support ongoing MPA planning and reporting at a national scale, and to complement work mapping Key Ecological Areas for New Zealand.

Gradient Forest models were used to analyse and predict spatial patterns of compositional turnover for species in each of four biotic groups, i.e., demersal fish, reef fish, benthic invertebrates and macroalgae. These four turnover models were then combined to derive estimates of combined compositional turnover along environmental gradients. Associated uncertainty estimates were also produced. Finally, the combined compositional turnover was hierarchically classified to a 30-, 50-, 75- and 100- group level (inferred species community groups) to the outer edge of the New Zealand Exclusive Economic Zone (EEZ – we refer to this area as the New Zealand marine environment. Here we provide a detailed description of a 75-group classification – termed the 'New Zealand Seafloor Community Classification' (SCC) – including information on the location of the SCC group within the New Zealand marine environment, its characterising environmental conditions and taxonomic assemblages, and a summary of confidence that can be placed on the information for each group based on several estimates of model uncertainty.

Background

In New Zealand, ongoing work to improve scientific inputs to decision-making associated with implementation of marine protection is supported by a DOC MPA research programme. This programme is undertaken with the advice of a Marine Protected Areas Science Advisory Group (MSAG). The MSAG includes representatives from the Department of Conservation (DOC), Ministry for the Environment (MfE) and Fisheries New Zealand (FNZ). Environmental classifications are often an important descriptor of biodiversity that can be used in the design of MPAs, by providing information on the distribution of biophysical habitats that can be used to set the boundaries of protection, appraise representativeness, and to prioritise spatial management for areas of high ecological value. Previous New Zealand environmental classifications have been found to be limited in terms of their utility for MPA planning at a national scale. Thus, DOC, on advice from the MSAG, commissioned development of a fit-for-purpose numerical environmental classification for use in ongoing MPA planning and reporting at a national scale. The classification also provides essential support for delivering the goal to develop a representative network of MPAs (objective 10.6.3 of the New Zealand Biodiversity strategy, Department of Conservation (2020)) and complements work to develop Key Ecological Areas mapping for New Zealand (Stephenson et al. 2018; Lundquist et al. 2020).

Gradient Forest (GF) models were used to analyse and predict spatial patterns of compositional turnover for several biotic groups that characterise seafloor communities (demersal fish, reef fish, benthic invertebrates and macroalgae) based on methods by Ellis et al. (2012); Pitcher et al. (2012). Individual turnover models from each biotic group were combined to represent a 'combined' compositional turnover of seafloor communities, which was then classified at various hierarchical levels (30-, 50-, 75- and 100-groups, representing inferred communities). Following advice from the MSAG, the final 75-group classification, referred to as the New Zealand 'Seafloor Community Classification' (SCC), was developed by Stephenson et al. (2020a) (Figure 1).

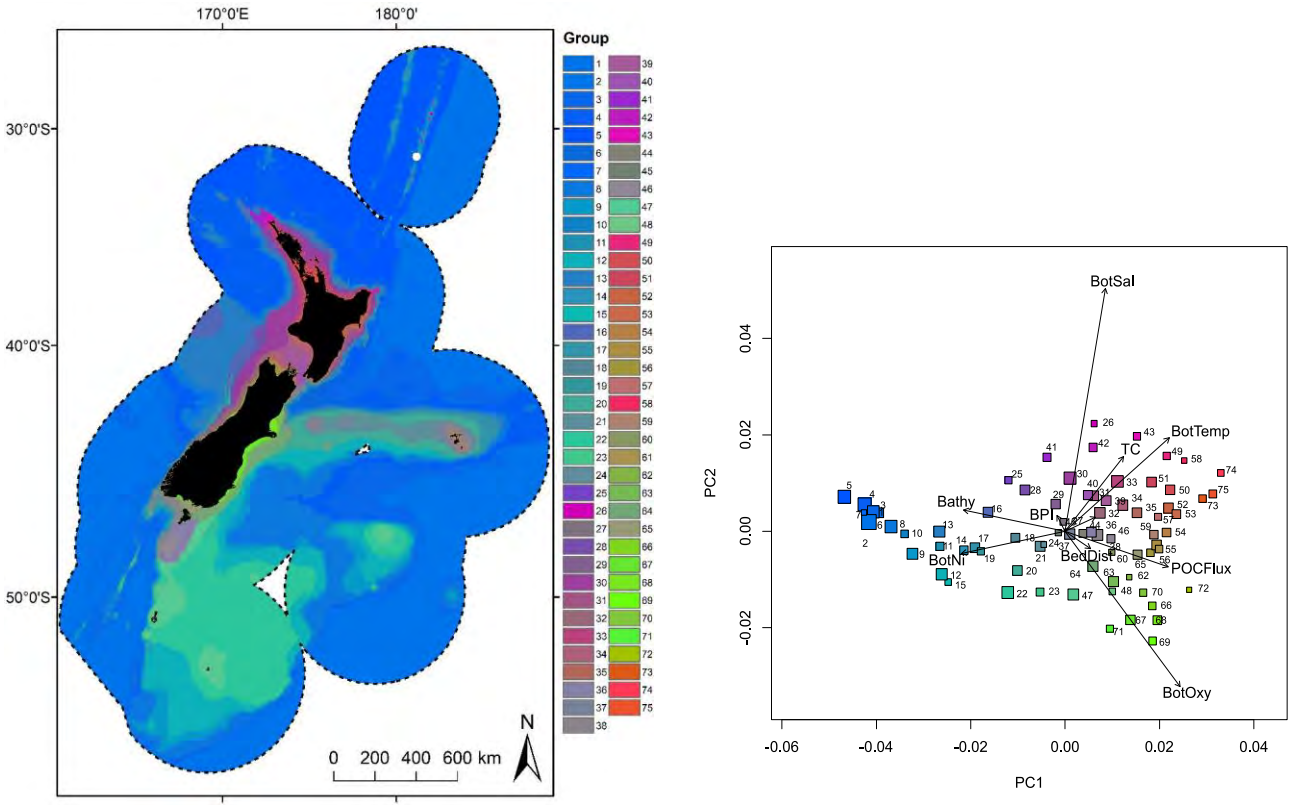

Figure 1: Distribution in geographic and PCA space of the Seafloor Community Classification (75 groups). Transformations were derived from 'combined' bootstrapped Gradient Forest model described in Stephenson et al. 2020. Colours are based on the first three axes of a PCA analysis applied to the group means for each of the transformed predictor variables, so that similarities/differences in colour correspond broadly to intergroup similarities/differences with respect to the transformed environmental variables. (a) Geographic distributions of groups in the New Zealand marine environment (EEZ shown as dashed line). (b) distributions of groups in PCA space, with vectors indicating correlations with the eight most important environmental predictors and symbol/font size indicating the relative extent of the group area.

Summary: New Zealand Seafloor Community Classification (SCC)

At broad spatial scales, SCC groups were differentiated primarily according to physical factors such as depth and bottom temperature (broadly, PC1 of Figure 1 B). Environmental differences among groups in deep water (approx. deeper than 1500 m, groups 1 – 19) were relatively muted, but greater environmental differences were evident among groups at intermediate depths (approx. 200 – 1500 m, group 20 – 48), particularly with respect to bottom temperature, bottom oxygen concentration and bottom salinity (broadly, PC2, Figure 1b). There were more pronounced environmental differences among groups at intermediate depths which were aligned with well-defined oceanographic patterns observed in New Zealand's oceans. For example, there was a clear latitudinal separation along the boundaries of the Subtropical Front (STF, Figure 2), a highly productive zone of mixing between high salinity, nutrient poor, warm, northern waters, and low salinity, nutrient rich, cold, southern waters (Bradford-Grieve et al. 2006; Stephenson et al. 2020c) (Figure 1b). Intermediate depth groups to the north of the STF included groups 27-35 and 41-43 and south of the STF included groups 20-23, 36-40 and 46- 48. Environmental differences were further pronounced at shallow depths (approx. shallower than 200 m, groups 49 -75), where variation in more localised environmental conditions such as productivity (downward vertical flux of particulate

organic matter at the seabed; POCFlux), seafloor topography (slope), benthic sediment disturbance and tidal currents were important differentiating factors (Figure 1b). As with previous classifications constructed from estimates of compositional turnover (e.g., Stephenson et al. 2020c), environmental similarities in SCC groups were closely mirrored by their biological compositions. For further details on environmental and biotic data, and the modelling methods used to estimate compositional turnover, see Stephenson et al. (2020a).

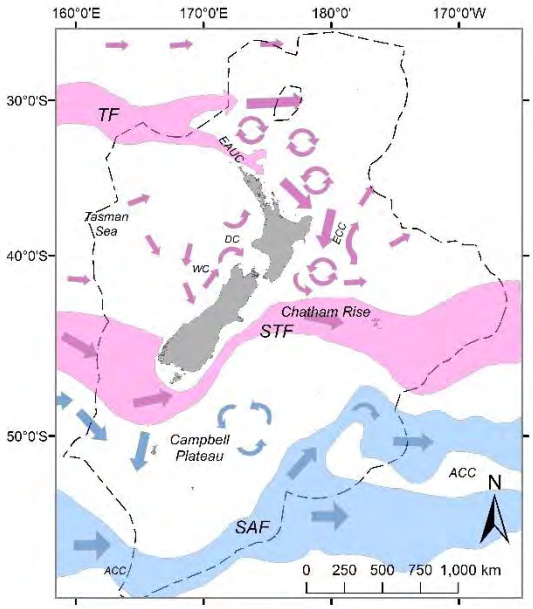

Figure 2: Approximate positions and direction of travel of water currents within the wider New Zealand Extended Continental Shelf. Tasman Front (TF and its associated currents) The east Auckland Current (EAUC) and East Cape Current (ECC) in the north-east, and the Westland Current (WC) and D'Urville Current (DC) in the West of the study area), Subtropical Front (STF) and Subantarctic Front (SAF and the Antarctic Circumpolar Current (ACC)). Adapted from Stephenson et al. (2018).

Individual Seafloor Community Classification group descriptions

Here we present individual group descriptions for the Seafloor Community Classification. This includes the location of the SCC group within the New Zealand marine environment; information on environmental characteristics; description of species' assemblages; and a summary of model uncertainty.

Descriptions of each group's environmental characteristics were provided by calculating the mean for each overlapping environmental variable layer (Stephenson et al. 2020c). Here, a subset of the available environmental variables is presented (termed "characterising environmental conditions"). The subset is a qualitative selection of the environmental variables that best distinguishes between closely related groups. The mean and range (25% quantile and 75% quantile) for all environmental variables for each group are available in the excel file: Summary_info_SCC).

Descriptions of each group's biological characteristics were provided by calculating mean frequency occurrence of each taxa within SCC groups as well as calculating the contribution of individual taxa to intra-group similarity (SIMPER analysis using Bray-Curtis similarity, in PRIMER v7.0.13) (Stephenson et al. 2020c). Characterising species were defined as those species contributing more than 4% to the SIMPER intra-group similarity (Clarke & Warwick 2001). Mean frequency occurrence of all taxa sampled within each group are available in the excel file: Mean_Taxa_Occ_SCC. Demersal fish species

were sampled using bottom trawls. Benthic invertebrate genera were sampled using a variety of sampling gear types. These databases also included records for demersal cephalopod species but for simplicity we refer to records of 'benthic invertebrates'. In order to account for differences in sampling parameters, gear types were grouped into catchability categories (Table 1); here, information for benthic invertebrate genera are reported for four combinations of these 'catchability' categories:

- Large gear types, deployed over large and moderate areas, which were not selective (e.g., otter trawls, beam trawls, code: LLG.LMG).
- Medium sized gear types, deployed over medium sized areas, which were not selective (e.g., benthic sled, code: MMG).
- Small gear types, deployed over medium sized areas, which were not selective (e.g., Devonport dredge, code: SMG).
- Small gear types, deployed over small areas, which were not selective (e.g., box corer, code: SSG).

Macroalgae occurrence records were sourced from herbarium records, opportunistic data and observational datasets. Reef fish species were obtained from SCUBA dives made around the coast of New Zealand. There was some overlap in the species sampled between demersal and reef fish groups. See Stephenson et al. 2020 for further information regarding biological samples.

Table 1: Categories used to reflect catchability of sampling gear types. Table from Stephenson et al. (2020a)

Type	Category	Description	Example
Gear size	Small	< 1m	Devonport dredge
	Medium	1-3m	Benthic sled
	Large	> 3m	Otter trawls
Deployment area	Small	< 1m	Box corer
	Medium	10 s – 100 s m	Beam trawls
	Large	> 1 km	Otter trawls
Selectivity	HS	Highly selective	Collected by hand
	G	General	Benthic sled

The number of samples available within each group provides an indication of how 'complete' the biological descriptions for each group are likely to be (as well as a measure of confidence that the listed characterising species are likely to be truly characterising species). Note that sample number for macroalgal and reef fish assemblages should only be considered a measure of completeness for groups with mean water depths less than approx. 30 m (e.g., because sampling was restricted to these shallower depths due to sampling method, i.e., SCUBA).

Finally, as a measure of model confidence, the mean uncertainty estimate of the 'combined' compositional turnover (standard deviation (SD)) and the environmental coverage were calculated for each classification group. The environmental coverage provides an indication of which areas of the biotic groups' estimated compositional turnover was likely to have been extrapolated into unsampled space, i.e., where there is limited sampling to validate the predicted relationships (Stephenson et al. 2020b). Standard deviation of the 'combined' compositional turnover provides an important indication of the variability in the modelling estimates (Leathwick et al. 2006). However,

given that model estimates of 'combined' compositional turnover will only vary in areas where samples are present, we suggest that the uncertainty associated with individual groups first be assessed by examining the number of samples and environmental coverage values. Where these values are moderate to high, the SD of 'combined' compositional turnover will provide further insight into the variability (and therefore the confidence) of the underlying models used for the classification. Lower confidence can be placed in groups with low environmental coverage estimates; conversely higher confidence can be placed in groups with low SD of the 'combined' compositional turnover. The mean and range (25% quantile to 75% quantile) for uncertainty measures for each group are available in the excel file: Summary_info_SCC).

To facilitate communication of environmental characteristics and uncertainty (both in terms of biological sampling distribution (sample number) and model confidence), qualitative descriptions are provided (defined in Table 2 and Table 3). For all environmental variables except bathymetry and uncertainty metrics except sample size, cut-offs for low and high categories were determined by the 1st and 2nd quantiles of values respectively, with the moderate category falling between these. The quantile cut offs were established based on appraising the distribution of the range of group values for each variable/metric using histograms. The quantiles were cut offs that allowed the classification of the largest number of variables. For the metric reporting sample size, cut offs for the low and high category were based on the 2nd quantile and the mean value, respectively, with the moderate category falling between these. An important consideration for the qualitative description of these metrics is that they are relative. That is, "high" uncertainty (SD) of the compositional turnover is in fact relatively low compared to the values of estimated compositional turnover (Stephenson et al. 2020a), but is higher than groups with "moderate" standard deviation of the compositional turnover. For bathymetry, cut off where defined based on common qualitative categorisations of NZs marine environment; deep (>2000 m), intermediate (>200 m), shelf (>50 m) and shallow (<50 m).

Table 2: Unit, abbreviation, range and relative qualitative description for characterising environmental variables. For a full list of environmental variables and ranges, see Stephenson et al. 2020

Environmental variable	Abbreviation	Unit	Range	Low	Moderate	High
Bottom silicate	BotSil	µmol L^{-1}	1.562 - 121.657	<5	5 – 40	>40
Dissolved oxygen at depth	BotOxy	mg L^{-1}	3.505 - 6.579	<5	5 – 6	>6
Bottom nitrate	BotNi	µmol L^{-1}	0.516 - 36.454	<6	6 – 20	>20
Slope	Slope	°	0.174 - 17.19	<1.0	1 – 3	>3
Temperature at depth	BotTemp	°C	1.374 - 17.44	<8	8 – 12.5	>12.5
Downward vertical flux of particulate organic matter at the seabed	POCFlux	mg C m^{-2} d^{-1}	2.314 - 72.942	<30	30 – 45	>45
Salinity at depth	BotSal	psu	33.63 - 35.561	<34.5	34.5 – 35	>35
Benthic sediment disturbance	BedDist	m s^{-1}	0 - 0.09	<0.005	0.005 – 0.02	>0.02
Chlorophyll *a* concentration spatial gradient	Chl-a.Grad	mg m^{-3} m^{-1}	0 - 0.332	<0.01	0.01 – 0.05	>0.05
Annual amplitude of sea floor temperature	SeasTDiff	°C	0 - 5.838	<0.1	0.1 – 2	>2
Sea surface temperature gradient	SSTGrad	°C	0.004 - 0.972	<0.02	0.02 – 0.1	>0.1

Detrital absorption	DET	m^{-1}	0.008 - 0.43	<0.03	0.03 – 0.1	>0.1
Tidal current	TC	m s^{-1}	0.014 - 0.574	<0.075	0.075 – 0.2	>0.2
Benthic position index (broad)	BPI	m	(-1121.4) – 2018.6	< (-58.2)	(-58.2) – 118.1	> 118.1
Turbidity	Turbidity		0.001 – 0.073	<0.003	0.003 – 0.012	> 0.012

Table 3: Range and relative qualitative description (low, moderate, high confidence) for measures of completeness (sample number) and model confidence (SD: standard deviation of the 'combined' compositional turnover and environmental coverage).

Metric	Low	Moderate	High
Sample size	< 13	13 – 194	> 194
SD	> 0.003	0.002 – 0.003	< 0.002
Environmental coverage	< 0.09	0.09 – 0.45	> 0.45

Group descriptions

1 Group 1

1.1 Geographic location

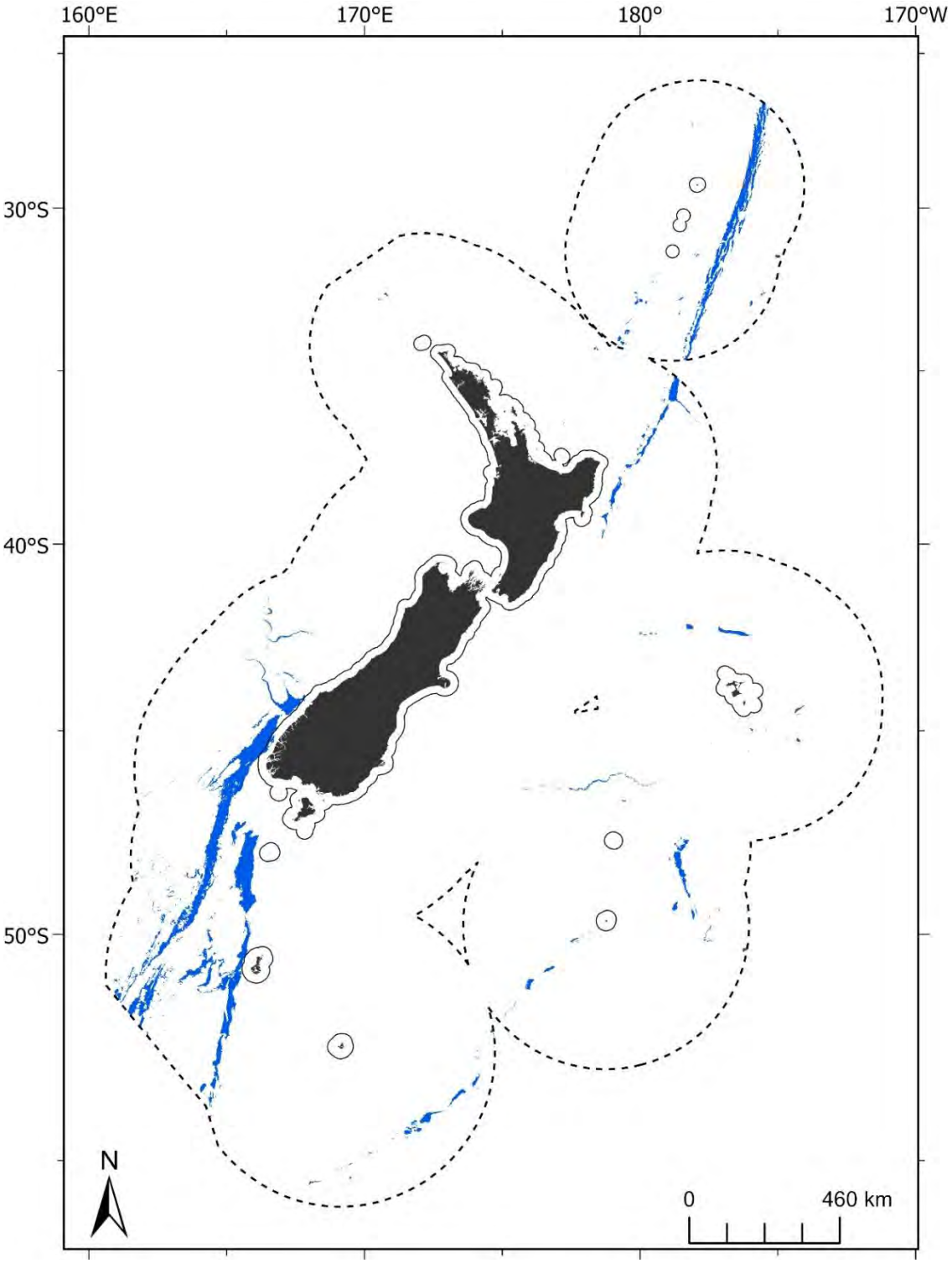

Figure 3: Geographic distribution of group 1 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

1.2 Group description

Group 1 is a widespread group (Figure 3) occurring in deep, cold waters with steep troughs/slopes, including the Kermadec and Puysegur trenches (Table 4). Other environmental variables show little variation reflecting the homogenous environmental conditions generally prevailing at these depths. This group has no characterising species due to the lack of, or very low, sampling effort across taxa (Table 5). Environmental coverage is low for each taxa (low confidence in modelled relationships, Table 6); care should be taken if using this group to inform management decisions.

1.3 Similar groups

Loosely related to groups 2 and 3.

1.4 Characterising environmental conditions

Table 4: Group 1 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	4156.33 m	Deep water
Slope	9.09 °	High slope
Bottom silicate	116.49 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	4.43 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	1.37 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	4.07 mg C m^{-2} d^{-1}	Low productivity

1.5 Characterising species

Table 5: Species name, mean frequency occurrence and % contribution to group 1 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as *na*.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	0	0	*na*	*na*	*na*	*na*
	MMG**	1	2	*na*	*na*	*na*	*na*
	SMG**	1	1	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		*0*	0	*na*	*na*	*na*	*na*
Macroalgae*		*0*	0	*na*	*na*	*na*	*na*
Reef fish*		*0*	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

1.6 Uncertainty ranges

Table 6: Mean uncertainty values for group 1 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	High	0.007	Low
Demersal fish	0.003	High	0.003	Low
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	High	0.004	Low

2 Group 2

2.1 Geographic location

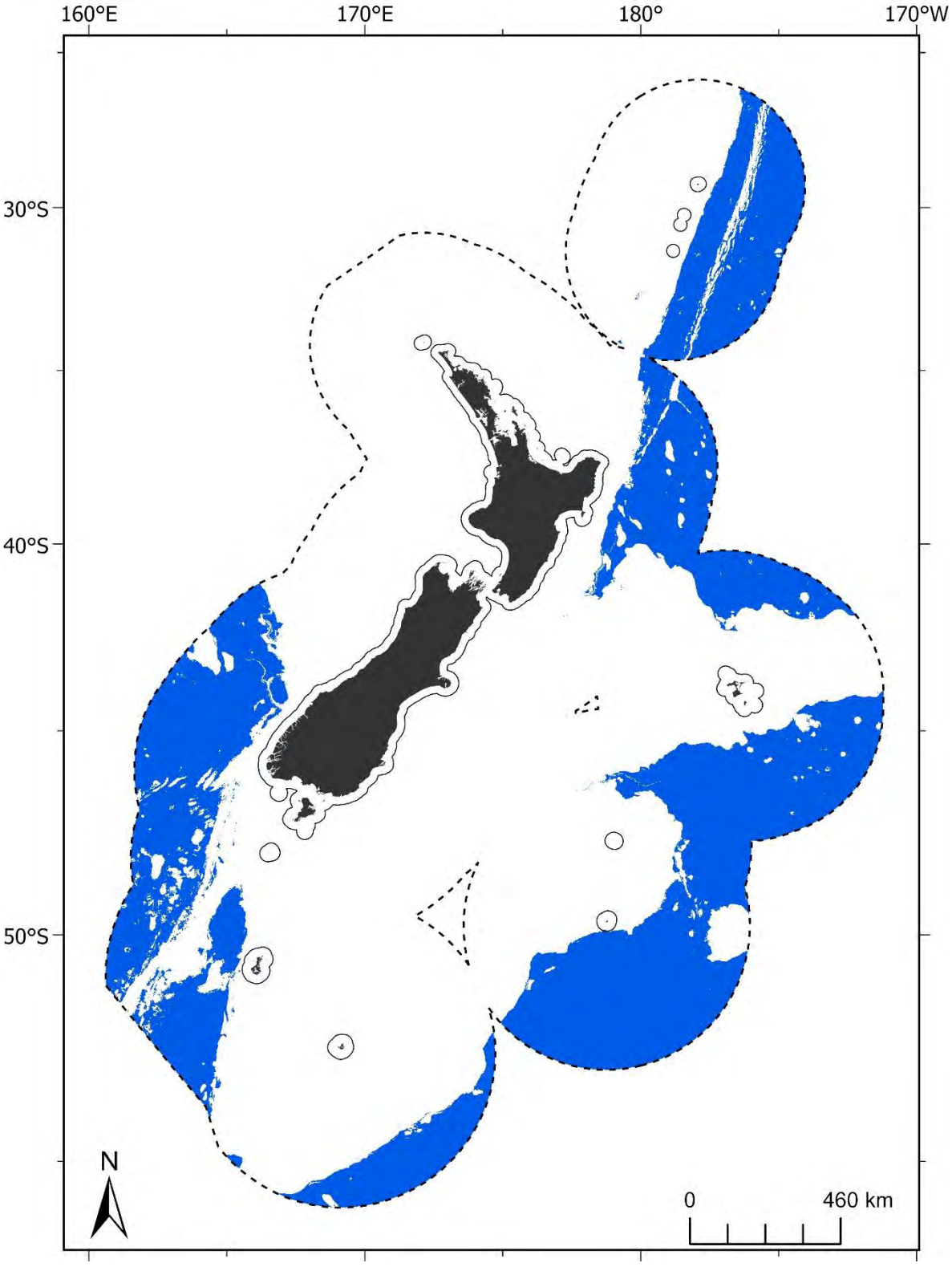

Figure 4: Geographic distribution of group 2 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

2.2 Group description

Group 2 is a large, widespread group (Figure 4) occurring in deep, cold waters on abyssal plains (Table 7). Other environmental variables show little variation reflecting the homogenous environmental conditions generally prevailing at these depths, with low oxygen, temperature and low productivity. This group is characterised solely by a genus of shrimp . (sampled in LLG.LMG gear types, Table 8) due to low sampling for other benthic invertebrate gear types and a lack of sampling for other biotic groups. Due to the low sample number, environmental coverage is very low and care should be taken if using this group to inform management decisions (Table 9).

2.3 Similar groups

Closely related to group 3; more loosely related to group 1.

2.4 Characterising environmental conditions

Table 7: Group 2 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	3600 m	Deep water
Bottom silicate	108.71 µmol L-1	High concentrations of silicate at depth
Dissolved oxygen at depth	4.63 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	1.42 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	3.2 mg C m^{-2} d^{-1}	Low productivity

2.5 Characterising species

Table 8: Species name, mean frequency occurrence and % contribution to group 2 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	9	4	*Gennadas*	Shrimp	0.22	100
	MMG**	1	6	*na*	*na*	*na*	*na*
	SMG**	1	3	*na*	*na*	*na*	*na*
	SSG**	1	1	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

2.6 Uncertainty ranges

Table 9: Mean uncertainty values for group 2 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.005	Low
Demersal fish	0.003	Moderate	0.002	Low
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.003	Low

3 Group 3

3.1 Geographic location

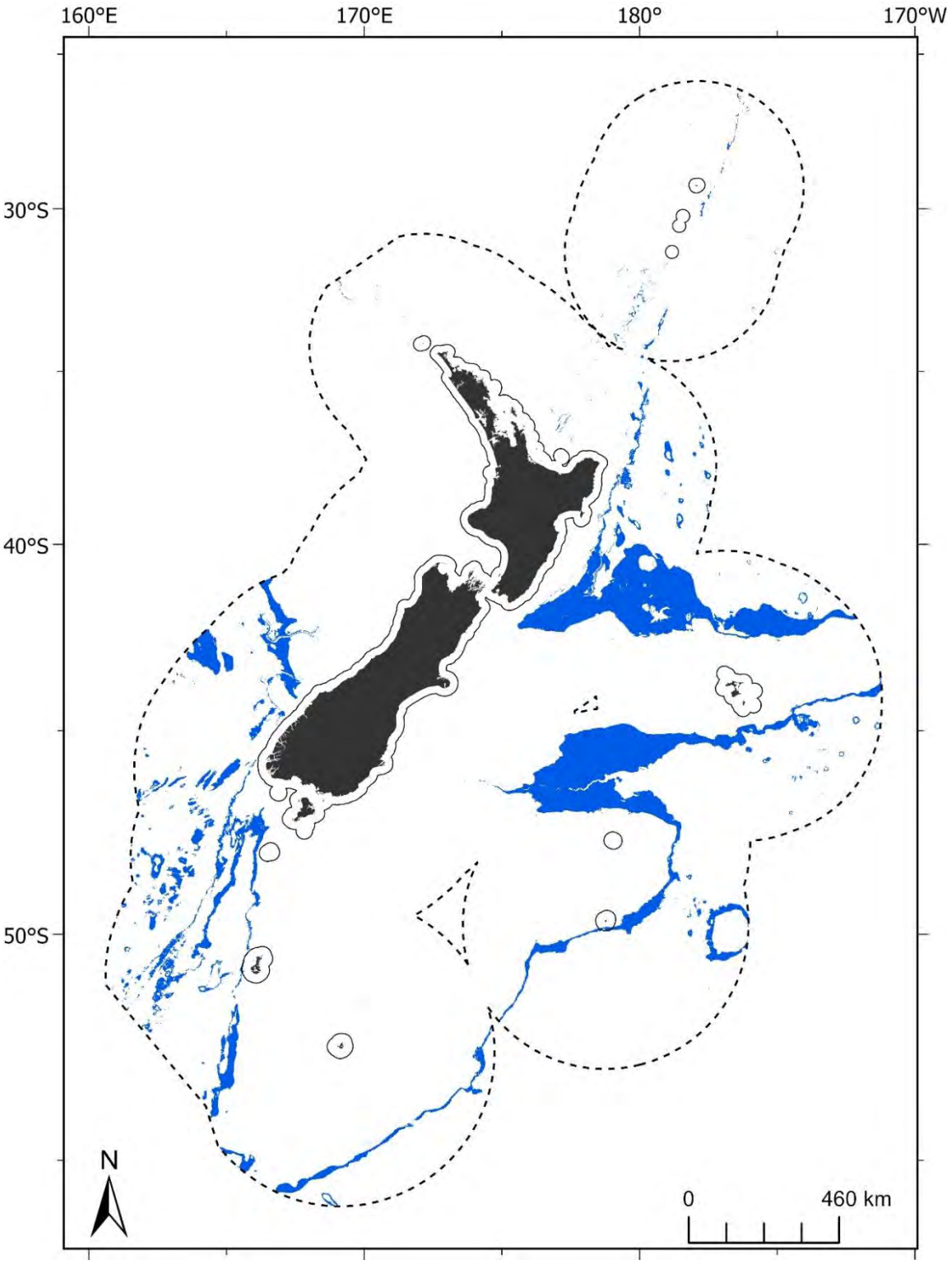

Figure 5: Geographic distribution of group 3 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

3.2 Group description

Group 3 is a large, widespread group (Figure 5) which occurs in very deep, cold waters in steep troughs/slopes with low dissolved oxygen at depth and low productivity, including the deeper parts of the Bounty and Hikurangi troughs (Table 10). Other environmental variables show little variation reflecting the homogenous environmental conditions generally prevailing at these depths. This group is characterised by high frequency occurrence of squid and brittle star, and moderate occurrence of two squat lobster species (Table 11). The demersal fish are represented by very high frequency occurrence of tubeshoulder and lightfish, and high frequency occurrence of other oreo and deep-sea Demersal fish assemblages. This group has a low number of benthic invertebrate samples, demersal fish samples and no sampling for macroalgae or reef fish. Environmental coverage is low for all biotic groups (low confidence in modelled relationships, Table 12); care should be taken if using this group to inform management decisions.

3.3 Similar groups

Closely related to group 2; more loosely related to group 1.

3.4 Characterising environmental conditions

Table 10: Group 3 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	2540 m	Deep water
Slope	4.85 °	High slope
Bottom silicate	94.74 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	4.36 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	1.9 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	6.73 mg C m^{-2} d^{-1}	Low productivity

3.5 Characterising species

Table 11: Species name, mean frequency occurrence and % contribution to group 3 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	27	35	*Brachioteuthis*	Squid	0.41	91.49
	MMG	17	68	*Ophiura*	Brittle star	0.29	30.49
				Munidopsis	Squat lobster	0.24	14.77
				Munida	Squat lobster	0.24	9.97
				Ophiactis	Brittle star	0.18	5.57
	SMG**	1	1	*na*	*na*	*na*	*na*
	SSG**	1	1	*na*	*na*	*na*	*na*
Demersal fish		6	38	*Persparsia kopua*	Tubeshoulder	0.5	19.33
				Phosichthys argenteus	Lightfish	0.5	19.33
				Lepidorhynchus denticulatus	Javelinfish	0.33	6.36
				Allocyttus niger	Black oreo	0.33	5.15
				Deania calcea	Shovelnose spiny dogfish	0.33	5.15
				Etmopterus baxteri	Lantern shark	0.33	5.15
				Pseudocyttus maculatus	Smooth oreo	0.33	5.15
				Argyropelecus hemigymnus	Hatchetfish	0.33	4.91
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

3.6 Uncertainty ranges

Table 12: Mean uncertainty values for group 3 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.011	Low
Demersal fish	0.003	Moderate	0.004	Low
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.004	Low

4 Group 4

4.1 Geographic location

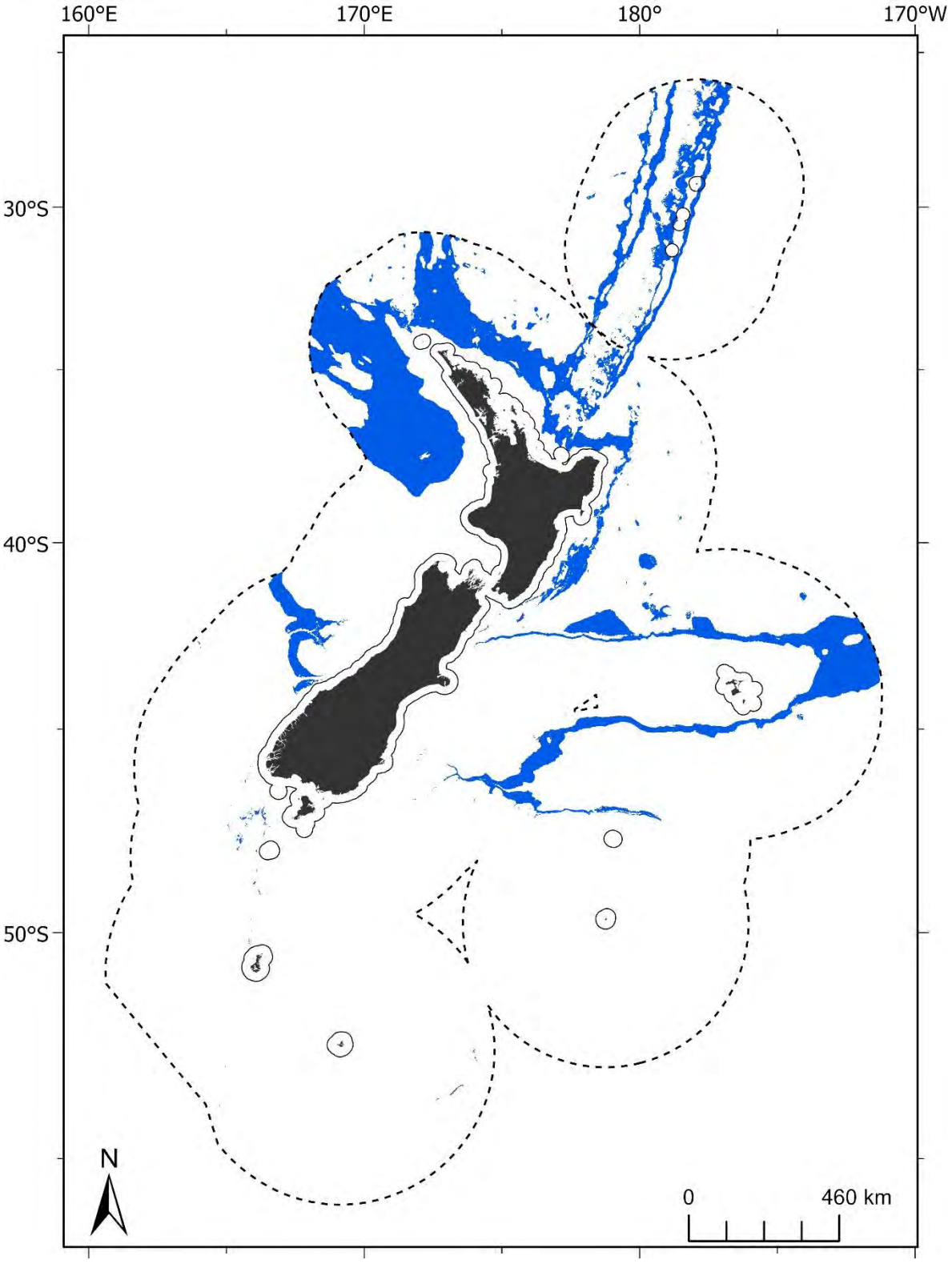

Figure 6: Geographic distribution of group 4 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

4.2 Group description

Group 4 occurs in deep, cold waters with steep troughs/slopes, predominantly north of the Subtropical Front (Figure 6), including parts of the New Caledonia Trough, in waters with low concentrations of oxygen at depth and low productivity (Table 13). Other environmental variables show little variation reflecting the homogenous environmental conditions generally prevailing at these depths. Benthic invertebrate assemblages are characterised by brittle and sea star genera several coralspolychaetes (Table 14). Demersal fish are characterised by very high frequency occurrence of orange roughy, basketwork eels and slickheads (Table 14). This group has a high number of benthic invertebrate samples, a moderate number of demersal fish samples and no sampling for macroalgae or reef fish. Environmental coverage is low or very low across biotic groups (Table 15); care should be taken if using this group to inform management decisions.

4.3 Similar groups

Closely related to group 5; more loosely related to group 6.

4.4 Characterising environmental conditions

Table 13: Group 4 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	1798 m	Deep water
Slope	2.66 °	Moderate slope
Bottom silicate	101.25 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	3.6 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	2.61 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	10.21 mg C m^{-2} d^{-1}	Low productivity

4.5 Characterising species

Table 14: Species name, mean frequency occurrence and % contribution to group 4 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	109	210	*Onykia*	Squid	0.25	41.1
				Opisthoteuthis	Octopus	0.16	6.57
				Enypniastes	Sea cucumber	0.16	4.42
	MMG	83	222	*Ophiomusa*	Brittle star	0.47	32.4
				Pectinaster	Sea star	0.16	7.03
				Ophiactis	Brittle star	0.27	5.2
				Porcellanaster	Sea star	0.14	5.13
				Munida	Squat lobster	0.23	4.74
				Ophiacantha	Brittle star	0.24	4.28
	SMG	57	50	*Solenosmilia*	Coral	0.32	35.01
				Desmophyllum	Stony coral	0.19	16.05
				Bentharca	Bivalve	0.11	8.21

				Ophiomusa	Brittle star	0.12	7.23
				Narella	Coral	0.12	6.87
	SSG	11	9	*Linopherus*	Polychaete	0.82	50.48
				Prionospio	Polychaete	0.82	43.65
Demersal fish		64	102	*Hoplostethus atlanticus*	Orange roughy	0.61	18.46
				Diastobranchus capensis	Basketwork eel	0.56	11.54
				Alepocephalus antipodianus	Bog scaled slickhead	0.55	10.12
				Alepocephalus australis	Small scaled slickhead	0.5	8.33
				Halargyreus johnsonii	Cod	0.44	5.86
				Coryphaenoides murrayi	Rattail	0.41	5.76
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

4.6 Uncertainty ranges

Table 15: Mean uncertainty values for group 4 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.028	Low
Demersal fish	0.003	Moderate	0.006	Low
Macroalgae	0	High	0.0	Low
Reef fish	0	High	0.0	Low
Combined	0.002	Moderate	0.006	Low

5 Group 5

5.1 Geographic location

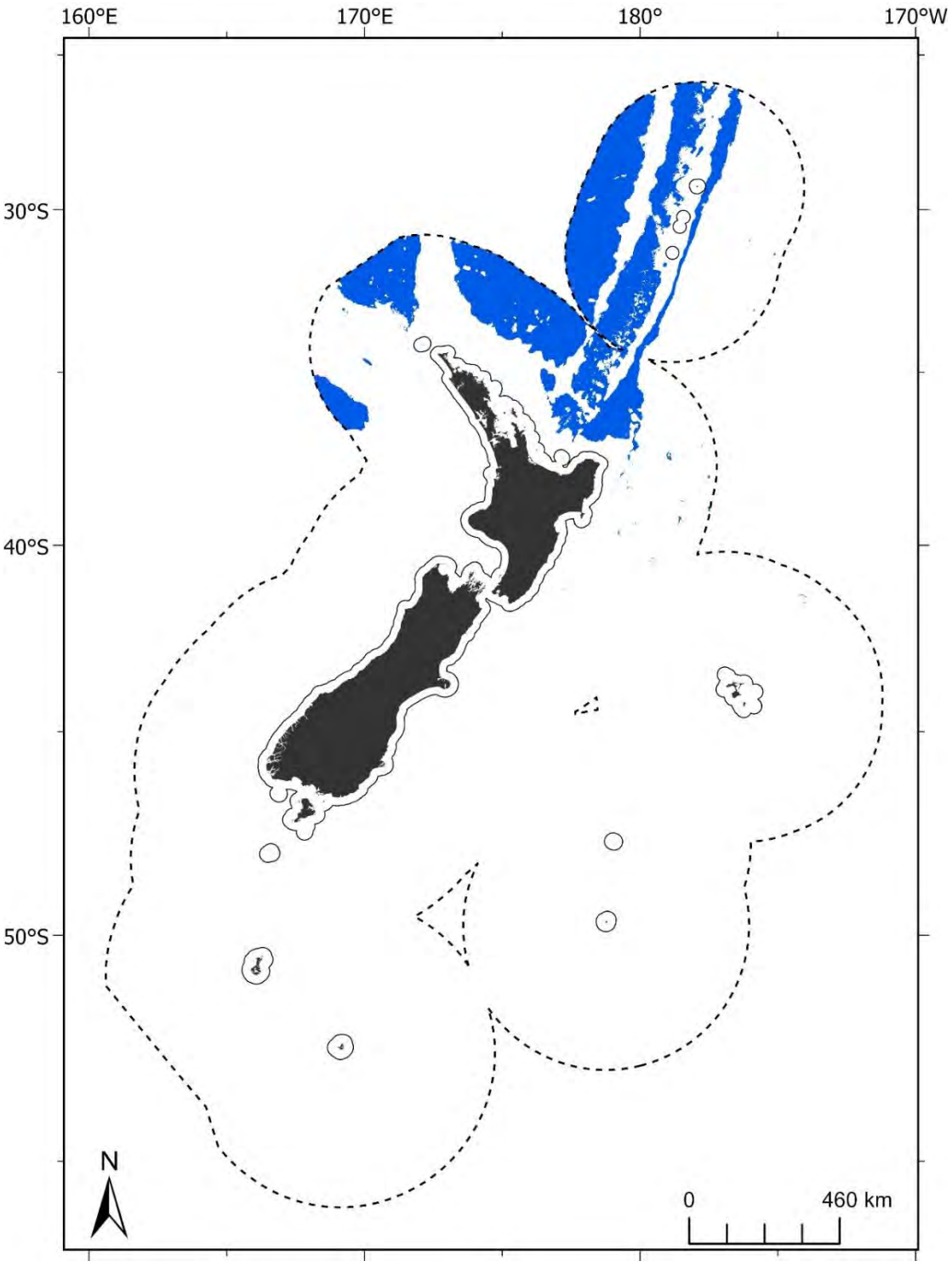

Figure 7: Geographic distribution of group 5 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

5.2 Group description

Group 5 (Figure 7) occurs in very deep, cold waters north of the Subtropical Front on low relief plains, including the South Norfolk Basin and the southern part of the South Fiji Basin, characterised by high nitrate, low oxygen and low productivity (Table 16). Other environmental variables show little variation reflecting the homogenous environmental conditions generally prevailing at these depths. Species assemblages are characterised by high frequency occurrence of brittle star, and lower frequency occurrence of shrimps, bivalves, hydrozoans and sponges (Table 17). This group has a low number of benthic invertebrate samples and no samples for the three other biotic groups. Environmental coverage is low for all taxa (low confidence in modelled relationships, Table 18); care should be taken if using this group to inform management decisions.

5.3 Similar groups

Closely related to group 4; more loosely related to group 6.

5.4 Characterising environmental conditions

Table 16: Group 5 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	2657 m	Deep water
Bottom silicate	121.66 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	3.51 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	2.03 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	5.67 mg C m^{-2} d^{-1}	Low productivity
Bottom nitrate	36.45 µmol L^{-1}	High concentrations of nitrate at depth

5.5 Characterising species

Table 17: Species name, mean frequency occurrence and % contribution to group 5 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	10	30	*Gennadas*	Shrimp	0.2	60.02
				Acryptolaria	Hydrozoan	0.2	9.23
				Hyalonema	Sponge	0.2	9.23
	MMG	13	53	*Ophiura*	Brittle star	0.46	69.14
				Bentharca	Bivalve	0.23	6.77
	SMG**	3	3	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

5.6 Uncertainty ranges

Table 18: Mean uncertainty values for group 5 by biotic group and 'combined'

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.006	Low
Demersal fish	0.003	Moderate	0.001	Low
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.001	Low

6 Group 6

6.1 Geographic location

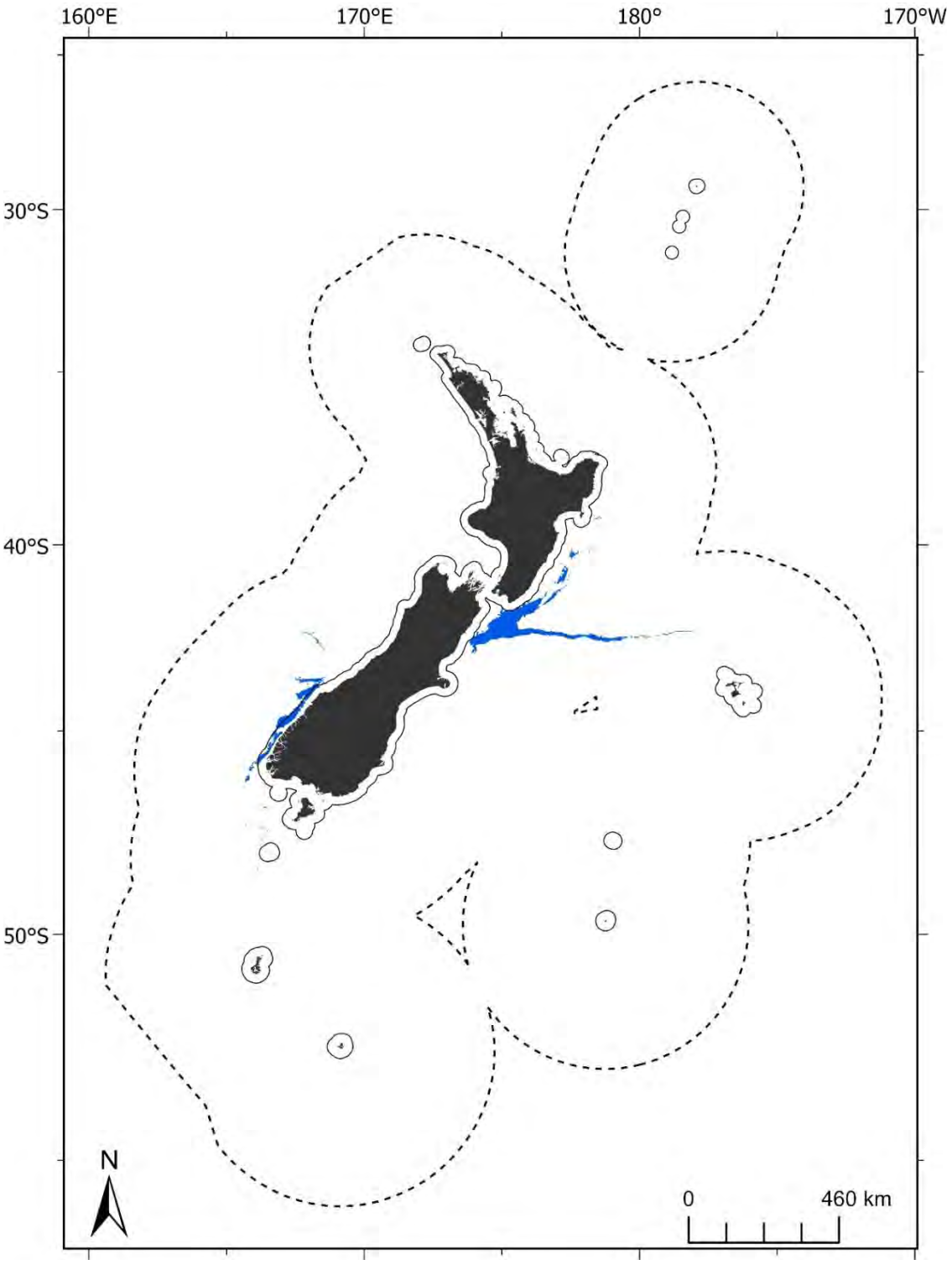

Figure 8: Geographic distribution of group 6 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

6.2 Group description

Group 6 occurs in very deep, cold waters with steep troughs/slopes predominately north of the Subtropical Front along the shelf breaks near mainland New Zealand (Figure 8). Group 6 is characterised by high silicate, low oxygen and low productivity (Table 19). Benthic invertebrate species assemblages are characterised by high frequency occurrence of squid, a genus of urchin, and lower frequency crustacea (Table 20). This group has a moderate number of benthic invertebrate samples from LLG.LMG gear types, but a low number of samples from all other gear types and demersal fish, and no samples for macroalgae or reef fish. Despite the group's proximity to shore, the environmental coverage is low for all taxa (low confidence in modelled relationships, Table 21); care should be taken if using this group to inform management decisions.

6.3 Similar groups

Loosely related to groups 4 and 5.

6.4 Characterising environmental conditions

Table 19: Group 6 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	2128 m	Deep water
Slope	6.09 °	High slope
Bottom silicate	97.02 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	3.81 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	2.29 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	11.27 mg C m^{-2} d^{-1}	Low productivity

6.5 Characterising species

Table 20: Species name, mean frequency occurrence and % contribution to group 6 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	31	56	*Brachioteuthis*	Squid	0.48	95.97
	MMG	11	59	*Brucerolis*	Isopod	0.18	31.45
				Plutonaster	Sea star	0.27	26.56
				Nematocarcinus	Crab	0.18	20.97
	SMG**	2	6	*na*	*na*	*na*	*na*
	SSG	2	5	*Brissopsis*	Sea urchin	1	100
Demersal fish**		2	21	*na*	*na*	*na*	*na*
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

6.6 Uncertainty ranges

Table 21: Mean uncertainty values for group 6 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.089	Low
Demersal fish	0.004	Low	0.03	Low
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.029	Low

7 Group 7

7.1 Geographic location

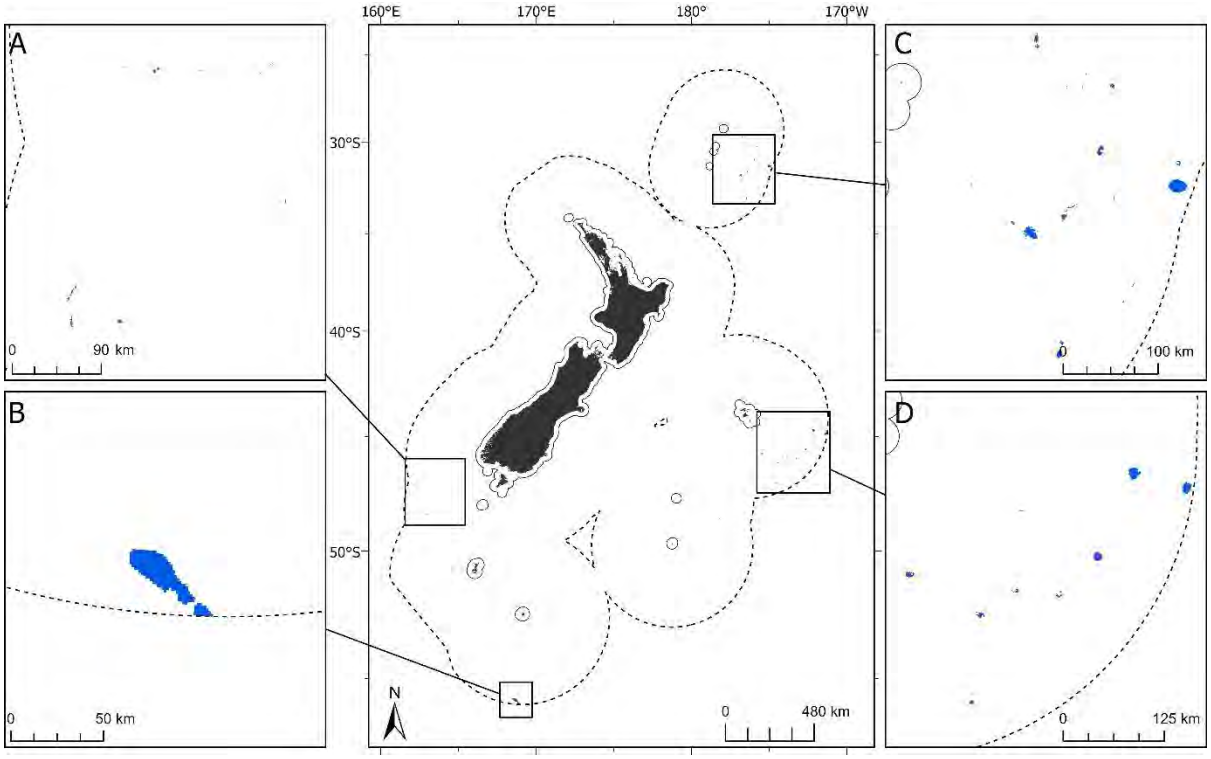

Figure 9: Geographic distribution of group 7 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

7.2 Group description

Group 7 is a widespread, patchy group (Figure 9) occurring in very deep, cold water on the steep seamounts with high silicate and low oxygen concentrations and productivity (Table 22). This group has no characterising species (Table 23) due to no, or very low sampling. The environmental coverage is low for each biotic group (low confidence in modelled relationships, Table 24); care should be taken if using this group to inform management decisions.

7.3 Similar groups

Loosely related to but distinct from other deep-water groups.

7.4 Characterising environmental conditions

Table 22: Group 7 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	3039 m	Deep water
Slope	11.45 °	High slope
Bottom silicate	110.37 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	4.55 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	1.48 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	2.31 mg C m^{-2} d^{-1}	Low productivity

7.5 Characterising species

Table 23: Species name, mean frequency occurrence and % contribution to group 7 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	0	0	*na*	*na*	*na*	*na*
	MMG**	1	26	*na*	*na*	*na*	*na*
	SMG*	0	0	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

7.6 Uncertainty ranges

Table 24: Mean uncertainty values for group 7 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.057	Low
Demersal fish	0.003	Moderate	0.006	Low
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.003	Moderate	0.008	Low

8 Group 8

8.1 Geographic location

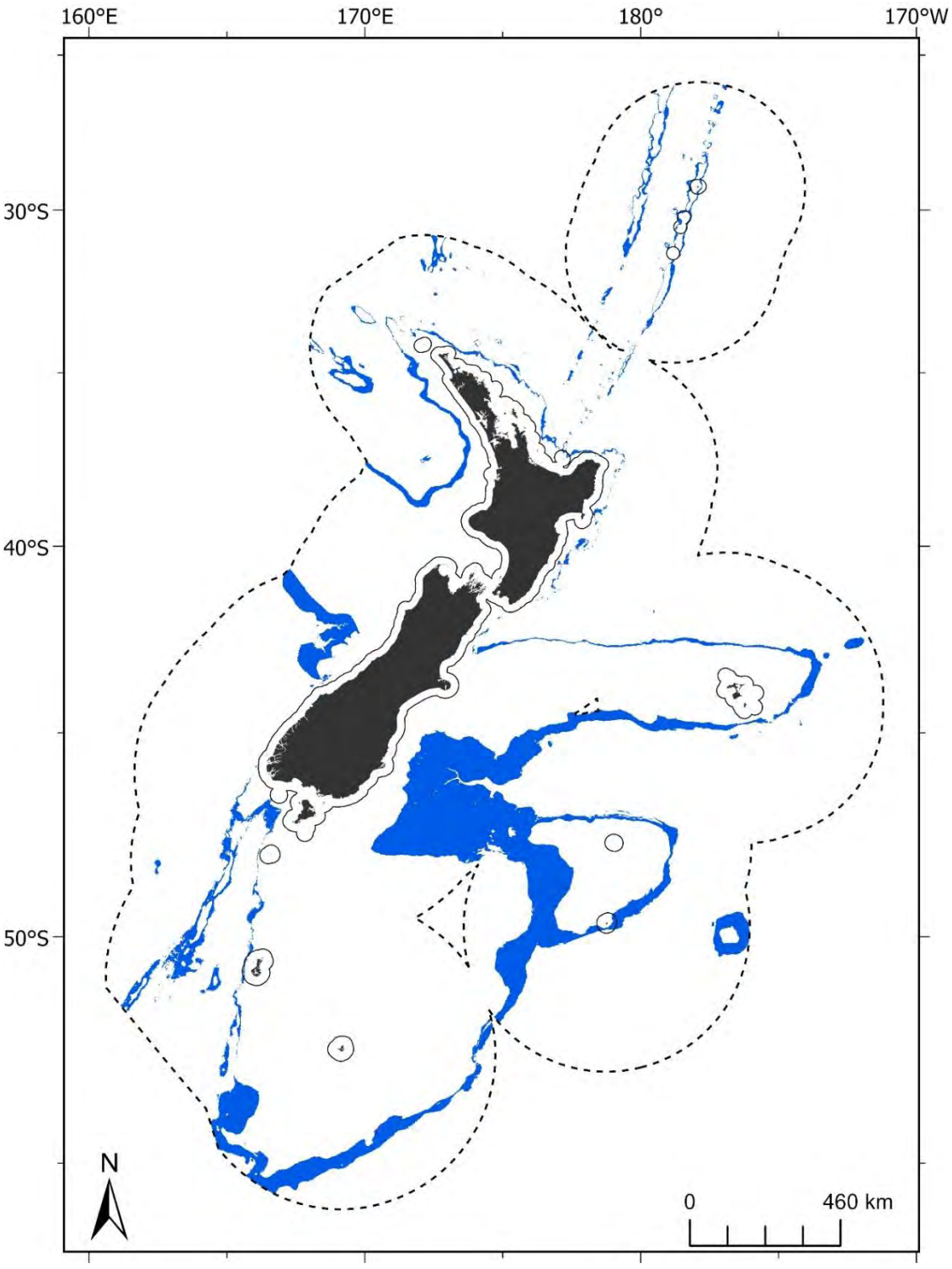

Figure 10: Geographic distribution of group 8 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

8.2 Group description

Group 8 is a large, widespread group (Figure 10) on the edges of the major continental rises and plateaus (Chatham Rise, and Challenger, Campbell, and Bounty plateaus) in deep, cold waters with steep troughs/slopes, low oxygen and low productivity (Table 25). Benthic invertebrate assemblages are diverse (high unique taxa, Table 26) and are characterised by squids, multiple species of brittle stars, corals and squat lobsters (Table 26). The demersal fish assemblages are also diverse and are characterised by several very high frequency occurrences of species including orange roughy and slickheads. This group has a high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae and reef fish. Despite high sample number, overall confidence in modelled relationships is varied for this group (low confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD),Table 27). Given the relatively low confidence as assessed by the environmental coverage care should be taken if using this group to inform management decisions.

8.3 Similar groups

Closely related to group 9; more loosely related to groups 10 and 11

8.4 Characterising environmental conditions

Table 25: Group 8 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	1443 m	Deep water
Slope	3.4 °	High slope
Bottom silicate	68.93 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	4.06 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	3.12 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	13.78 mg C m^{-2} d^{-1}	Low productivity

8.5 Characterising species

Table 26: Species name, mean frequency occurrence and % contribution to group 8 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	476	217	*Onykia*	Squid	0.39	81.36
	MMG	128	328	*Ophiomusa*	Brittle star	0.42	19.49
				Ophiactis	Brittle star	0.34	10.61
				Munida	Squat lobster	0.26	5.23
	SMG	37	69	*Solenosmilia*	Coral	0.14	34.82
				Uroptychus	Squat lobster	0.11	12.01
				Narella	Coral	0.11	10.7
				Enallopsammia	Coral	0.08	8.36
				Gracilechinus	Sea urchin	0.08	6.5
	SSG	7	2	*Ophiocentrus*	Brittle star	0.57	50

			Amphiura	Brittle star	0.57	50
Demersal fish	408	166	*Hoplostethus atlanticus*	Orange roughy	0.75	13.39
			Alepocephalus australis	Small scaled slickhead	0.71	11.62
			Halargyreus johnsonii	Cod	0.65	9.5
			Diastobranchus capensis	Basketwork eel	0.65	9.33
			Etmopterus baxteri	Lantern shark	0.6	8.78
			Pseudocyttus maculatus	Smooth oreo	0.56	8.39
			Alepocephalus antipodianus	Big scaled slickhead	0.55	6.61
			Coelorinchus trachycarus	Rattail	0.52	5.98
Macroalgae*	0	0	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

8.6 Uncertainty ranges

Table 27: Mean uncertainty values for group 8 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.086	Low
Demersal fish	0.004	Low	0.049	Low
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.048	Low

9 Group 9

9.1 Geographic location

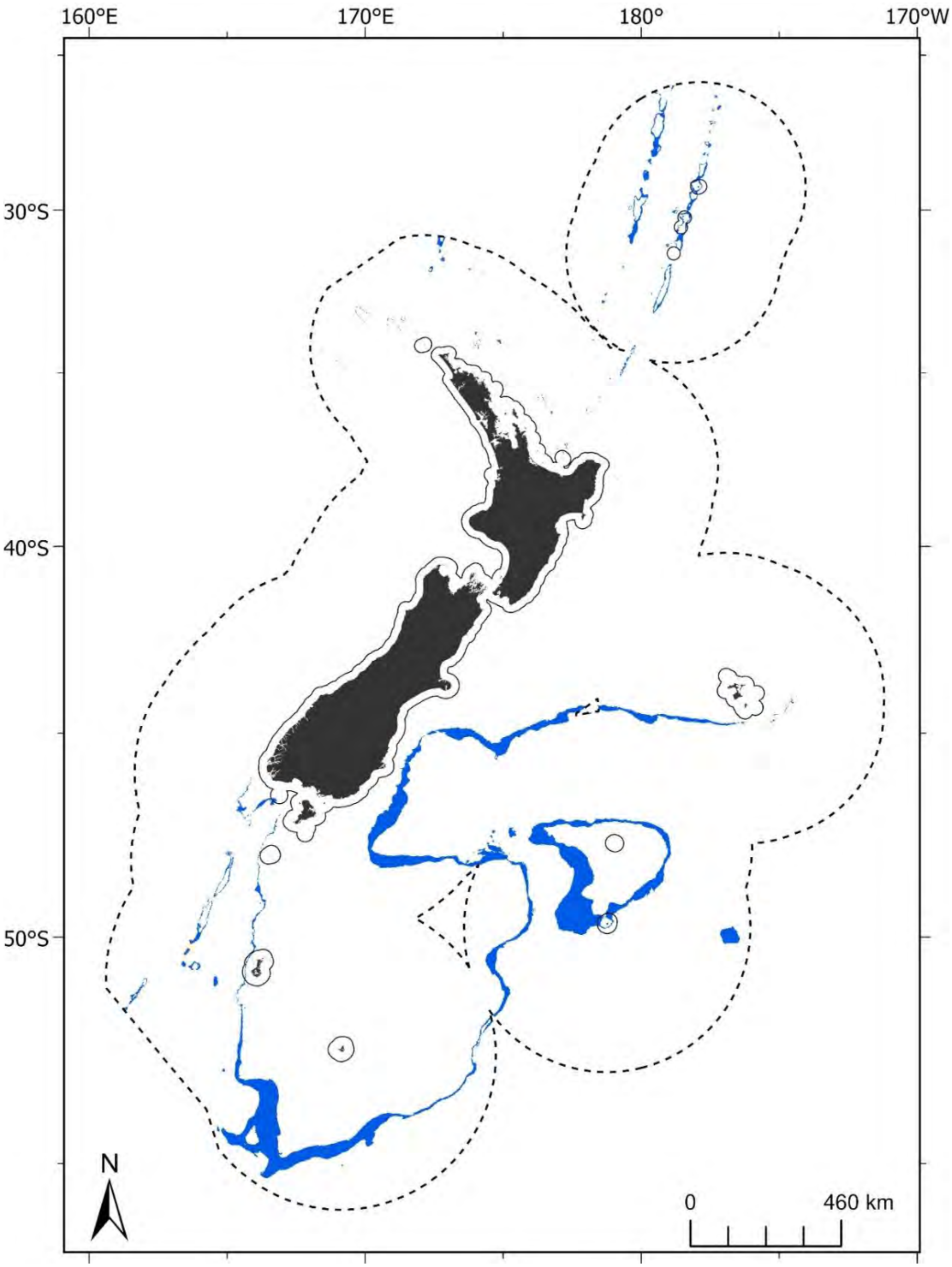

Figure 11: Geographic distribution of group 9 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

9.2 Group description

Group 9 is a widespread group (Figure 11) occurring predominantly in southern waters on deep ridges and steep slopes in cold waters with low oxygen and low productivity, including the southern slopes of the Chatham Rise and the slopes of the Campbell Plateau (Table 28). This group is characterised by high concentrations of nitrate and silicate at depth. Benthic invertebrate assemblages are diverse, characterised by high frequency occurrence of squid, multiple species of brittle star and several coral genera (Table 29). Demersal fish assemblages are diverse, characterised by very high frequency occurrence of oreo, lantern shark and orange roughy. This group has a high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish. Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and Model variability (SD),Table 30).

9.3 Similar groups

Closely related to group 8; more loosely related to groups 10 and 11.

9.4 Characterising environmental conditions

Table 28: Group 9 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	1095 m	Deep water
Bottom nitrate	32.45 µmol L^{-1}	High concentrations of nitrate at depth
Bottom silicate	48.04 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	4.41 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	3.91 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	17 mg C m^{-2} d^{-1}	Low productivity

9.5 Characterising species

Table 29: Species name, mean frequency occurrence and % contribution to group 9 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	297	129	*Onykia*	Squid	0.58	94.83
	MMG	54	290	*Ophiomusa*	Brittle star	0.35	17.52
				Ophiacantha	Brittle star	0.26	8.02
				Ophiactis	Brittle star	0.28	7.63
				Munida	Squat lobster	0.24	5.05
				Psilaster	Sea star	0.13	4.11
	SMG	25	63	*Ophiactis*	Brittle star	0.24	30.47
				Desmophyllum	Stony coral	0.16	14.37
				Flabellum	Coral	0.12	7.98
				Calyptopora	Hydrozoan	0.12	5.1
				Caryophyllia	Coral	0.12	5.1

				Astrothorax	Brittle star	0.08	4.49
				Ophiura	Brittle star	0.08	4.49
	SSG**	2	2	*na*	*na*	*na*	*na*
Demersal fish		305	127	*Pseudocyttus maculatus*	Smooth oreo	0.82	14.48
				Etmopterus baxteri	Lantern shark	0.82	13.07
				Hoplostethus atlanticus	Orange roughy	0.73	11.53
				Macrourus carinatus	Ridge scaled rattail	0.66	7.88
				Halargyreus johnsonii	Johnson's cod	0.65	7.39
				Alepocephalus antipodianus	Big scaled slickhead	0.64	7.26
				Allocyttus niger	Black oreo	0.56	6.42
				Diastobranchus capensis	Basketwork eel	0.57	5.41
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

9.6 Uncertainty ranges

Table 30: Mean uncertainty values for group 9 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.168	Moderate
Demersal fish	0.003	Moderate	0.096	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.097	Moderate

10 Group 10

10.1 Geographic location

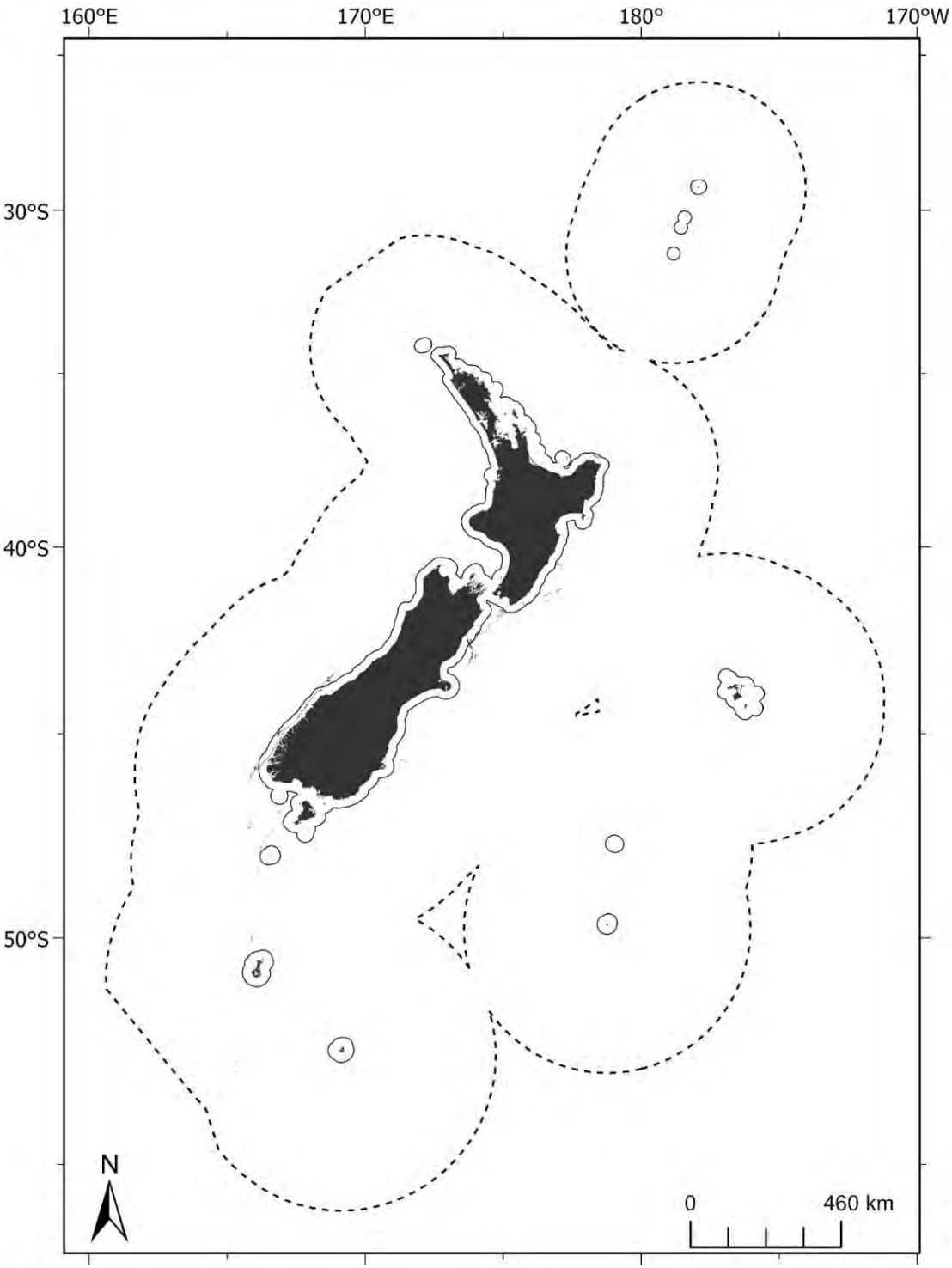

Figure 12: Geographic distribution of group 10 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

10.2 Group description

Group 10 is a small group (Figure 12) occurring in the canyons along the shelf break, in deep, cold waters with low oxygen and low productivity (Table 31). In addition, this group is characterised by high concentrations of nitrate and silicate at depth. Benthic invertebrate assemblages are characterised by very high frequency occurrence of squid, brittle star, sea cucumber, coral and polychaetes (Table 32). Demersal fish assemblages are characterised by high frequency occurrence of multiple species, including orange roughy, lantern shark and cod (Table 32). This group has a moderate number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish (Table 32). Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 33).

10.3 Similar groups

Closely related to group 11; more loosely related to groups 8 and 9

10.4 Characterising environmental conditions

Table 31: Group 10 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	1366 m	Deep water
Slope	10.08 °	High slope
Bottom silicate	62.04 µmol L^{-1}	High concentrations of silicate at depth
Dissolved oxygen at depth	4.02 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	3.69 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	18.53 mg C m^{-2} d^{-1}	Low productivity

10.5 Characterising species

Table 32: Species name, mean frequency occurrence and % contribution to group 10 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	32	71	*Onykia*	Squid	0.66	89.43
	MMG	3	36	*Ophiacantha*	Brittle star	1	22.88
				Psolus	Sea cucumber	1	22.88
				Telesto	Soft coral	1	22.88
				Acryptolaria	Hydrozoan	0.67	6.27
	SMG**	2	7	*na*	*na*	*na*	*na*
	SSG	5	8	*Cossura*	Polychaete	0.8	39.53
				Aphelochaeta	Polychaete	0.8	36.19
Demersal fish		35	103	*Hoplostethus atlanticus*	Orange roughy	0.91	14.44

			Etmopterus baxteri	Lantern shark	0.89	12.86
			Halargyreus johnsonii	Cod	0.74	8.74
			Pseudocyttus maculatus	Smooth oreo	0.66	7.76
			Diastobranchus capensis	Basketwork eel	0.69	6.93
			Macrourus carinatus	Ridge scaled rattail	0.69	6.77
			Centroscymnus crepidater	Dogfish	0.57	5.6
			Alepocephalus antipodianus	Big scaled slickhead	0.6	4.85
			Coryphaenoides subserrulatus	Four-rayed rattail	0.54	4.12
Macroalgae*	0	0	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

10.6 Uncertainty ranges

Table 33: Mean uncertainty values for group 10 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.55	High
Demersal fish	0.004	Low	0.469	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.003	Moderate	0.452	Moderate

11 Group 11

11.1 Geographic location

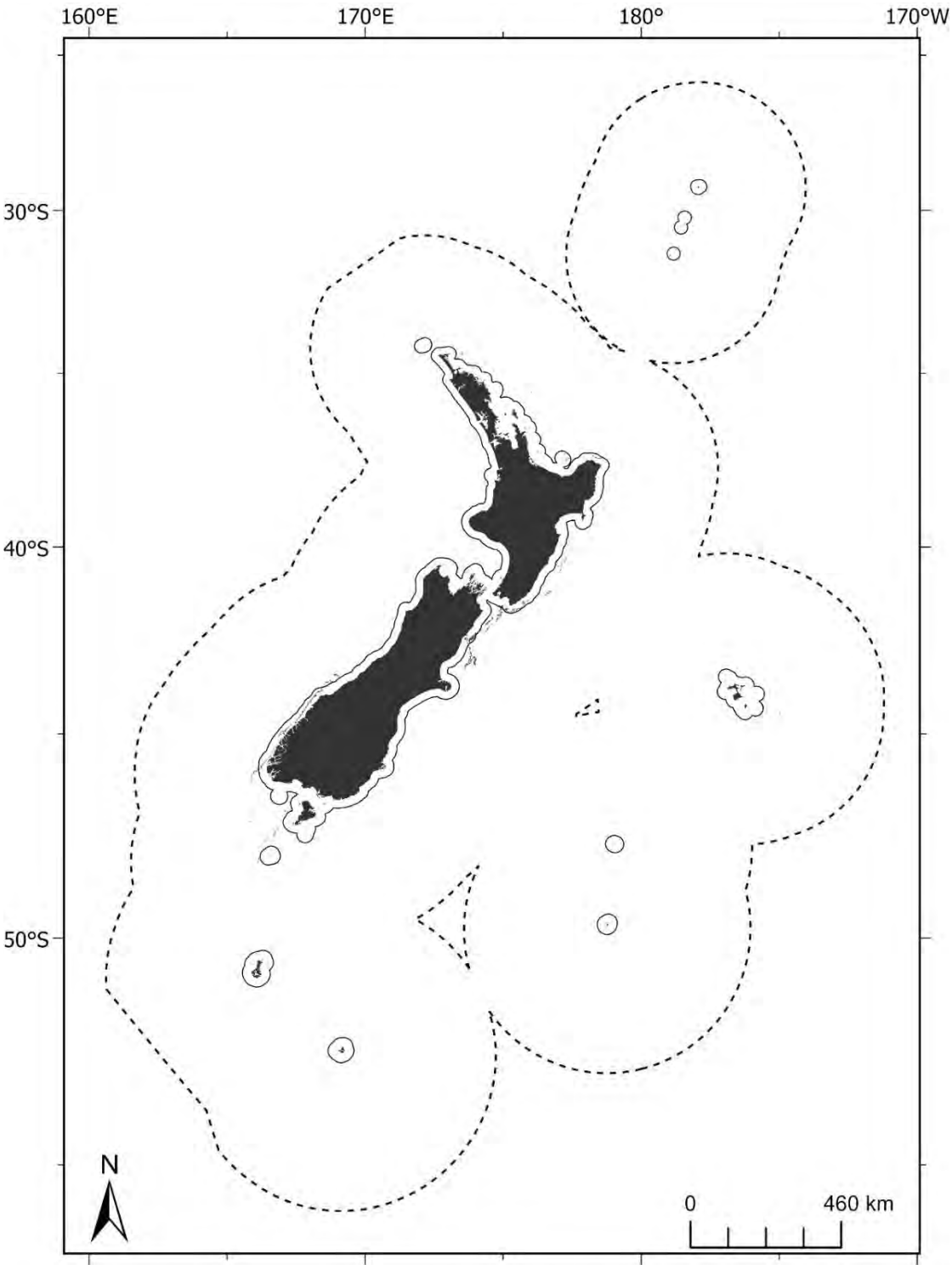

Figure 13: Geographic distribution of group 11 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

11.2 Group description

Group 11 is a small group occurring in deep shelf break canyons (Figure 13), in waters with low oxygen and low productivity (Table 34). Benthic invertebrate assemblages are characterised predominantly by polychaetes and urchins, while demersal fish assemblages are characterised by high frequency occurrence of orange roughy, hoki and rattails (Table 35). This group has a moderate number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish (Table 35). Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate model variability (SD), Table 36).

11.3 Similar groups

Closely related to group 10; more loosely related to groups 8 and 9.

11.4 Characterising environmental conditions

Table 34: Group 11 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	1041m	Deep water
Slope	11.16 °	High slope
Bottom silicate	39.14 µmol L^{-1}	Moderate to high concentrations of silicate at depth
Dissolved oxygen at depth	4.34 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	5.14 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	23.65 mg C m^{-2} d^{-1}	Low productivity

11.5 Characterising species

Table 35: Species name, mean frequency occurrence and % contribution to group 11 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	47	128	*Onykia*	Squid	0.49	74.77
	MMG	8	39	*Aglaophenia*	Hydrozoan	0.25	47.62
				Brissopsis	Sea urchin	0.25	26.19
	SMG	7	26	*Asteroschema*	Brittle star	0.29	100
	SSG	13	19	*Linopherus*	Polychaete	0.54	17.84
				Holanthus	Sea urchin	0.54	16.3
				Brissopsis	Sea urchin	0.46	11.99
				Cossura	Polychaete	0.46	11.63
				Glycera	Polychaete	0.46	11.63
				Maldane	Polychaete	0.38	8.53
Demersal fish		45	103	*Hoplostethus atlanticus*	Orange roughy	0.78	12.68
				Macruronus novaezelandiae	Hoki	0.58	8.26

			Coryphaenoides serrulatus	Serrulate rattail	0.69	8.22
			Etmopterus baxteri	Lantern shark	0.64	7.09
			Coryphaenoides subserrulatus	Four-rayed rattail	0.62	6.17
			Pseudocyttus maculatus	Smooth oreo	0.56	5.42
			Halargyreus johnsonii	Cod	0.56	5.08
			Coelorinchus innotabilis	Notable rattail	0.53	4.33
			Centroscymnus crepidater	Dogfish	0.51	4.08
Macroalgae*	0	0	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

11.6 Uncertainty ranges

Table 36: Mean uncertainty values for group 11 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.772	High
Demersal fish	0.004	Low	0.734	High
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.003	Moderate	0.72	High

12 Group 12

12.1 Geographic location

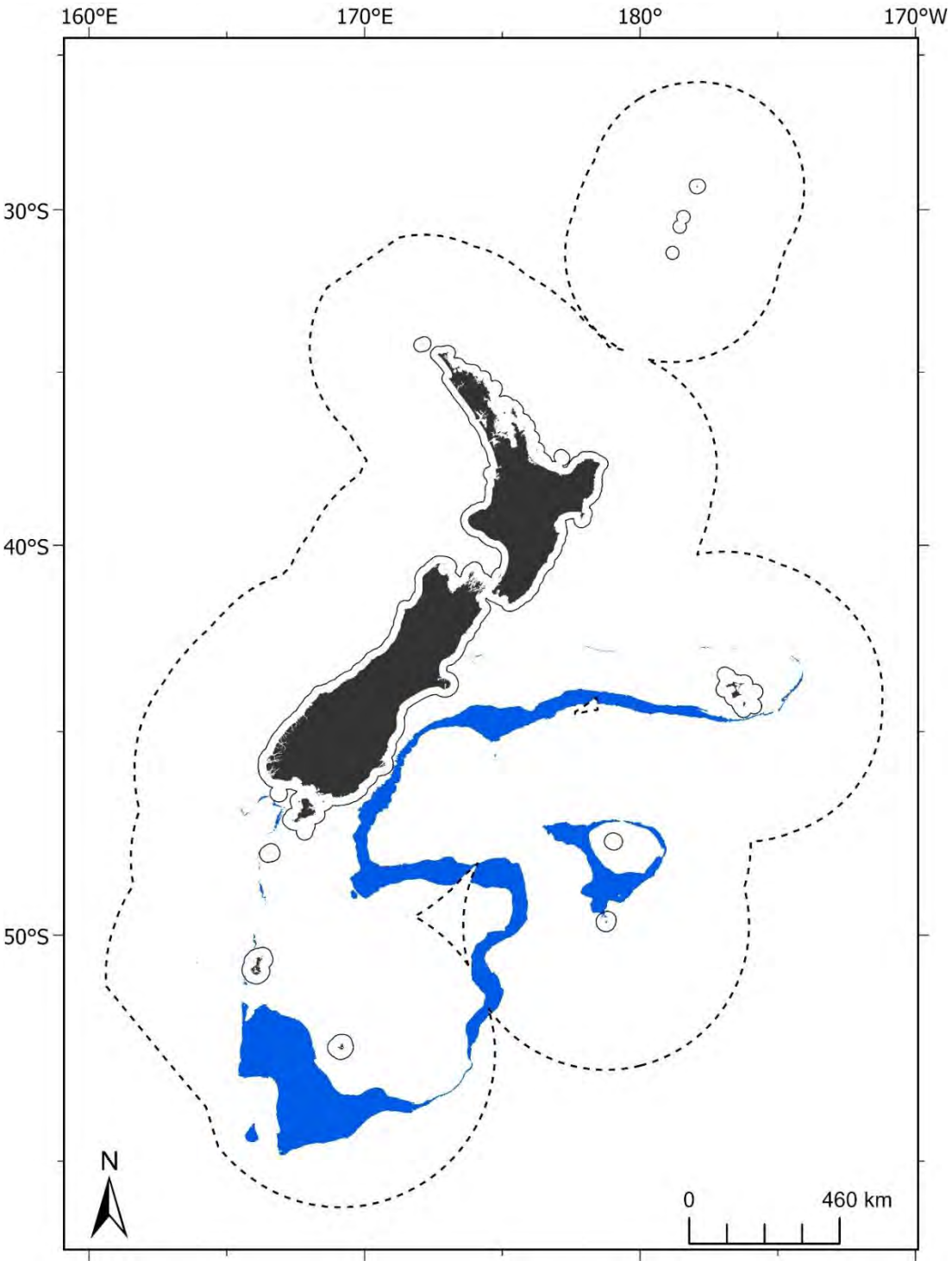

Figure 14: Geographic distribution of group 12 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

12.2 Group description

Group 12 is a large, widespread group (Figure 14) occurring in deep to intermediate water depths south of the Subtropical Front on continental rises, including the Campbell and Bounty plateaus, characterised by cold waters with low oxygen and low productivity (Table 37). Benthic invertebrate assemblages are diverse and are characterised by squid, sea cucumber, several polychaetes and multiple genera of sea star (Table 38). Demersal fish assemblages are also diverse and are characterised by high frequency occurrence of several species including lantern shark, oreos and rattails (Table 38). This group has a high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish (Table 38). Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 39).

12.3 Similar groups

Closely related to group 13.

12.4 Characterising environmental conditions

Table 37: Group 12 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	915 m	Intermediate depth
Bottom nitrate	31.37 µmol L^{-1}	High concentrations of nitrate at depth
Bottom silicate	39.48 µmol L^{-1}	Moderate to high concentrations of silicate at depth
Dissolved oxygen at depth	4.77 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	4.14 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	20.82 mg C m^{-2} d^{-1}	Low productivity
Slope	1.98°	Moderate slope

12.5 Characterising species

Table 38: Species name, mean frequency occurrence and % contribution to group 12 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	2231	222	*Onykia*	Squid	0.75	92.1
	MMG	58	205	*Ceramaster*	Cushion star	0.31	14.26
				Pseudarchaster	Sea star	0.31	13.6
				Flabellum	Coral	0.28	7.8
				Brucerolis	Isopod	0.24	7.01
				Mediaster	Sea star	0.21	6.94
				Pillsburiaster	Sea star	0.21	6.91
				Ophiophthalmus	Brittle star	0.24	4.86
	SMG	11	37	*Brucerolis*	Isopod	0.18	28.89
				Acesta	Bivalve	0.18	17.78

				Errina	Hydrozoan	0.18	17.78
				Psilaster	Sea star	0.18	17.78
	SSG	4	8	*Rynkatorpa*	Sea cucumber	0.5	42.31
				Aphelochaeta	Polychaete	0.5	11.54
				Chaetozone	Polychaete	0.5	11.54
				Linopherus	Polychaete	0.5	11.54
Demersal fish		2346	200	*Etmopterus baxteri*	Lantern shark	0.89	11.97
				Pseudocyttus maculatus	Smooth oreo	0.85	11.53
				Allocyttus niger	Black oreo	0.79	10.16
				Macrourus carinatus	Ridge scaled rattail	0.72	7.46
				Macruronus novaezelandiae	Hoki	0.61	5.23
				Coryphaenoides subserrulatus	Four-rayed rattail	0.59	4.79
				Diastobranchus capensis	Basketwork eel	0.59	4.78
				Halargyreus johnsonii	Cod	0.55	4.39
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

12.6 Uncertainty ranges

Table 39: Mean uncertainty values for group 12 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.327	Moderate
Demersal fish	0.003	Moderate	0.28	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.282	Moderate

13 Group 13

13.1 Geographic location

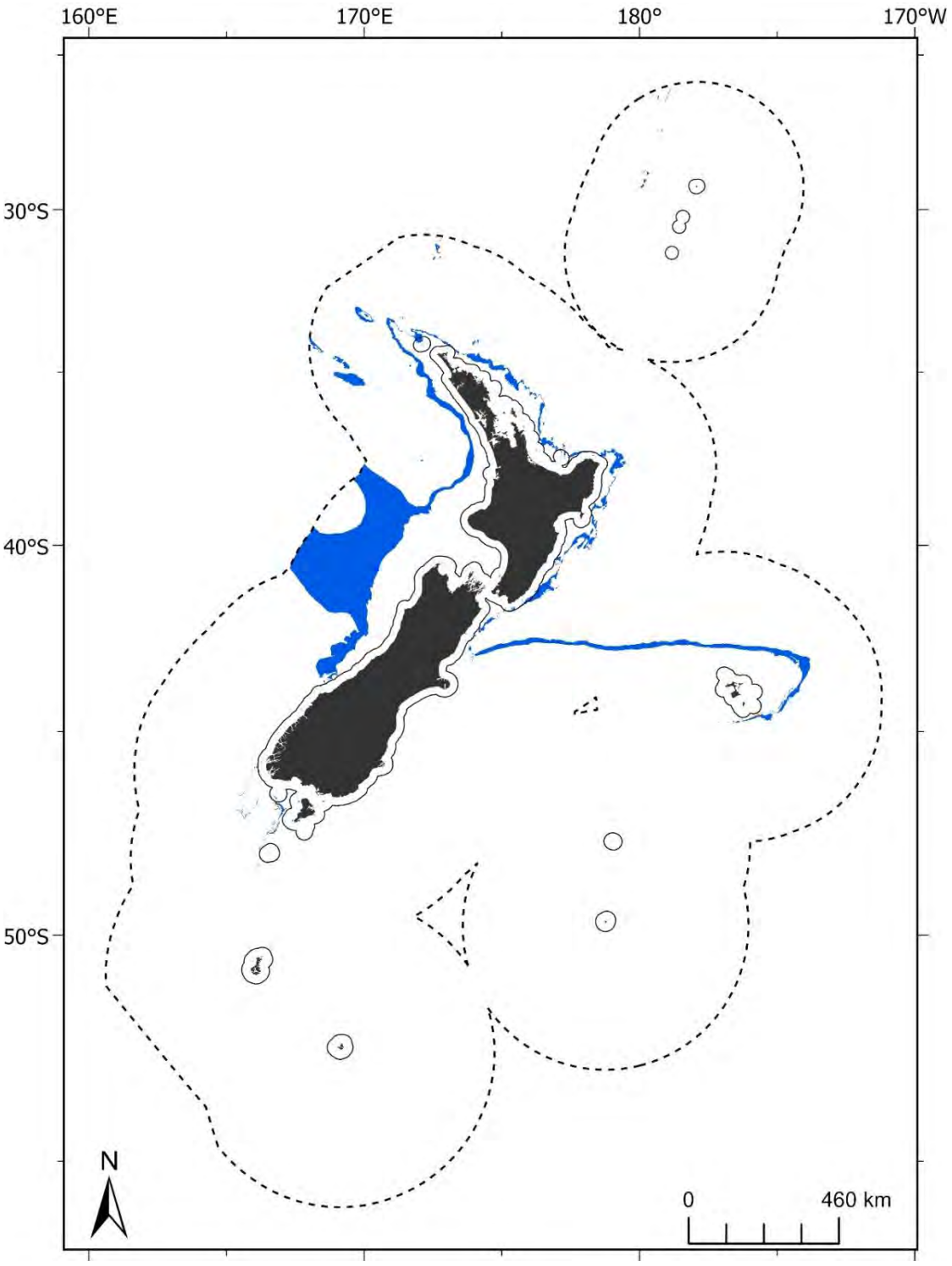

Figure 15: Geographic distribution of group 13 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

13.2 Group description

Group 13 is a large, widespread group (Figure 15) occurring in deep to intermediate water depth on the edge of continental shelves north of the Subtropical Front, including the northern edge of Chatham Rise and parts of the Challenger Plateau, characterised by cold waters with low oxygen and productivity (Table 40). Benthic invertebrate assemblages are diverse and are characterised by squid, brittle star, corals and hydrozoans (Table 41). Demersal fish assemblages are also diverse with over 200 taxa sampled and are characterised by high frequency occurrence of orange roughy, cod and rattails (Table 41). This group has a high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish (Table 41). Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 39).

13.3 Similar groups

Closely related to group 12.

13.4 Characterising environmental conditions

Table 40: Group 13 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	956 m	Intermediate depth
Salinity at depth	34.43 psu	Low salinity at depth
Bottom nitrate	24.31 µmol L^{-1}	High concentrations of nitrate at depth
Dissolved oxygen at depth	4.23 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	5.833 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	18.2 mg C m^{-2} d^{-1}	Low productivity
Slope	2.32	Moderate slope

13.5 Characterising species

Table 41: Species name, mean frequency occurrence and % contribution to group 13 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	2878	320	*Onykia*	Squid	0.54	76.61
	MMG	134	410	*Flabellum*	Coral	0.19	7.89
				Ophiacantha	Brittle star	0.28	4.45
				Caryophyllia	Coral	0.25	4.02
	SMG	29	53	*Flabellum*	Coral	0.21	12.63
				Caryophyllia	Coral	0.24	12.42
				Conopora	Hydrozoan	0.17	11.22
				Chrysogorgia	Soft coral	0.21	7.99
				Crypthelia	Hydrozoan	0.17	6.32
				Gracilechinus	Sea urchin	0.1	5.49
				Ophiacantha	Brittle star	0.17	4.84

				Globocassidulina	Foraminifera	0.07	4.22
	SSG	11	17	*Notomastus*	Polychaete	0.45	36.13
				Amphioplus	Brittle star	0.27	19.75
				Amphiura	Brittle star	0.27	9.41
				Brissopsis	Sea urchin	0.27	8.44
Demersal fish		3460	228	*Hoplostethus atlanticus*	Orange roughy	0.96	14.27
				Coryphaenoides serrulatus	Serrulate rattail	0.79	8.56
				Halargyreus johnsonii	Cod	0.73	7.13
				Coryphaenoides subserrulatus	Four-rayed rattail	0.71	6.87
				Diastobranchus capensis	Basketwork eel	0.63	5.22
				Deania calcea	Shovelnose spiny dogfish	0.61	4.97
				Etmopterus baxteri	Lantern shark	0.59	4.65
				Centroscymnus crepidater	Dogfish	0.57	4.34
				Trachyrincus aphyodes	White rattail	0.56	4.13
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

13.6 Uncertainty ranges

Table 42: Mean uncertainty values for group 13 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.449	Moderate
Demersal fish	0.003	Moderate	0.466	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.477	Moderate

14 Group 14

14.1 Geographic location

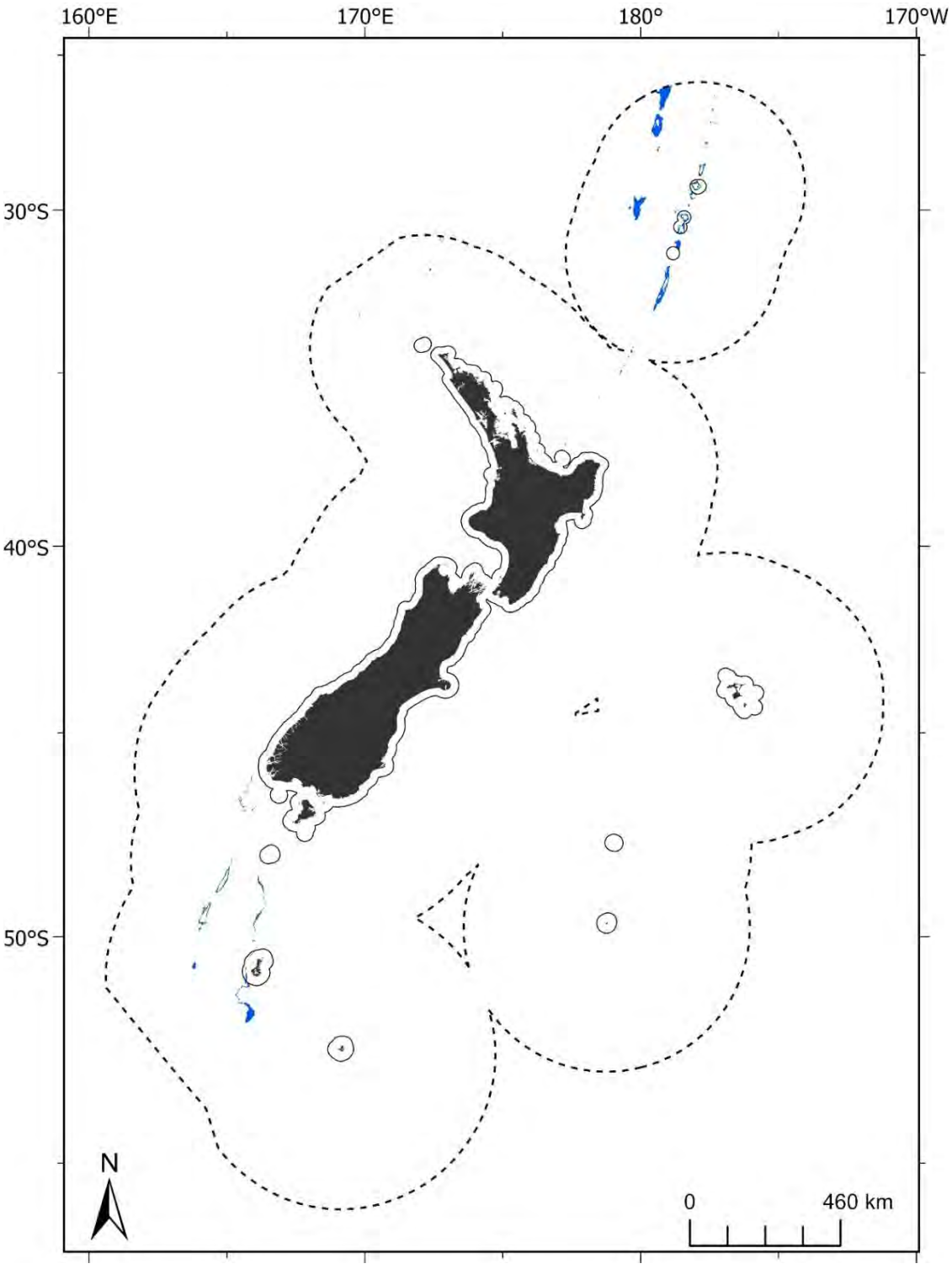

Figure 16: Geographic distribution of group 14 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

14.2 Group description

Group 14 is a small group (Figure 16) occurring at intermediate water depths on the tops the major deep sea ridges north and south of mainland New Zealand (Colville, Kermadec, and Macquarie ridges), characterised by cold waters with low oxygen and productivity (Table 43). Benthic invertebrate assemblages are characterised predominantly by squid, brittle star and hydrozoans, and demersal fish assemblages are characterised by high frequency occurrence of Hoki, orange roughy and dogfish (Table 44). This group has a low number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish (Table 44). Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 45).

14.3 Similar groups

Closely related to group 15.

14.4 Characterising environmental conditions

Table 43: Group 14 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	797 m	Intermediate depth
Salinity at depth	34.43 psu	Low salinity at depth
Bottom nitrate	24.31 µmol L^{-1}	High concentrations of nitrate at depth
Dissolved oxygen at depth	4.78 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	6.95 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	18.2 mg C m^{-2} d^{-1}	Low productivity
Benthic position index	1008.526	High seafloor unevenness

14.5 Characterising species

Table 44: Species name, mean frequency occurrence and % contribution to group 14 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	14	22	*Onykia*	Squid	0.5	94.21
	MMG	17	141	*Munida*	Squat lobster	0.41	9.11
				Ophiactis	Brittle star	0.41	7.81
				Ophiacantha	Brittle star	0.41	7.37
				Bentharca	Bivalve	0.29	6.2
				Stylaster	Hydrozoan	0.29	5.36
				Chrysogorgia	Soft coral	0.29	4.74
	SMG	19	55	*Gracilechinus*	Sea urchin	0.16	24.19
				Conopora	Hydrozoan	0.26	16.12
				Errina	Hydrozoan	0.21	11.05
				Stylaster	Hydrozoan	0.21	8.4
				Amphiophiura	Brittle star	0.21	8.11

				Ophiocreas	Brittle star	0.11	6.91
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		16	62	*Macruronus novaezelandiae*	Hoki	0.81	14.45
				Hoplostethus atlanticus	Orange roughy	0.75	11.82
				Centroscymnus owstonii	Dogfish	0.63	7.97
				Pseudocyttus maculatus	Smooth oreo	0.56	7.53
				Centroscymnus crepidater	Dogfish	0.56	7.15
				Coryphaenoides subserrulatus	Four-rayed Rattail	0.56	6.54
				Etmopterus baxteri	Lantern shark	0.56	6.54
				Lepidorhynchus denticulatus	Javelinfish	0.56	6.54
				Centrophorus squamosus	Leafscale gulper shark	0.56	6.41
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

14.6 Uncertainty ranges

Table 45: Mean uncertainty values for group 14 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.305	Moderate
Demersal fish	0.003	Moderate	0.132	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.123	Moderate

15 Group 15

15.1 Geographic location

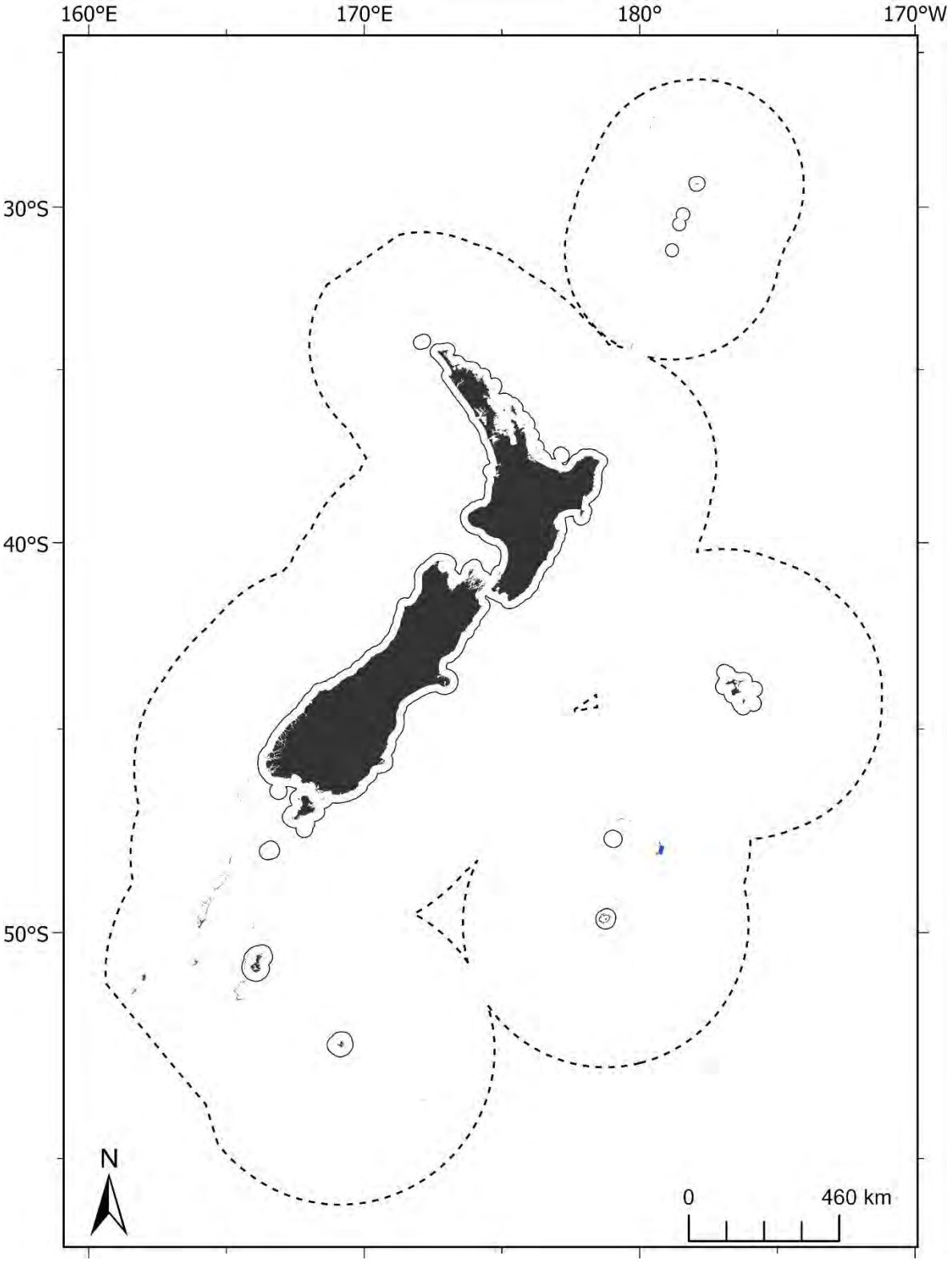

Figure 17: Geographic distribution of group 15 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

15.2 Group description

Group 15 is a very small group (Figure 17) occurring at intermediate water depths on the tops of steep ridges in cold waters with low productivity and moderate to high dissolved silicate and nitrate at depth (Table 46). Benthic invertebrate assemblages are characterised predominantly by brittle stars, crab and coral (Table 47). Demersal fish assemblages are characterised by very high frequency occurrence of rattail, lantern shark, cod and orange roughy (Table 47). This group has a low number of samples for all biotic groups. Despite the low sampling within this group, overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 48) suggesting similar environmental conditions were sampled within other groups.

15.3 Similar groups

Closely related to group 14.

15.4 Characterising environmental conditions

Table 46: Group 15 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	784 m	Intermediate depth
Slope	9.7 °	High slope
Bottom silicate	30.13 µmol L^{-1}	Moderate to high concentrations of silicate at depth
Dissolved oxygen at depth	4.94 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	4.54 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	20.95 mg C m^{-2} d^{-1}	Low productivity
Benthic position index	1257.114	High seafloor unevenness

15.5 Characterising species

Table 47: Species name, mean frequency occurrence and % contribution to group 15 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	1	1	*na*		*na*	*na*
	MMG	8	136	*Amphiura*	Brittle star	0.88	13.94
				Sympagurus	Crab	0.63	5.86
				Ophiactis	Brittle star	0.63	5.47
				Ophiomyxa	Brittle star	0.63	5.42
	SMG	8	55	*Ophiomyxa*	Brittle star	0.38	23.47
				Ophiocreas	Brittle star	0.25	15.94
				Eguchipsammia	Coral	0.25	12.75
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		2	18	*Coryphaenoides serrulatus*	Serrulate rattail	1	20

			Etmopterus baxteri	Lantern shark	1	20
			Halargyreus johnsonii	Cod	1	20
			Hoplostethus atlanticus	Orange roughy	1	20
Macroalgae*	0	0	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

15.6 Uncertainty ranges

Table 48: Mean uncertainty values for group 15 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.471	High
Demersal fish	0.003	Moderate	0.203	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.186	Moderate

16 Group 16

16.1 Geographic location

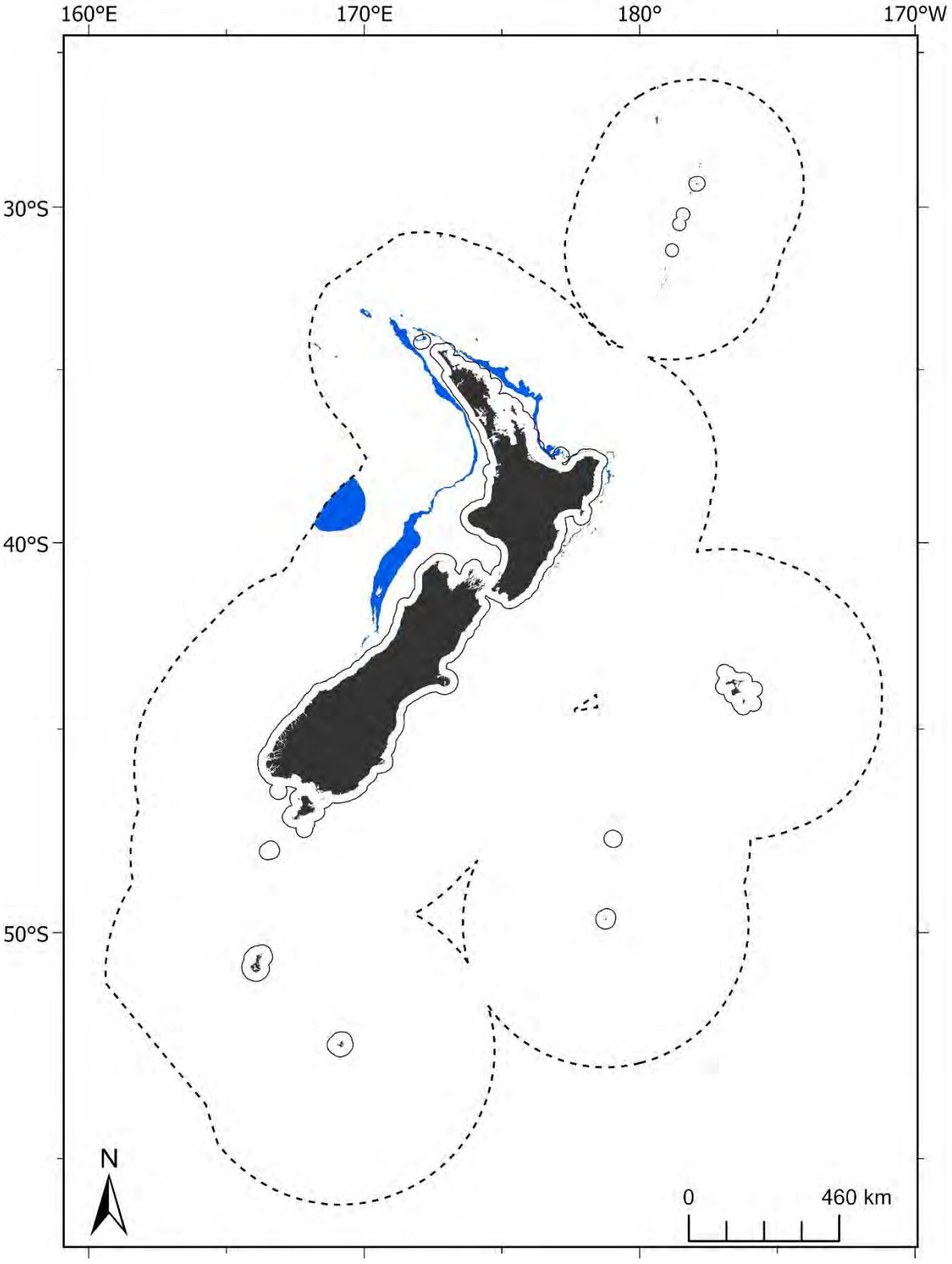

Figure 18: Geographic distribution of group 16 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

16.2 Group description

Group 16 is a large group (Figure 18) occurring north of the Subtropical Front on the continental shelf at intermediate water depths, including parts of the Challenger Plateau, characterised by low oxygen and productivity (Table 49). Other environmental variables are generally moderate (e.g., temperature and salinity at depth, Table 49). Benthic invertebrate assemblages are diverse and are characterised by squid, squat lobster, hydrozoans, brittle stars, corals and polychaetes (Table 50). Demersal fish assemblages are also diverse, characterised by very high frequency occurrence of hoki, ling, dory and javelinfish (Table 50). This group has a high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish (Table 50). Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 51).

16.3 Similar groups

Closely related to group 17; more loosely related to groups 18 and 19.

16.4 Characterising environmental conditions

Table 49: Group 16 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	546 m	Intermediate depth
Salinity at depth	34.71 psu	Moderate to high salinity at depth
Bottom nitrate	21.28 µmol L^{-1}	High concentrations of nitrate at depth
Dissolved oxygen at depth	4.53 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	9.05 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	27.39 mg C m^{-2} d^{-1}	Low productivity
Turbidity	0.001 m^{-1}	Low turbidity

16.5 Characterising species

Table 50: Species name, mean frequency occurrence and % contribution to group 16 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	667	215	*Nototodarus*	Squid	0.47	70.18
	MMG	88	299	*Munida*	Squat lobster	0.3	25.47
				Amphiura	Brittle star	0.15	7.4
				Plesionika	Shrimp	0.14	6.16
				Lytocarpia	Hydrozoan	0.11	4.48
				Phylladiorhynchus	Squat lobster	0.13	4.07
	SMG	41	78	*Munida*	Squat lobster	0.17	19.74
				Conopora	Hydrozoan	0.15	15.87
				Caryophyllia	Coral	0.17	12.57
				Stichopathes	Coral	0.1	6.45

				Diastylis	Cumacean	0.1	6.1
				Ophiozonella	Brittle star	0.07	5.65
				Eguchipsammia	Coral	0.12	5.33
	SSG	6	7	*Asychis*	Polychaete	0.33	100
Demersal fish		806	171	*Macruronus novaezelandiae*	Hoki	0.86	18.9
				Genypterus blacodes	Ling	0.78	13.6
				Cyttus traversi	Lookdown dory	0.73	11.73
				Lepidorhynchus denticulatus	Javelinfish	0.71	10.04
				Hoplostethus mediterraneus	Silver roughy	0.58	6.22
				Seriolella punctata	Silver warehou	0.42	4.01
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

16.6 Uncertainty ranges

Table 51: Mean uncertainty values for group 16 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.454	High
Demersal fish	0.003	Moderate	0.41	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.408	Moderate

17 Group 17

17.1 Geographic location

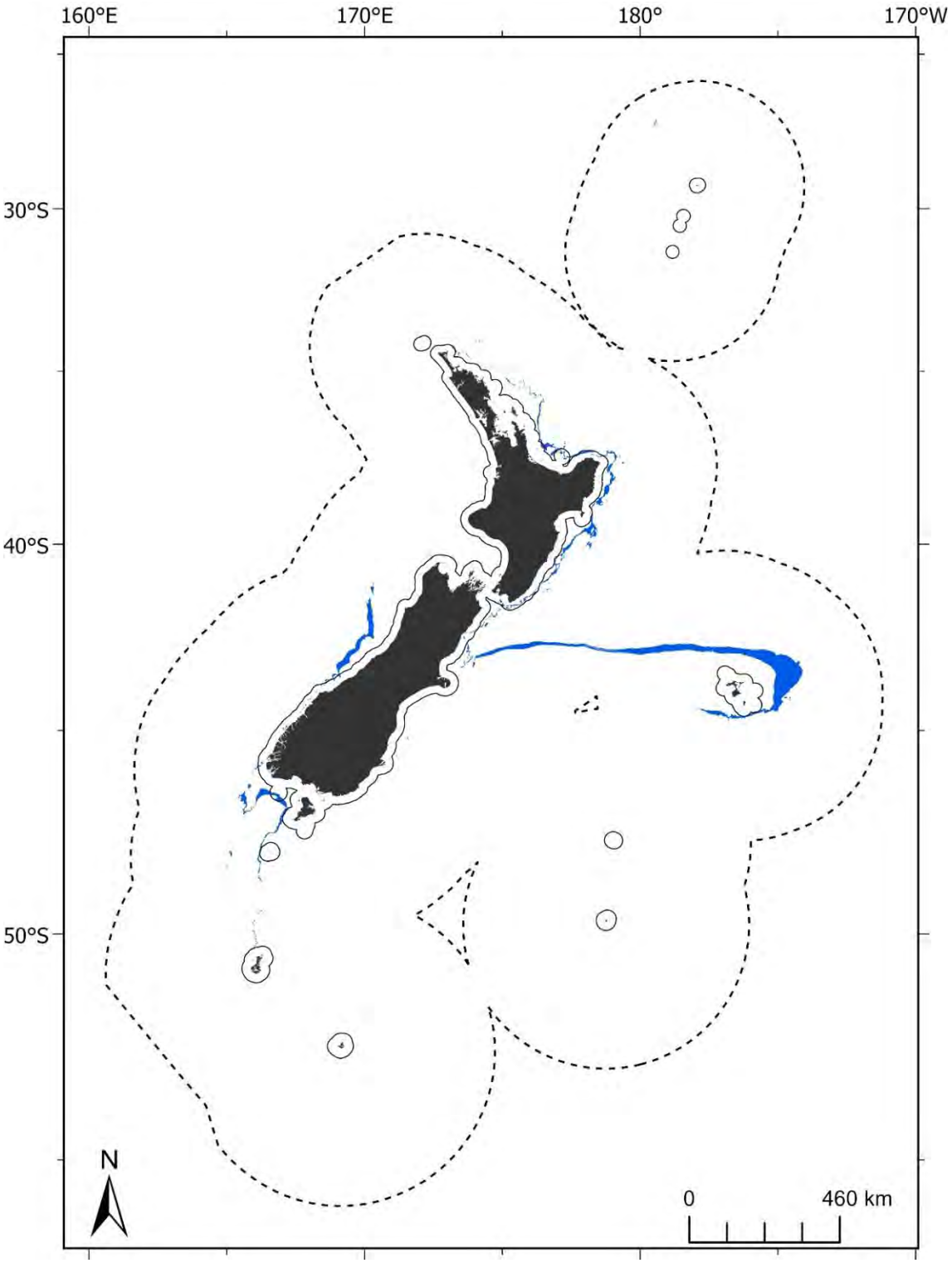

Figure 19: Geographic distribution of group 17 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

17.2 Group description

Group 17 is a widespread group (Figure 19) occurring predominantly on the continental shelf rises north of the Subtropical Front at intermediate water depths (including the Chatham Rise), characterised by low bottom oxygen concentration, temperature and productivity (Table 52). Dissolved solutes are generally moderate to high (silicate, nitrate concentrations at depth). Benthic invertebrate assemblages are diverse, characterised by squid, brittle star and multiple coral and hydrozoan species (Table 53). Demersal fish assemblages are very diverse (over 240 unique taxa) and are characterised by high frequency occurrence of orange roughy, Hoki, dogfish, javelinfish, mora and cod (Table 53). This group has a very high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae and reef fish (Table 53). Overall confidence in modelled relationships is high for this group (high confidence for 'combined' biotic group environmental coverage and moderate (but bordering low) model variability (SD), Table 52).

17.3 Similar groups

Closely related to group 16; more loosely related to groups 18 and 19.

17.4 Characterising environmental conditions

Table 52: Group 17 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	777 m	Intermediate depth
Bottom nitrate	25.26 µmol L^{-1}	High concentrations of nitrate at depth
Bottom silicate	19.39 µmol L^{-1}	Moderate concentrations of silicate at depth
Dissolved oxygen at depth	4.73 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	6.88 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	25.86 mg C m^{-2} d^{-1}	Low productivity

17.5 Characterising species

Table 53: Species name, mean frequency occurrence and % contribution to group 17 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	2022	286	*Onykia*	Squid	0.68	84.51
	MMG	63	343	*Ophiactis*	Brittle star	0.3	5.86
				Molpadia	Sea cucumber	0.11	4.16
	SMG	18	56	*Caryophyllia*	Coral	0.22	22.12
				Munida	Squat lobster	0.17	16.41
				Conopora	Hydrozoan	0.17	14.78
				Flabellum	Coral	0.17	13.74
				Lytocarpia	Hydrozoan	0.11	11.18
	SSG	8	8	*Natatolana*	Isopod	0.38	44.95
				Holanthus	Sea urchin	0.38	30.28

Demersal fish	2404	241	*Hoplostethus atlanticus*	Orange roughy	0.79	7.83
			Deania calcea	Shovelnose spiny dogfish	0.86	7.74
			Macruronus novaezelandiae	Hoki	0.83	7.46
			Mora moro	Mora	0.78	6.34
			Lepidorhynchus denticulatus	Javelinfish	0.7	5.01
			Centroscymnus crepidater	Dogfish	0.69	4.79
			Halargyreus johnsonii	Cod	0.68	4.55
Macroalgae*	0	0	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

17.6 Uncertainty ranges

Table 54: Mean uncertainty values for group 17 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.739	High
Demersal fish	0.003	Moderate	0.748	High
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.738	High

18 Group 18

18.1 Geographic location

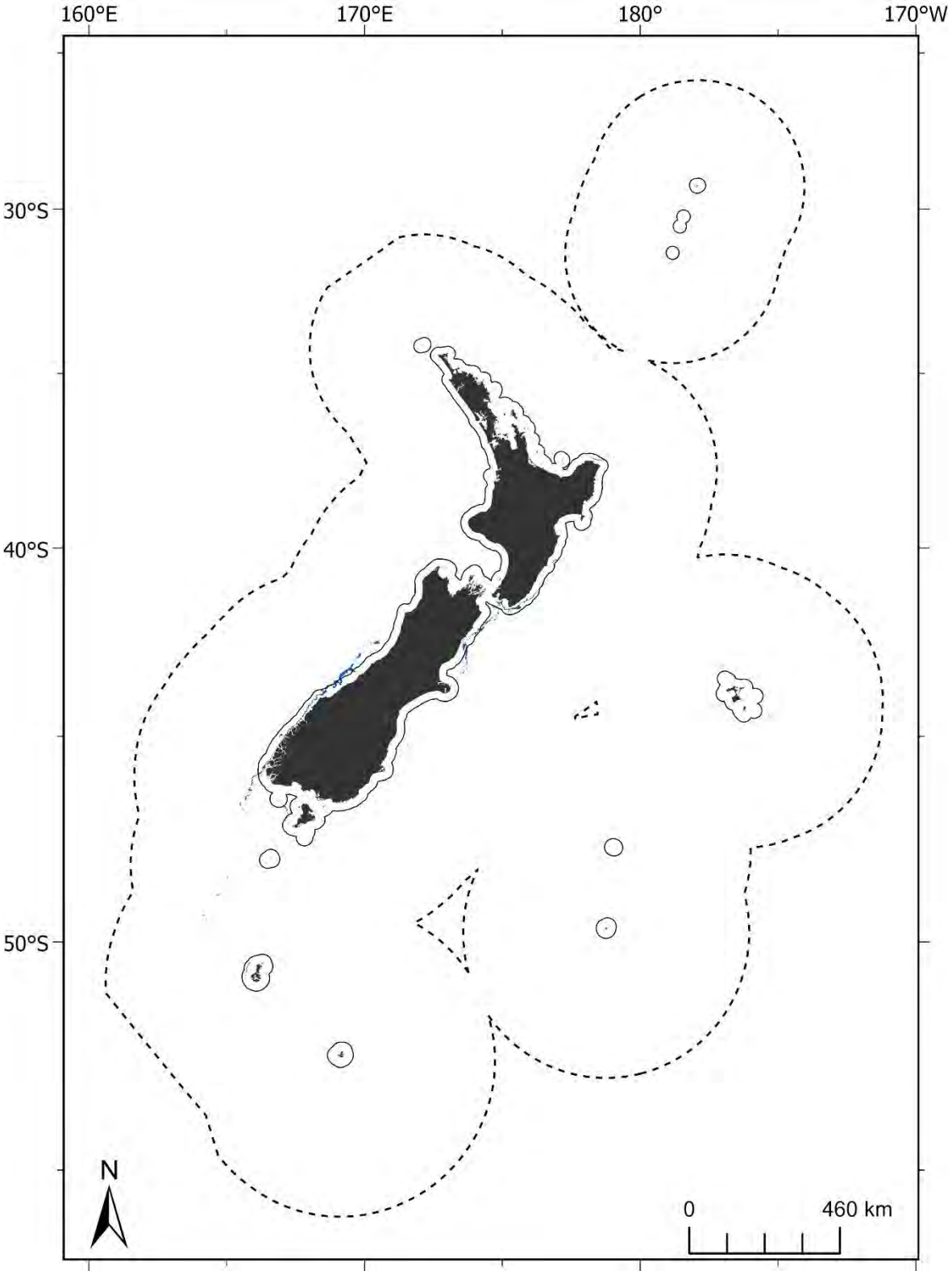

Figure 20: Geographic distribution of group 18 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

18.2 Group description

Group 18 is a small group (Figure 20) occurring along the continental shelf break on the west and east of the South Island at intermediate water depths, characterised by moderate levels of oxygen concentration and steep relief (Table 55). Other environmental variables have moderate values (bottom nitrate concentration and temperature). Benthic invertebrate assemblages are characterised by squid, coral, crab, echinoderms and polychaete species (Table 56). Demersal fish assemblages are characterised by very high frequency occurrence of Hoki, and moderate frequency occurrence of ling, hake and javelinfish (Table 56). This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish, but a low number of benthic invertebrate samples for other gear types, and no samples for macroalgae or reef fish (Table 56). Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage but moderate model variability (SD), Table 57).

18.3 Similar groups

Closely related to group 19; more loosely related to groups 16 and 17.

18.4 Characterising environmental conditions

Table 55: Group 18 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	498 m	Intermediate depth
Slope	7.86 °	High slope
Bottom nitrate	19.87 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	5.14 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	8.89 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	32.39 mg C m^{-2} d^{-1}	Moderate productivity

18.5 Characterising species

Table 56: Species name, mean frequency occurrence and % contribution to group 18 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	103	119	*Nototodarus*	Squid	0.6	90.01
	MMG	18	83	*Philine*	Gastropod	0.17	14.6
				Lophopagurus	Crab	0.28	12.2
				Munida	Squat lobster	0.28	12.08
				Spirobranchus	Polychaete	0.22	7.4
				Desmophyllum	Stony coral	0.22	6.58
				Heterothyone	Sea cucumber	0.17	5.52
	SMG	16	43	*Caryophyllia*	Coral	0.25	34.31
				Trichopeltarion	Crab	0.19	31.19
				Munida	Squat lobster	0.25	13.12

	SSG	8	17	*Holanthus*	Sea urchin	0.38	48.26
				Asychis	Polychaete	0.25	12.11
				Aphelochaeta	Polychaete	0.25	9.91
Demersal fish		177	149	*Macruronus novaezelandiae*	Hoki	0.9	44.99
				Genypterus blacodes	Ling	0.62	16.79
				Merluccius australis	Hake	0.37	5.26
				Lepidorhynchus denticulatus	Javelinfish	0.41	5.03
Macroalgae		0	0	*na*	*na*	*na*	*na*
Reef fish		0	0	*na*	*na*	*na*	*na*

18.6 Uncertainty ranges

Table 57: Mean uncertainty values for group 18 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.719	High
Demersal fish	0.003	Moderate	0.709	High
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.003	Moderate	0.699	High

19 Group 19

19.1 Geographic location

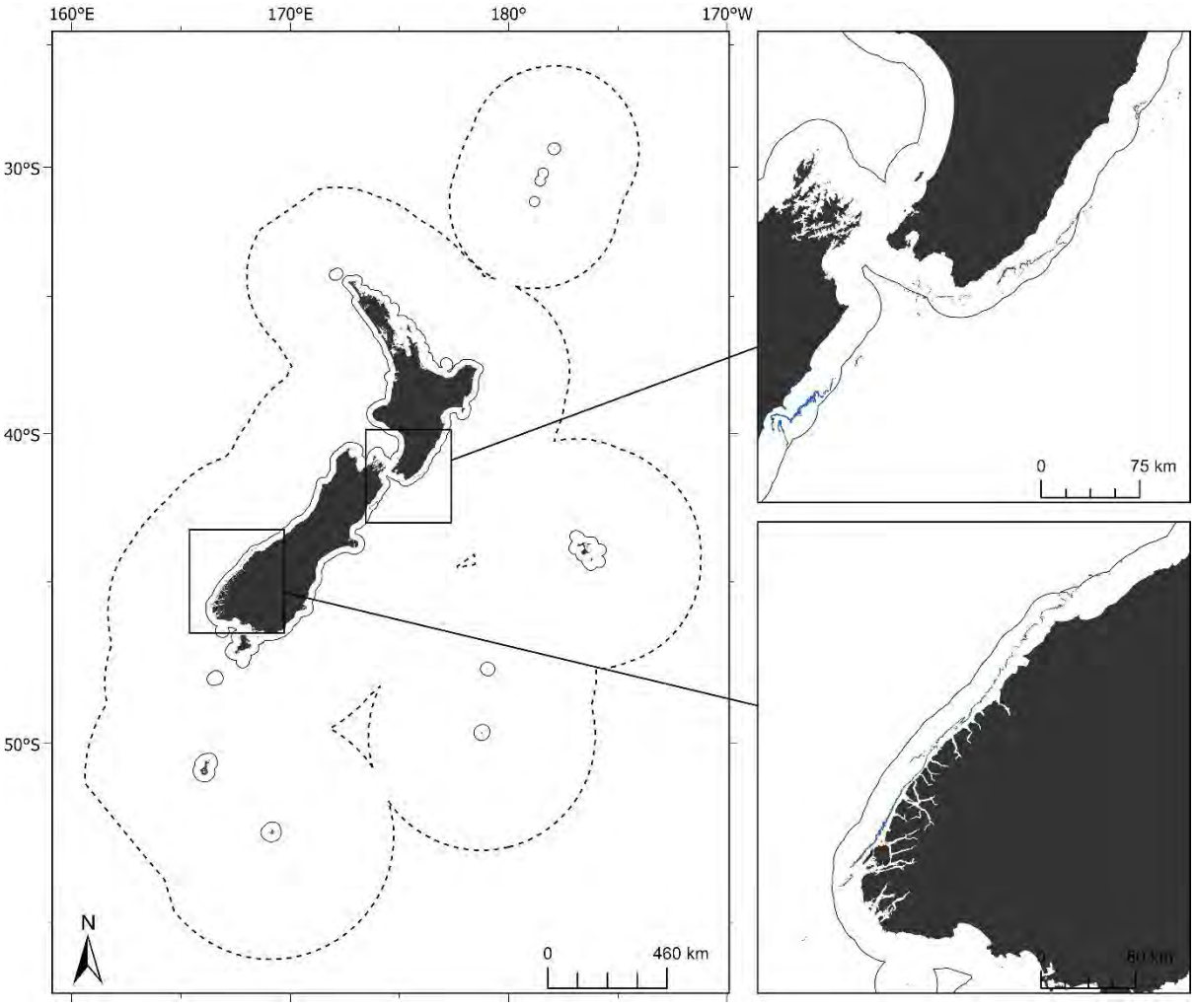

Figure 21: Geographic distribution of group 19 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

19.2 Group description

Group 19 is a very small, nearshore group (Figure 20) occurring on the steep, intermediate depth continental shelf breaks, including off Fiordland, characterised by moderate to high bottom silicate concentrations (Table 58). Other environmental variables have low values (bottom oxygen concentrations, productivity and temperature). Benthic invertebrate assemblages are characterised by squid *Nototodarus* and the coral, and demersal fish assemblages are characterized by Hoki occurring at very high frequency (Table 59). This group has a low number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish (Table 59). Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate confidence for model variability (SD), Table 60).

19.3 Similar groups

Closely related to group 18; more loosely related to groups 16 and 17.

19.4 Characterising environmental conditions

Table 58: Group 19 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	685 m	Intermediate depth
Slope	17.19 °	High slope
Bottom silicate	17.76 µmol L^{-1}	Moderate to high concentrations of silicate at depth
Dissolved oxygen at depth	4.92 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	7.32 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	27.06 mg C m^{-2} d^{-1}	Low productivity

19.5 Characterising species

Table 59: Species name, mean frequency occurrence and % contribution to group 19 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	7	53	*Nototodarus*	Squid	0.43	90.16
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	3	8	*Caryophyllia*	Coral	0.67	100
	SSG**	1	7	*na*	*na*	*na*	*na*
Demersal fish		9	25	*Macruronus novaezelandiae*	Hoki	1	73.46
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

19.6 Uncertainty ranges

Table 60: Mean uncertainty values for group 19 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.685	High
Demersal fish	0.003	Moderate	0.682	High
Macroalgae	0.002	Moderate	0.03	Low
Reef fish	0.004	Low	0.063	Low
Combined	0.003	Moderate	0.635	High

20 Group 20

20.1 Geographic location

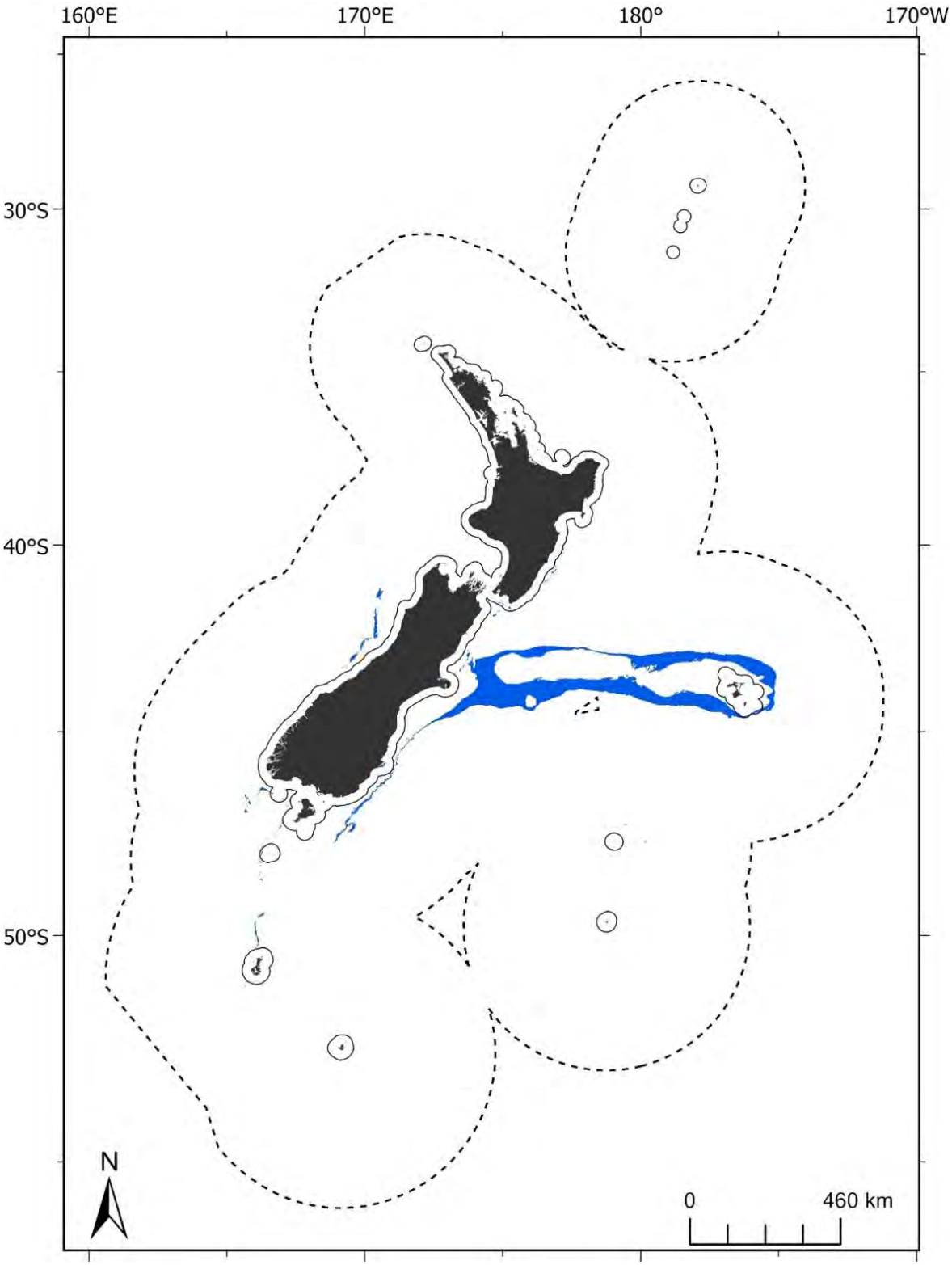

Figure 22: Geographic distribution of group 20 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

20.2 Group description

Group 20 is a large, widespread group (Figure 22), which predominantly occurs along the Chatham Rise shelf break at intermediate water depths (Table 61).This group is characterised by low bottom temperatures, high concentrations of bottom nitrate and low to moderate values for other environmental variables (productivity, dissolved oxygen and salinity at depth). Benthic invertebrate assemblages are diverse and characterised by squid, crustacea, urchin, brachiopods and corals (Table 62). Demersal fish assemblages are also diverse and are characterised by very high frequency occurrence of Hoki, ling, dory and javelinfish (Table 62). This group has a very high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate model variability (SD), Table 63).

20.3 Similar groups

Closely related to group 21; more loosely related to group 22.

20.4 Characterising environmental conditions

Table 61: Group 20 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	537 m	Intermediate depth
Salinity at depth	34.48 psu	Low salinity at depth
Bottom nitrate	20.66 µmol L^{-1}	High concentrations of nitrate at depth
Dissolved oxygen at depth	5.44 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	7.72 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	33 mg C m^{-2} d^{-1}	Moderate productivity

20.5 Characterising species

Table 62: Species name, mean frequency occurrence and % contribution to group 20 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	1894	279	*Nototodarus*	Squid	0.46	47.26
				Onykia	Squid	0.43	32.9
	MMG	87	202	*Munida*	Squat lobster	0.48	28.62
				Goniocidaris	Sea urchin	0.26	7.6
				Brucerolis	Isopod	0.23	6.23
				Campylonotus	Shrimp	0.25	5.96
	SMG	39	100	*Flabellum*	Coral	0.23	17.3
				Liothyrella	Brachiopod	0.26	7.81
				Gyrothyris	Brachiopod	0.23	7.62
				Goniocidaris	Sea urchin	0.18	5.81
				Paramaretia	Sea urchin	0.15	5.05
				Goniocorella	Coral	0.21	4.64

				Phylladiorhynchus	Squat lobster	0.18	4.48
	SSG	11	15	*Liothyrella*	Brachiopod	0.55	58.39
				Gyrothyris	Brachiopod	0.45	34.9
Demersal fish		1916	194	*Macruronus novaezelandiae*	Hoki	0.97	12.17
				Genypterus blacodes	Ling	0.92	10.71
				Cyttus traversi	Lookdown dory	0.89	9.6
				Lepidorhynchus denticulatus	Javelinfish	0.87	8.9
				Hydrolagus bemisi	Pale ghost shark	0.75	6.41
				Coelorinchus bollonsi	Bollons' rattail	0.72	5.73
				Merluccius australis	Hake	0.67	5.51
				Etmopterus lucifer	Lucifer dogshark	0.62	4.27
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

20.6 Uncertainty ranges

Table 63: Mean uncertainty values for group 20 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.749	High
Demersal fish	0.003	Moderate	0.694	High
Macroalgae	0	High	0	Low
Reef fish	0	High	0.058	Low
Combined	0.003	Moderate	0.677	High

21 Group 21

21.1 Geographic location

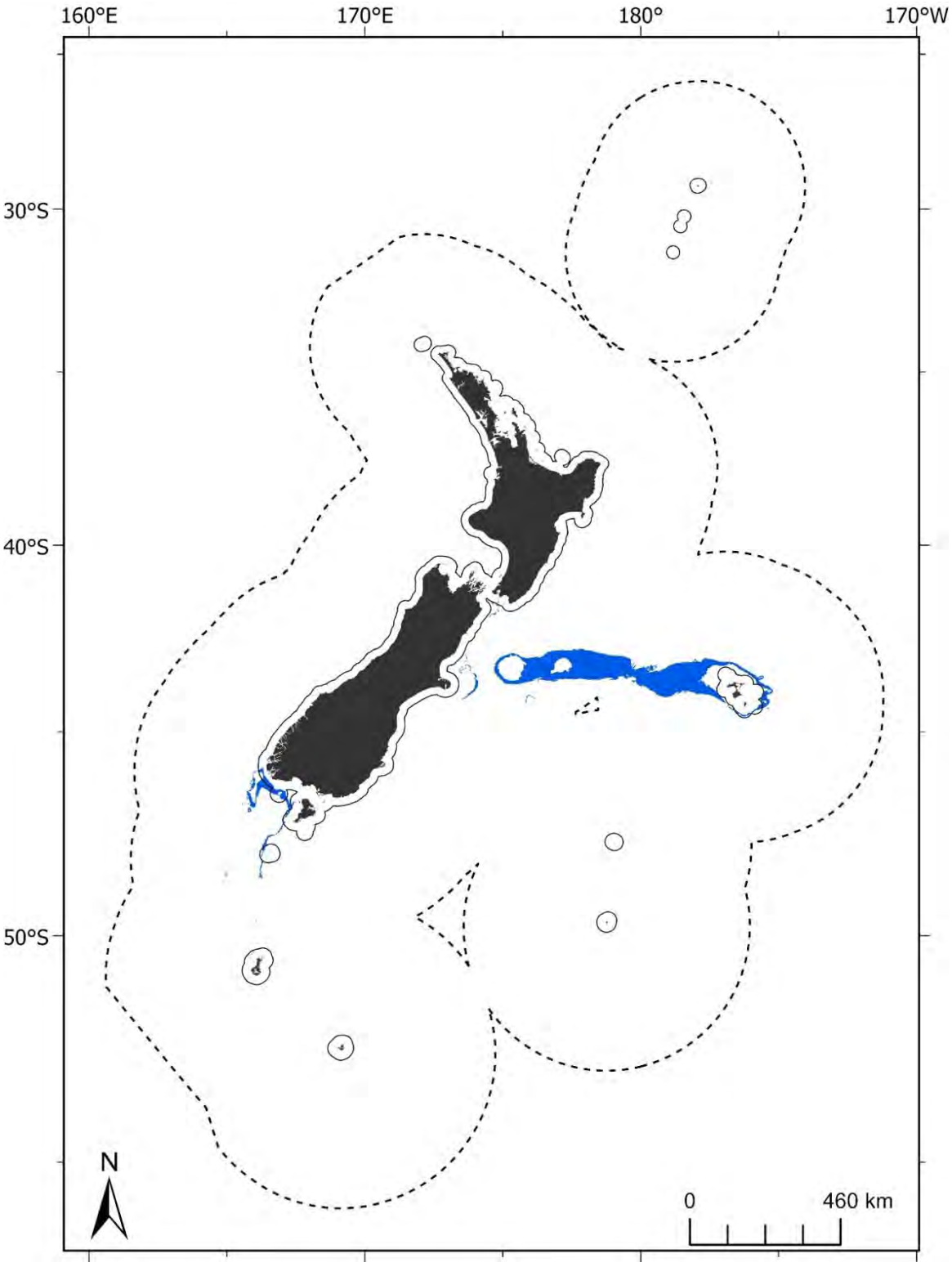

Figure 23: Geographic distribution of group 21 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

21.2 Group description

Group 21 is a large, widespread group (Figure 23), which predominantly occurs along the Chatham Rise at intermediate water depths and moderate water temperatures at depth (Table 64). Other characterising environmental variables have moderate values (productivity, oxygen concentrations, silicate concentrations and salinity at depth) reflecting that this group may be in a transitional zone along the Subtropical Front. Benthic invertebrate assemblages are diverse and characterised by squid, crustacea, urchins and brachiopods (Table 65). Demersal fish assemblages are also diverse and characterised by very high frequency occurrence of Hoki, ling, dory, dogfish, javelinfish and ghost shark (Table 65). This group has a very high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae or reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage but moderate for model variability (SD), Table 66).

21.3 Similar groups

Closely related to group 20; more loosely related to group 22.

21.4 Characterising environmental conditions

Table 64: Group 21 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	362 m	Intermediate depth
Salinity at depth	34.68 psu	Moderate salinity at depth
Bottom silicate	7.15 µmol L^{-1}	Moderate concentrations of silicate at depth
Dissolved oxygen at depth	5.49 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	9.3 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	37.94 mg C m^{-2} d^{-1}	Moderate productivity

21.5 Characterising species

Table 65: Species name, mean frequency occurrence and % contribution to group 21 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	1491	275	*Nototodarus*	Squid	0.73	71.9
	MMG	63	250	*Munida*	Squat lobster	0.68	44.44
				Brucerolis	Isopod	0.24	4.85
				Phylladiorhynchus	Squat lobster	0.29	4.85
				Gyrothyris	Brachiopod	0.27	4.41
	SMG	66	89	*Munida*	Squat lobster	0.36	35.73
				Neothyris	Brachiopod	0.23	11.56
				Gyrothyris	Brachiopod	0.23	10.23
				Liothyrella	Brachiopod	0.18	6.03
				Paramaretia	Sea urchin	0.17	5.08

				Goniocidaris	Sea urchin	0.15	4.36
	SSG	26	14	*Gyrothyris*	Brachiopod	0.54	51.74
				Liothyrella	Brachiopod	0.5	45.37
Demersal fish		1512	177	*Macruronus novaezelandiae*	Hoki	0.92	10.71
				Genypterus blacodes	Ling	0.87	9.27
				Cyttus traversi	Lookdown dory	0.83	8.13
				Lepidorhynchus denticulatus	Javelinfish	0.8	7.42
				Squalus acanthias	Spiny dogfish	0.74	6.53
				Hydrolagus novaezealandiae	Dark ghost shark	0.74	6.4
				Argentina elongata	Silverside	0.66	5.03
				Seriolella punctata	Silver warehou	0.64	4.92
				Coelorinchus bollonsi	Bollons' rattail	0.63	4.38
				Kathetostoma giganteum	Giant stargazer	0.59	4.13
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

21.6 Uncertainty ranges

Table 66: Mean uncertainty values for group 21 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.755	High
Demersal fish	0.003	Moderate	0.699	High
Macroalgae	0.002	Moderate	0.029	Low
Reef fish	0.004	Low	0.021	Low
Combined	0.003	Moderate	0.715	High

22 Group 22

22.1 Geographic location

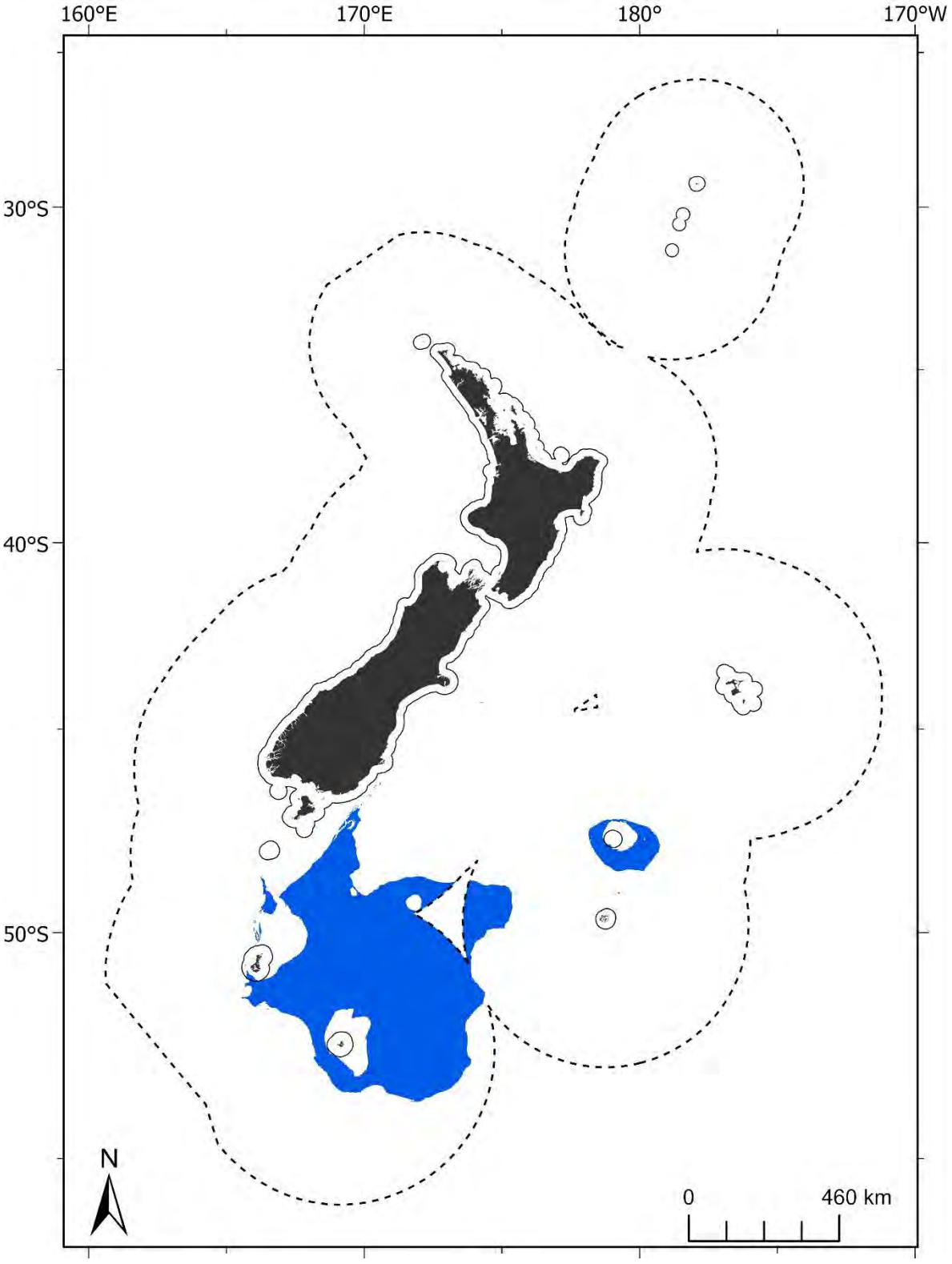

Figure 24: Geographic distribution of group 22 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

22.2 Group description

Group 22 is a large group (Figure 24) occurring on Campbell and Bounty plateaus south of the Subtropical Front at intermediate water depths waters with high concentrations of nitrate and moderate to high concentrations of dissolved oxygen at depth (Table 67). Other environmental variables have low to moderate values (productivity, temperature and silicate at depth). Benthic invertebrate assemblages are diverse and characterised by squid, molluscs, crustacea, echinoderms and a brachiopod (Table 68). Demersal fish assemblages are also diverse and characterised by and high frequency occurrence of ling, hoki, javelinfish and ghost shark (Table 68). This group has a very high number of samples for benthic invertebrates and demersal fish and no samples for macroalgae and reef fish (Table 68). Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 69).

22.3 Similar groups

Loosely related to groups 20 and 21.

22.4 Characterising environmental conditions

Table 67: Group 22 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	524 m	Intermediate depth
Bottom nitrate	20.47 µmol L^{-1}	High concentrations of nitrate at depth
Bottom silicate	13.21 µmol L^{-1}	Moderate concentrations of silicate at depth
Dissolved oxygen at depth	5.77 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Temperature at depth	6.89 °C	Low bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	26.37 mg C m^{-2} d^{-1}	Low productivity
Tidal current	0.104 m s^{-1}	Moderate tidal current speed

22.5 Characterising species

Table 68: Species name, mean frequency occurrence and % contribution to group 22 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	2468	195	*Onykia*	Squid	0.78	83.92
	MMG	81	138	*Campylonotus*	Shrimp	0.57	34.19
				Teratomaia	Crab	0.3	11.17
				Ceramaster	Cushion star	0.36	10.63
				Pseudostichopus	Sea cucumber	0.27	5.8
				Goniocidaris	Sea urchin	0.22	4.51
	SMG	31	126	*Ceramaster*	Cushion star	0.21	13.41
				Campylonotus	Shrimp	0.18	7.87
				Cominella	Gastropod	0.18	7.3

				Gyrothyris	Brachiopod	0.32	6.31
				Sassia	Gastropod	0.26	5.51
				Zygochlamys	Bivalve	0.26	4.13
				Lophopagurus	Crab	0.13	4.06
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		2669	161	*Genypterus blacodes*	Ling	0.91	14.53
				Macruronus novaezelandiae	Hoki	0.87	13.3
				Lepidorhynchus denticulatus	Javelinfish	0.86	12.59
				Hydrolagus bemisi	Pale ghost shark	0.81	10.95
				Argentina elongata	Silverside	0.63	6.98
				Micromesistius australis	Southern blue whiting	0.55	6.21
				Coelorinchus fasciatus	Banded rattail	0.57	4.87
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

22.6 Uncertainty ranges

Table 69: Mean uncertainty values for group 22 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.419	Moderate
Demersal fish	0.003	Moderate	0.39	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.002	Moderate	0.381	Moderate

23 Group 23

23.1 Geographic location

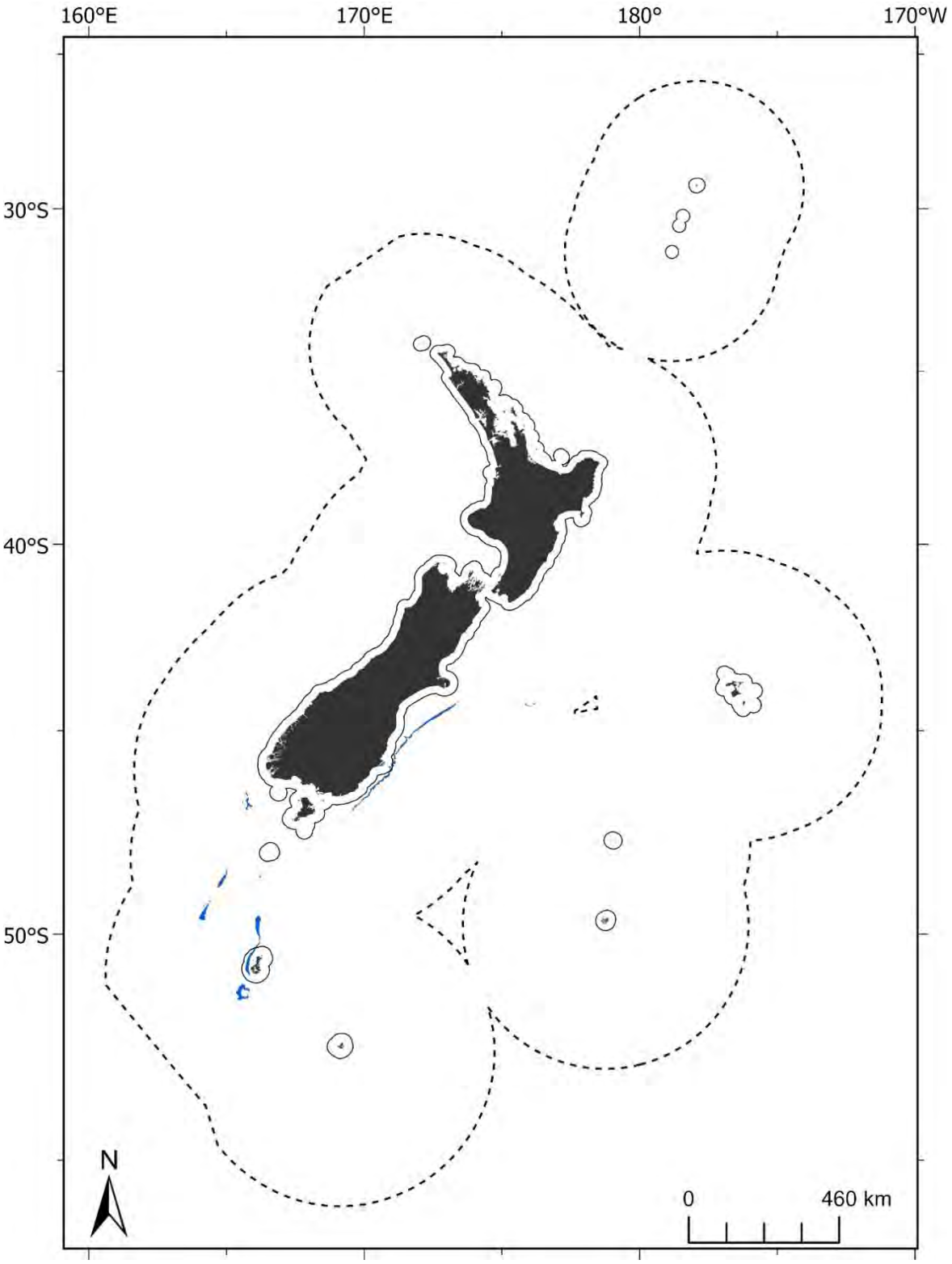

Figure 25: Geographic distribution of group 23 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

23.2 Group description

23.3 Group 23 is a widespread group (Figure 25) occurring south of the Subtropical Front along shelf breaks at intermediate water depths with high dissolved oxygen at depth (Table 70). Other environmental variables have moderate values (productivity, temperature, nitrate concentration at depth). Benthic invertebrate assemblages are characterised by squid, crab, a polychaete and various echinoderms and gastropods (Table 71). Demersal fish assemblages are characterised by high frequency occurrence of the spiny dogfish, dark ghost shark and ling (Table 71). In shallower depths, this group has macroalgal assemblages that are characterized by several red algae species This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish but a low number of samples for benthic invertebrates sampled with other gear types, low numbers of macroalgae samples and no samples for reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD),Table 72). Note, that despite some samples available for macroalgal assemblages, the environmental coverage for this biotic group is low (low confidence in predictions for these taxa in this group).

23.4 Similar groups

Loosely related to groups 20 – 22.

23.5 Characterising environmental conditions

Table 70: Group 23 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	298 m	Intermediate depth
Slope	3.86 °	High slope
Bottom nitrate	16.84 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	6.05 mg L^{-1}	High concentrations of oxygen at depth
Temperature at depth	8.25 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	36.33 mg C m^{-2} d^{-1}	Moderate productivity
Benthic position index	1097.725	High seafloor unevenness

23.6 Characterising species

Table 71: Species name, mean frequency occurrence and % contribution to group 23 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	270	136	*Nototodarus*	Squid	0.92	98.08
	MMG	8	95	*Lophopagurus*	Crab	0.63	25.47
				Spirobranchus	Polychaete	0.5	18.15
				Astromesites	Sea star	0.38	6.38

				Sclerasterias	Sea star	0.38	6.18
				Neothyris	Brachiopod	0.25	6.15
				Ophiomusa	Brittle star	0.25	6.15
	SMG	28	100	*Neothyris*	Brachiopod	0.57	22.12
				Aerothyris	Brachiopod	0.36	10.05
				Maurea	Gastropod	0.36	8.03
				Pseudechinus	Sea urchin	0.39	8.01
				Cantharidus	Gastropod	0.29	4.23
	SSG**	1	2	*na*	*na*	*na*	*na*
Demersal fish		279	85	*Squalus acanthias*	Spiny dogfish	0.8	16.27
				Hydrolagus novaezealandiae	Dark ghost shark	0.72	12.41
				Genypterus blacodes	Ling	0.71	11.85
				Seriolella punctata	Silver warehou	0.68	11.68
				Arnoglossus scapha	Witch	0.59	8.07
				Pseudophycis bachus	Red cod	0.56	7.22
				Thyrsites atun	Barracouta	0.53	7
Macroalgae		9	44	*Callophyllis atrosanguinea*	Red algae	0.44	13
				Schizoseris dichotoma	Red algae	0.33	10.14
				Pterothamnion squarrulosum	Red algae	0.33	8.22
				Hymenena durvillaei	Red algae	0.33	7.88
				Sarcothalia lanceata	Red algae	0.33	6.14
				Marginariella parsonsii	Brown algae	0.33	6.14
				Blastophyllis calliblepharoides	Red algae	0.22	4.24
				Desmarestia ligulata	Brown algae	0.33	4.21
				Halopteris funicularis	Brown algae	0.33	4.21
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

23.7 Uncertainty ranges

Table 72: Mean uncertainty values for group 23 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.779	High
Demersal fish	0.003	Moderate	0.546	High
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low

Combined	0.003	Moderate	0.543	High

24 Group 24

24.1 Geographic location

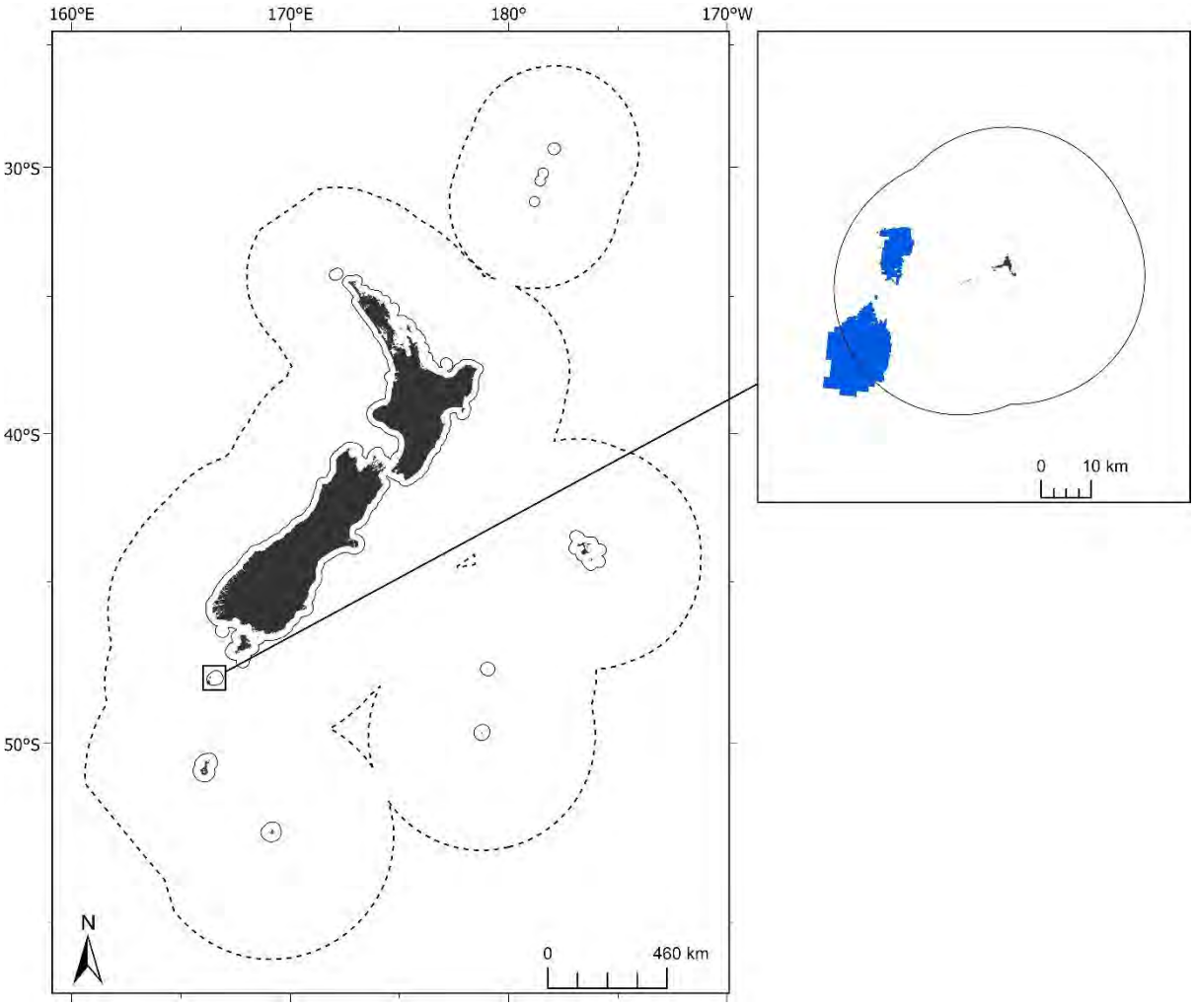

Figure 26: Geographic distribution of group 24 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

24.2 Group description

Group 24 is a very small group occurring in the deep waters on the shelf break of The Snares islands south of the Subtropical Front (Figure 26) in waters with moderate temperature, salinity at depth and productivity, and moderate to high oxygen concentrations (Table 73). There is insufficient sampling for any biotic group to define characterising taxa (Table 74). Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 75), suggesting sampling in areas with similar environmental conditions has occurred for these taxa in other SCC groups.

24.3 Similar groups

Closely related to group 25; more loosely related to group 26.

24.4 Characterising environmental conditions

Table 73: Group 24 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	1404 m	Deep water
Slope	5.77 °	High slope
Salinity at depth	34.7 µmol L^{-1}	Moderate salinity at depth
Dissolved oxygen at depth	5.8 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Temperature at depth	9.9 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	34.7 mg C m^{-2} d^{-1}	Moderate productivity
Benthic sediment disturbance	0.002	Low benthic sediment disturbance by wave action

24.5 Characterising species

Table 74: Species name, mean frequency occurrence and % contribution to group 24 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	0	0	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG*	0	0	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish *		0	0	*na*	*na*	*na*	*na*
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

24.6 Uncertainty ranges

Table 75: Mean uncertainty values for group 24 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.656	High
Demersal fish	0.003	Moderate	0.673	High
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.003	Moderate	0.793	High

25 Group 25

25.1 Geographic location

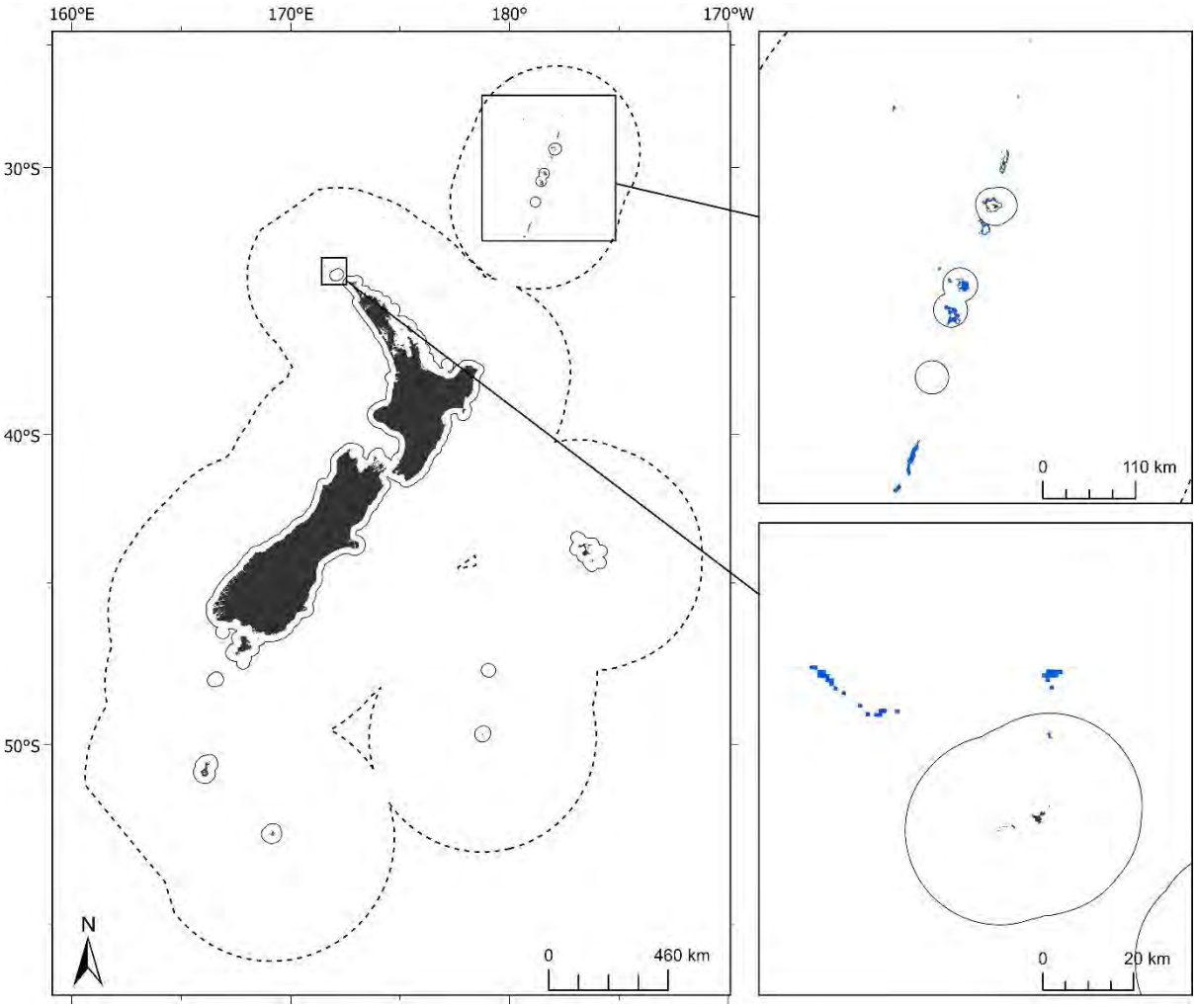

Figure 27: Geographic distribution of group 25 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

25.2 Group description

Group 25 is a small group occurring at intermediate water depths with steep relief along the Kermadec Ridge and seamounts north of the Three Kings Islands (Figure 27). These northern waters have low oxygen and productivity, with moderate temperature and solute concentrations (Table 76). Benthic invertebrate assemblages are diverse (especially given the relatively low sample number) and are characterised predominantly by corals, with two bivalve species, squat lobster*, a* hydrozoan and a sea star (Table 77). This group has a moderate number of samples for benthic invertebrates and no samples for other biotic groups (Table 77). Overall confidence in modelled relationships is low to moderate for this group (low confidence for 'combined' biotic group environmental coverage and moderate model variability (SD), Table 78).

25.3 Similar groups

Closely related to group 24; more loosely related to group 26.

25.4 Characterising environmental conditions

Table 76: Group 25 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	411 m	Intermediate depth
Slope	7.36 °	High slope
Bottom nitrate	14.92 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	4.63 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	11.48 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	20.95 mg C m^{-2} d^{-1}	Low productivity
Benthic position index	1500.096 m	High seafloor unevenness
Turbidity	0.001 m^{-1}	Low turbidity

25.5 Characterising species

Table 77: Species name, mean frequency occurrence and % contribution to group 25 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	7	14	*na*	*na*	*na*	*na*
	MMG	19	131	*Caryophyllia*	Coral	0.47	24.35
				Stichopathes	Coral	0.32	15.71
				Stylopathes	Coral	0.21	6.03
				Coronaster	Sea star	0.21	5.83
				Eguchipsammia	Coral	0.26	5.08
	SMG	19	66	*Stichopathes*	Coral	0.32	15.62
				Cryptopecten	Bivalve	0.32	10.31
				Antipathes	Coral	0.21	10.24
				Caryophyllia	Coral	0.26	9.95
				Errina	Hydrozoan	0.21	9.28
				Barbatia	Bivalve	0.26	8.83
				Munida	Squat lobster	0.26	7.57
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish *		0	0	*na*	*na*	*na*	*na*
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

25.6 Uncertainty ranges

Table 78: Mean uncertainty values for group 25 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.5	High
Demersal fish	0.003	Moderate	0.041	Low
Macroalgae	0.002	Moderate	0.011	Low
Reef fish	0.004	Low	0.011	Low
Combined	0.003	Moderate	0.046	Low

26 Group 26

26.1 Geographic location

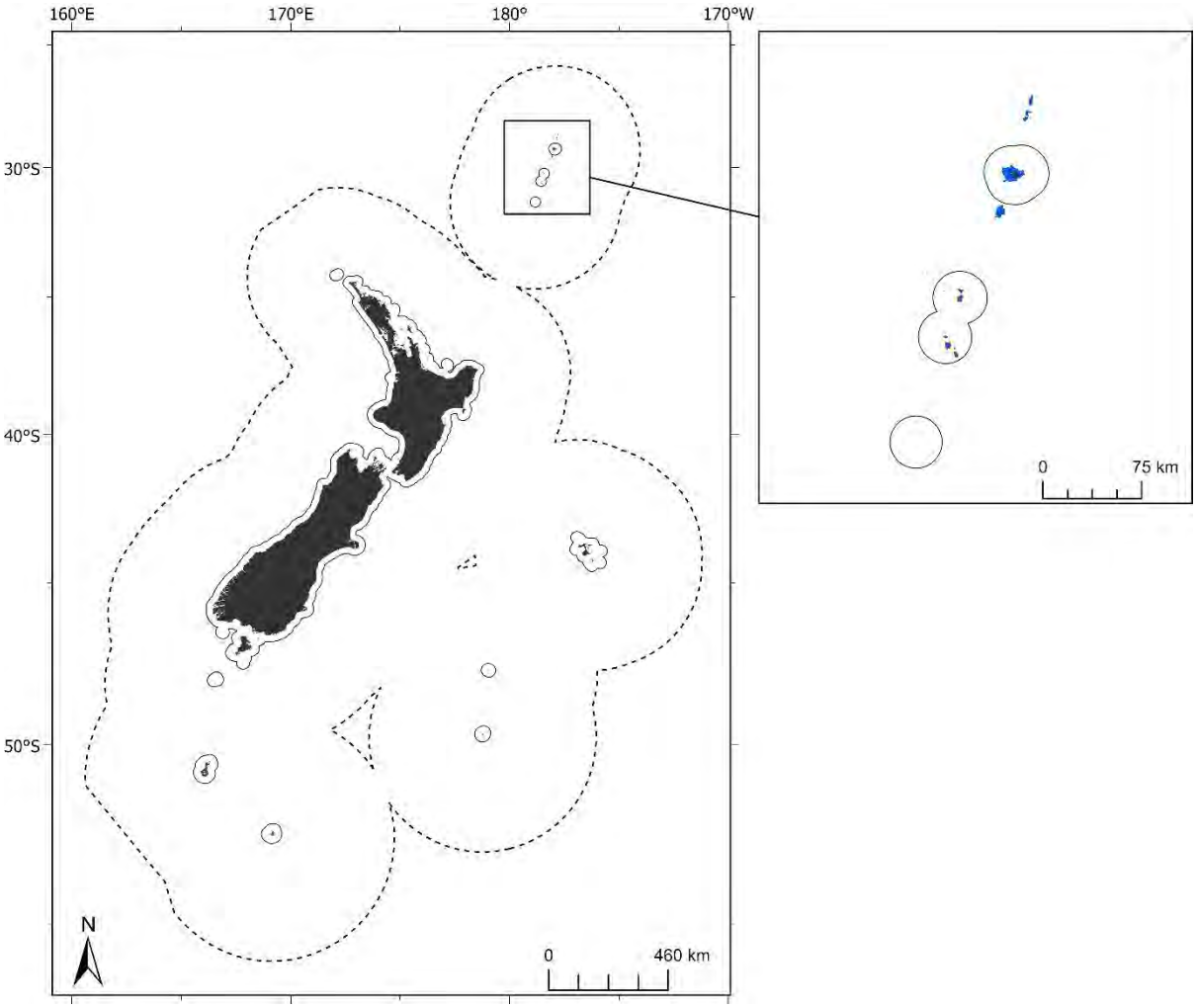

Figure 28: Geographic distribution of group 26 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

26.2 Group description

Group 26 is a small group localized on the Kermadec Ridge and around the Kermadec Islands (Figure 28). This group is characterised by high water temperatures and salinity at depth, and low dissolved oxygen and silicate (Table 79). Species Assemblages are characterised by high frequency occurrence of echinoderms, corals and lower frequency bivalves (benthic invertebrates), high occurrence of two macroalgae species and very high frequency occurrence of multiple reef fish assemblages, including grouper, trevally, kingfish and wrasse (Table 80). This group has a low number of samples for benthic invertebrates, macroalgae and reef fish and no samples for demersal fish (Table 80). Overall confidence in modelled relationships is moderate for this group (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 81).

26.3 Similar groups

Loosely related to groups 24 and 25.

26.4 Characterising environmental conditions

Table 79: Group 26 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	170 m	Shelf depth
Slope	4.66 °	High slope
Bottom silicate	2.82 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	4.85 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	17.35 °C	High bottom water temperature
Salinity at depth	35.56 psu	High salinity at depth
Benthic position index	1635.71 m	High seafloor unevenness
Turbidity	0.001 m^{-1}	Low turbidity

26.5 Characterising species

Table 80: Species name, mean frequency occurrence and % contribution to group 26 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	2	2	*na*		*na*	*na*
	MMG	6	35	*Peronella*	Sea dollar	0.5	40.69
				Stichopathes	Coral	0.5	26.58
				Caryophyllia	Coral	0.33	13.79
	SMG	11	34	*Ophionereis*	Brittle star	0.18	44.94
				Cryptopecten	Bivalve	0.18	29.96
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae		24	27	*Dictyota intermedia*	Brown algae	0.38	46.89
				Martensia sp A	Red algae	0.33	27.47
Reef fish		7	29	*Epinephelus daemelii*	Grouper	1	6.41
				Pseudocaranx dentex	Trevally	1	6.41
				Seriola lalandi	Kingfish	1	6.41
				Atypichthys latus	Sea chub	1	6.41
				Amphichaetodon howensis	Butterflyfish	1	6.41
				Chromis dispilus	Damselfish	1	6.41
				Aplodactylus etheridgii	Marblefish	1	6.41
				Pseudolabrus luculentus	Wrasse	1	6.41
				Anampses elegans	Wrasse	1	6.41
				Parma alboscapularis	Damselfish	0.86	4.64

	Notolabrus inscriptus	Wrasse	0.86	4.64
	Scorpis violaceus	Sea chub	0.86	4.56

**** No samples with species present, ** insufficient data to run SIMPER analysis***

26.6 Uncertainty ranges

Table 81: Mean uncertainty values for group 26 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.693	High
Demersal fish	0.003	Moderate	0.008	Low
Macroalgae	0.002	Moderate	0.764	High
Reef fish	0.005	Low	0.443	Moderate
Combined	0.003	Moderate	0.25	Moderate

27 Group 27

27.1 Geographic location

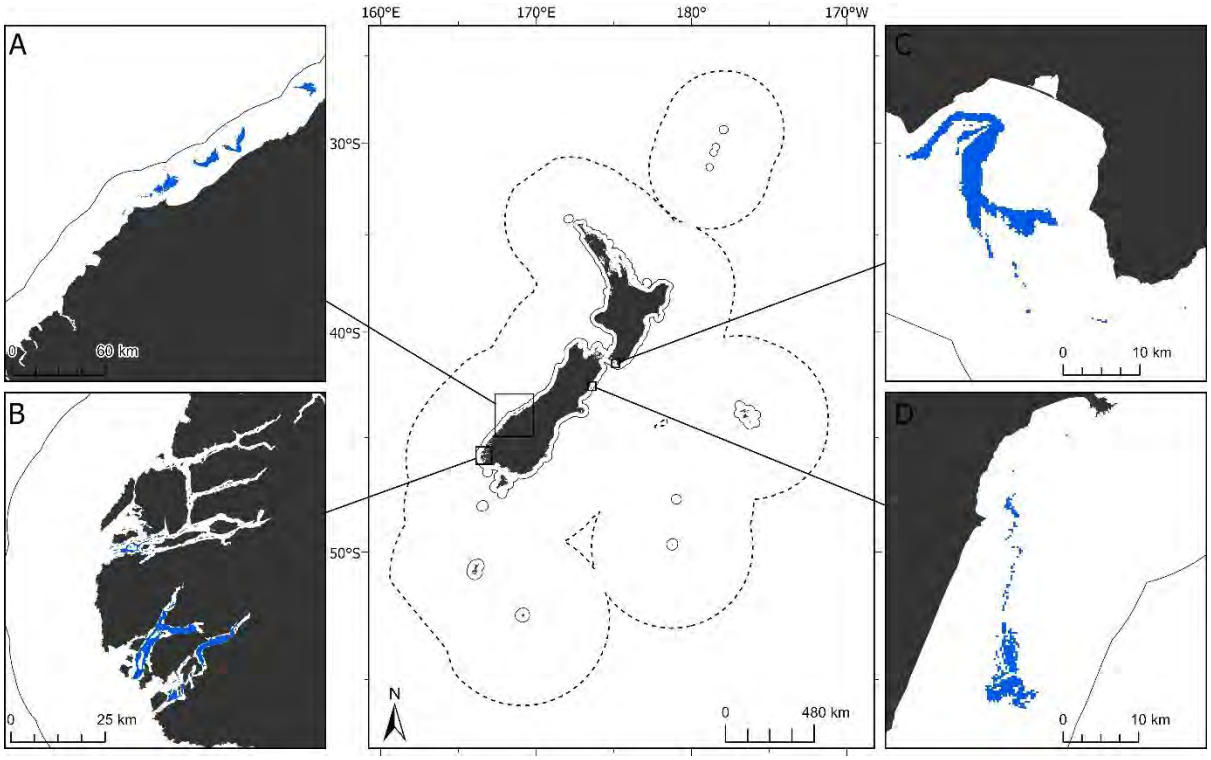

Figure 29: Geographic distribution of group 27 from a 75-group seafloor community classification (SCC) for the seas to the outer edge of the New Zealand Exclusive Economic Zone (dashed line).

27.2 Group description

Group 27 is a small, patchy group (Figure 29) occurring in shelf break canyons and fiords, at intermediate water depths waters close to the shoreline (Table 76). This group has moderate oxygen concentration, temperature and productivity and high salinity at depth (Table 76). This group has a low number of samples for benthic invertebrates, demersal fish and macroalgae and no samples for reef fish. Benthic invertebrate assemblages are characterised by high frequency occurrence of the squid and a crab, while demersal fish populations are characterised by high frequency occurrence of ling, dogfish and hoki (Table 83). Macroalgal assemblages are characterised by a single species of brown algae. Overall confidence in modelled relationships is moderate – high for this group (high confidence for 'combined' biotic group environmental coverage and moderate model variability (SD), Table 84). Given the low sample number occurring in this group, the moderate – high confidence in modelled relationships is driven by sampling in areas with similar environmental conditions.

27.3 Similar groups

Loosely related to groups 28 and 29.

27.4 Characterising environmental conditions

Table 82: Group 27 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	356 m	Intermediate depth
Slope	5.38 °	High slope
Salinity at depth	35.08 psu	High salinity at depth
Dissolved oxygen at depth	5.26 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	12.18 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	44.67 mg C m^{-2} d^{-1}	Moderate productivity
Chlorophyll *a* concentration spatial gradient	0.05 mg m^{-3} m^{-1}	High chlorophyll *a* gradient

27.5 Characterising species

Table 83: Species name, mean frequency occurrence and % contribution to group 27 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	4	8	*Nototodarus*	Squid	0.5	100
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	4	14	*Trichopeltarion*	Crab	0.5	100
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		14	38	*Genypterus blacodes*	Ling	0.79	32.58
				Squalus acanthias	Spiny dogfish	0.79	26.62
				Macruronus novaezelandiae	Hoki	0.64	24.2
Macroalgae		5	20	*Carpophyllum flexuosum*	Brown algae	0.4	100
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

27.6 Uncertainty ranges

Table 84: Mean uncertainty values for group 27 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.718	High
Demersal fish	0.003	Moderate	0.779	High
Macroalgae	0.002	Moderate	0.555	High
Reef fish	0.005	Low	0.408	High
Combined	0.003	Moderate	0.794	High

28 Group 28

28.1 Geographic location

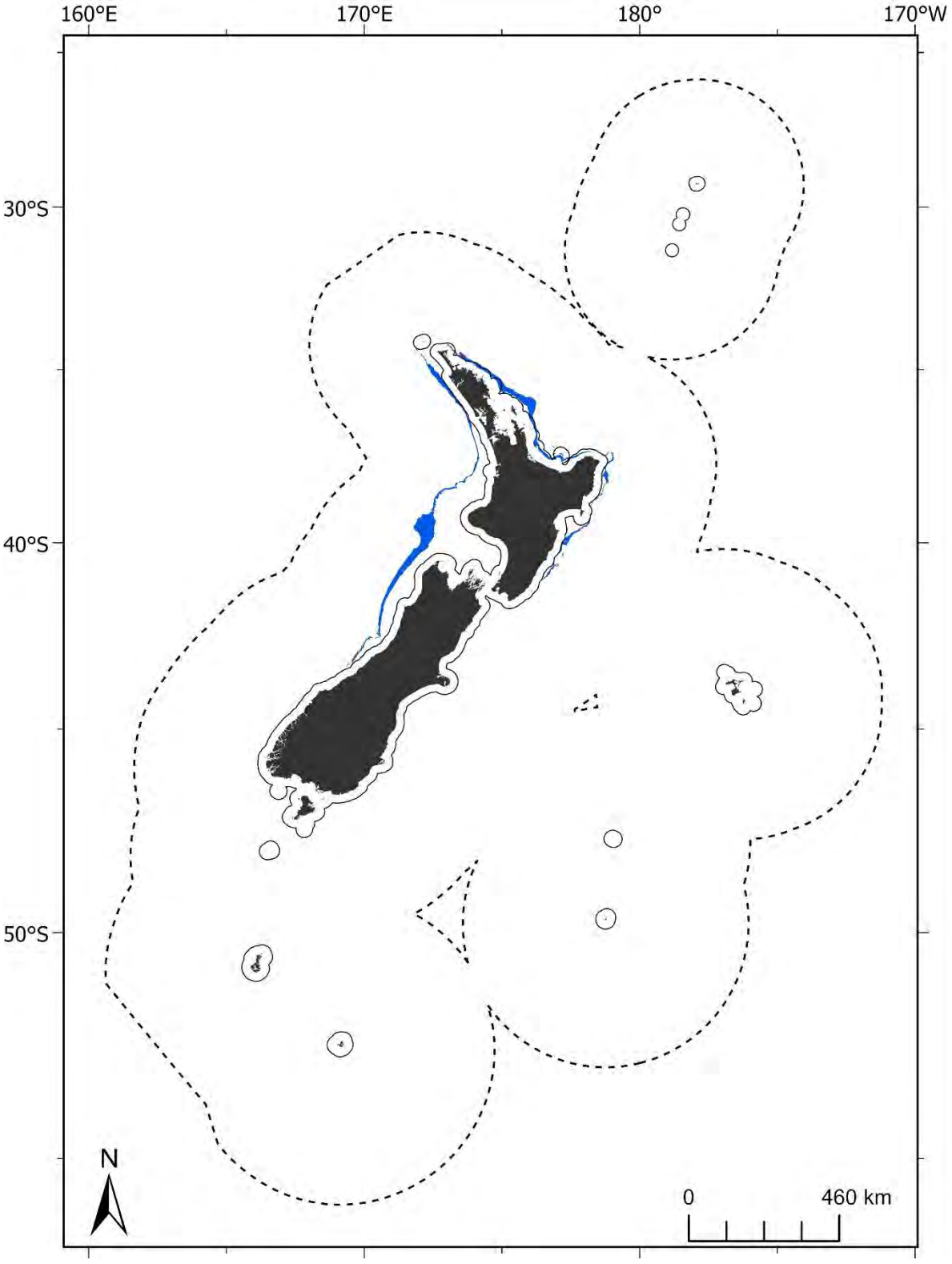

Figure 30: Geographic distribution of group 28 from a 75-group seafloor community classification (SCC) for the seas to the outer edge of the New Zealand Exclusive Economic Zone in the New Zealand marine environment (EEZ shown as dashed line).

28.2 Group description

Group 28 is a large, widespread group (Figure 30) occurring on continental shelf breaks north of the Subtropical Front at intermediate water depths, including at the eastern side of the Challenger Plateau (Table 85). This group is characterised by high salinity at depth, low oxygen concentration, and moderate temperature, nitrate concentrations and productivity (Table 85). Benthic invertebrate assemblages are diverse, characterised by high frequency occurrence of squid and multiple crustacea, echinoderm and coral species (Table 86). Demersal fish assemblages are characterised by moderate frequency occurrence of hoki, ling and dory (Table 86). This group has a high number of samples for benthic invertebrates, demersal fish but no samples for macroalgae or reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate model variability (SD), Table 87).

28.3 Similar groups

Closely related to group 29; more loosely related to group 27.

28.4 Characterising environmental conditions

Table 85: Group 28 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	291 m	Intermediate depth
Bottom nitrate	13.38 µmol L^{-1}	Moderate concentrations of nitrate at depth
Salinity at depth	35.07 psu	High salinity at depth
Dissolved oxygen at depth	4.75 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	12.11 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	34.34 mg C m^{-2} d^{-1}	Moderate productivity
Benthic sediment disturbance	0.00005 m s-1	Low benthic sediment disturbance by wave action

28.5 Characterising species

Table 86: Species name, mean frequency occurrence and % contribution to group 28 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	808	206	*Nototodarus*	Squid	0.63	69.46
				Metanephrops	Squat lobster	0.43	18.3
	MMG	68	218	*Lyreidus*	Crab	0.28	12.24

				Pseudarchaster	Sea star	0.19	11.93
				Notopandalus	Shrimp	0.18	11.05
				Munida	Squat lobster	0.19	6.9
				Araeosoma	Sea urchin	0.22	5.8
				Aglaophenia	Hydrozoan	0.13	4.26
				Lyreidus	Crab	0.28	12.24
	SMG	31	75	*Globocassidulina*	Foraminifera	0.1	23.51
				Saccella	Bivalve	0.13	13.72
				Aciculites	Sponge	0.13	9.01
				Eguchipsammia	Coral	0.13	6.74
				Goniocorella	Coral	0.13	6.15
				Conopora	Hydrozoan	0.1	5.55
				Caryophyllia	Coral	0.1	4.2
	SSG	11	12	*Marphysa*	Polychaete	0.36	100
Demersal fish		824	169	*Macruronus novaezelandiae*	Hoki	0.59	9.13
				Genypterus blacodes	Ling	0.57	7.72
				Capromimus abbreviatus	Dory	0.56	7.24
				Lepidorhynchus denticulatus	Javelinfish	0.56	7.14
				Nemadactylus macropterus	Tarakihi	0.43	5.6
				Squalus griffini	Northern spiny dogfish	0.43	5.11
				Pseudophycis bachus	Red cod	0.43	4.04
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

28.6 Uncertainty ranges

Table 87: Mean uncertainty values for group 28 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.727	High
Demersal fish	0.002	Moderate	0.626	High
Macroalgae	0.002	Moderate	0.025	Low
Reef fish	0.004	Low	0.021	Low
Combined	0.002	Moderate	0.645	High

29 Group 29

29.1 Geographic location

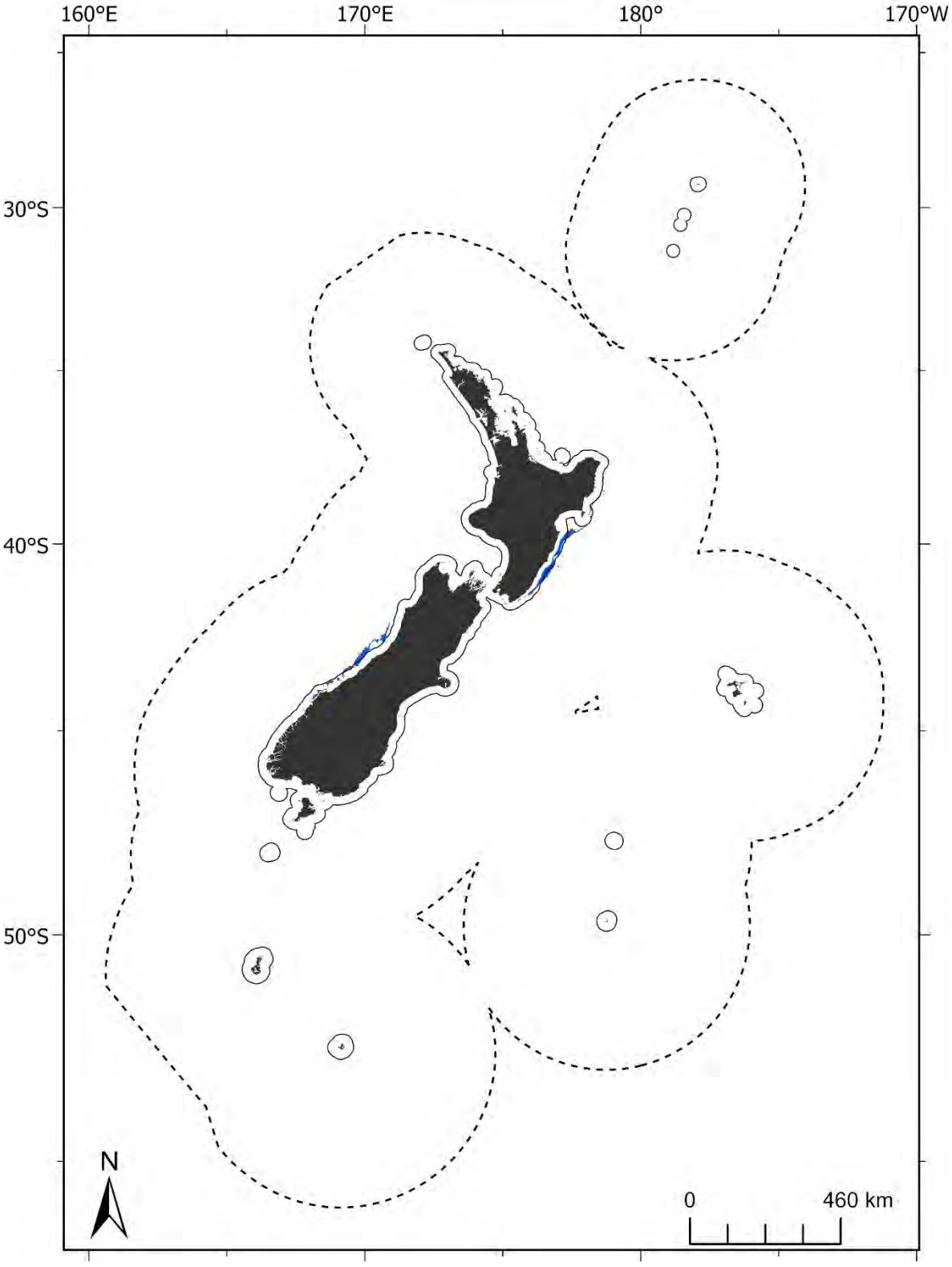

Figure 31: Geographic distribution of group 29 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

29.2 Group description

Group 29 occurs in continental shelf breaks north of the Subtropical Front (Figure 31) at intermediate water depths, including the Hikurangi margin (Table 88). This group is characterised by low tidal speed, moderate bottom salinity, temperature, nitrate and oxygen concentrations, and moderate productivity. Benthic invertebrate assemblages are characterised by high frequency occurrence of squid, crabs, and moderate frequency coral, urchin and polychaete occurrence (Table 89). Demersal fish assemblages are characterised by high frequency hoki, tarakihi and red cod (Table 89). This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish but a low number of samples for benthic invertebrates sampled with other gear types and no samples for macroalgae or reef fish (Table 89). Despite the low sample number across several taxa, overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate model variability Table 90) suggesting sampling in areas with similar environmental conditions has occurred for these taxa in other SCC groups.

29.3 Similar groups

Closely related to group 28; more loosely related to group 27.

29.4 Characterising environmental conditions

Table 88: Group 29 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	206 m	Intermediate depth
Bottom nitrate	11.12 µmol L^{-1}	Moderate concentrations of nitrate at depth
Salinity at depth	35.08 psu	High salinity at depth
Dissolved oxygen at depth	5.16 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	12.43 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	39.98 mg C m^{-2} d^{-1}	Moderate productivity
Tidal current	0.032 m s-1	Low tidal current speed

29.5 Characterising species

Table 89: Species name, mean frequency occurrence and % contribution to group 29 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	295	57	*Nototodarus*	Squid	0.88	87.88
	MMG	6	18	*Trichopeltarion*	Crab	0.5	72.66
	SMG	11	29	*Caryophyllia*	Coral	0.36	40.61
				Lophopagurus	Crab	0.27	13.7
				Echinocardium	Sea urchin	0.18	9.8
				Aglaophamus	Polychaete	0.18	8.4

	SSG**	3	7	*na*	*na*	*na*	*na*
Demersal fish		328	121	*Macruronus novaezelandiae*	Hoki	0.77	10.96
				Nemadactylus macropterus	Tarakihi	0.73	8.6
				Pseudophycis bachus	Red cod	0.76	8.59
				Genypterus blacodes	Ling	0.68	8.1
				Kathetostoma giganteum	Giant stargazer	0.71	7.84
				Lepidopus caudatus	Frostfish	0.62	5.92
				Squalus acanthias	Spiny dogfish	0.59	5.82
				Thyrsites atun	Barracouta	0.57	5.09
				Capromimus abbreviatus	Dory	0.57	4.69
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

29.6 Uncertainty ranges

Table 90: Mean uncertainty values for group 29 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.746	High
Demersal fish	0.003	Moderate	0.751	High
Macroalgae	0.002	Moderate	0.034	Low
Reef fish	0.005	Low	0.11	Moderate
Combined	0.003	Moderate	0.79	High

30 Group 30

30.1 Geographic location

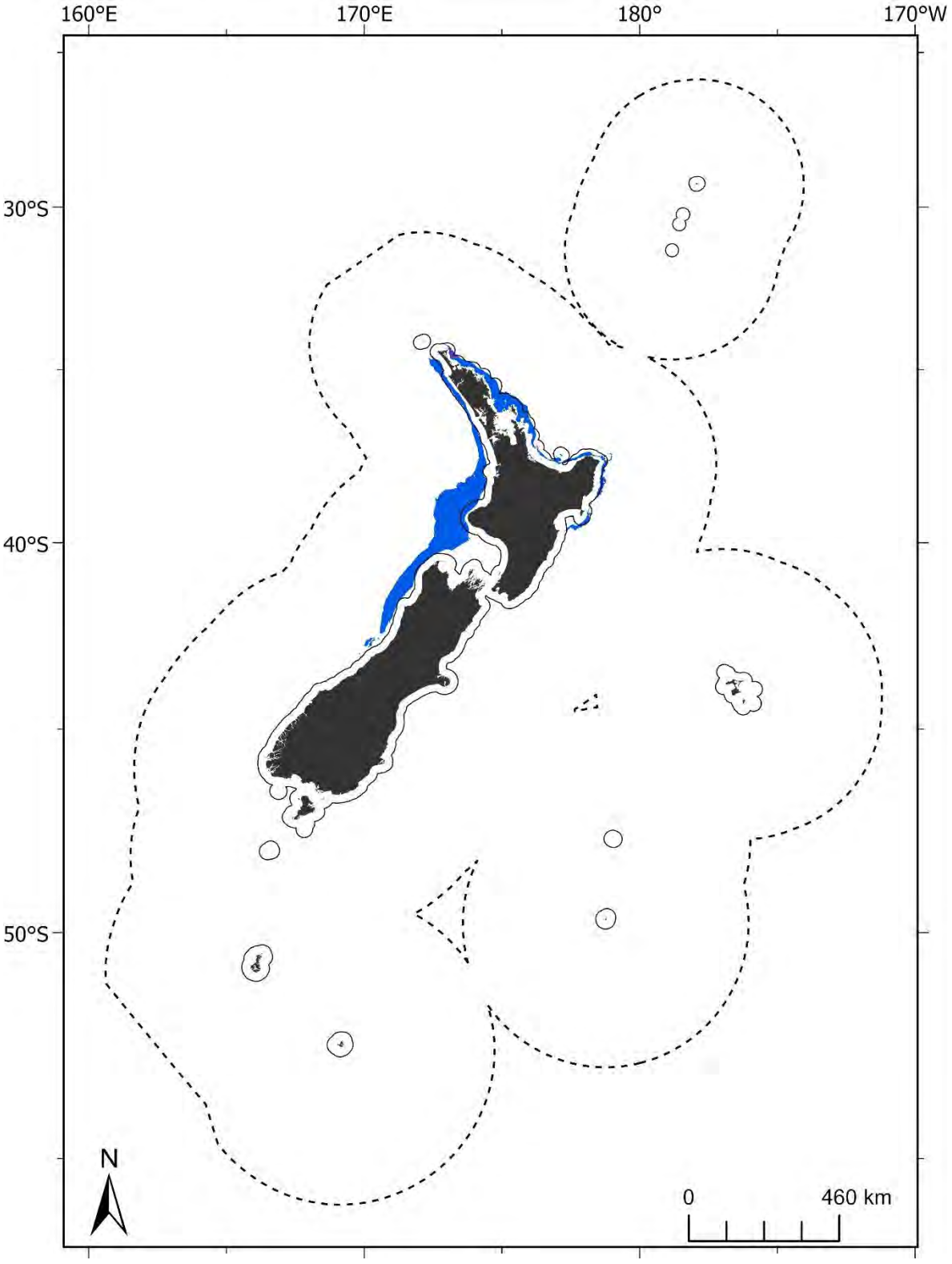

Figure 32: Geographic distribution of group 30 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

30.2 Group description

Group 30 is a large widespread group (Figure 32) occurring on the continental shelf north of the Subtropical Front in warm, moderate productivity coastal waters on both sides of the North Island but predominantly off the west coast (Table 91). This group is characterised by moderate oxygen concentrations and low dissolved silicate and nitrate concentrations at depth (Table 91). Benthic invertebrate assemblages are diverse and are characterised by high frequency occurrence of squid, multiple coral species, and low frequency bivalve, brachiopod and gastropod occurrence (Table 92). Fish assemblages are diverse, with ~130 demersal fish taxa and ~50 reef fish taxa. Demersal fish assemblages are characterised by high frequency tarakihi, barracouta and school sharks. Reef fish assemblages are characterised by very high frequency occurrence of nearly 20 taxa including perch, damselfish and morwong (Table 92). This group has a very high number of samples for benthic invertebrates and demersal fish and very low samples for macroalgae and reef fish (Table 92). Overall confidence in modelled relationships is moderate – high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 93). Note, there is low sample number and low confidence associated with model variability of reef fish (Table 93).

30.3 Similar groups

Closely related to group 31; more loosely related to group 32.

30.4 Characterising environmental conditions

Table 91: Group 30 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	129 m	Shelf depth
Slope	0.34 °	Low slope
Bottom silicate	4.91 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.21 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	14.15 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	41.22 mg C m^{-2} d^{-1}	Moderate productivity
Turbidity	0.002 m^{-1}	Low turbidity

30.5 Characterising species

Table 92: Species name, mean frequency occurrence and % contribution to group 30 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	1271	154	*Nototodarus*	Squid	0.92	99.06
	MMG	65	191	*Lyreidus*	Crab	0.4	15.8
				Heteromolpadia	Sea cucumber	0.31	10.71
				Ophiozonoida	Brittle star	0.31	10

				Monomyces	Coral	0.32	7.15
				Peronella	Sea cucumber	0.26	5.21
	SMG	70	154	*Monomyces*	Coral	0.13	11.8
				Saccella	Bivalve	0.11	10.51
				Caryophyllia	Coral	0.1	7.98
				Pratulum	Bivalve	0.09	6.14
				Splendrillia	Gastropod	0.06	5.37
				Neothyris	Brachiopod	0.07	4.68
				Tethocyathus	Coral	0.07	4.24
				Balanophyllia	Coral	0.06	4.11
	SSG	33	17	*Dittosa*	Crab	0.33	48.72
				Neothyris	Brachiopod	0.3	27.12
Demersal fish		1414	129	*Nemadactylus macropterus*	Tarakihi	0.75	13.05
				Thyrsites atun	Barracouta	0.7	11.48
				Trachurus declivis	Jack mackerel	0.59	8.22
				Galeorhinus galeus	School shark	0.56	7.19
				Zeus faber	John Dory	0.55	7.14
				Chelidonichthys kumu	Red gurnard	0.5	5.94
				Lepidopus caudatus	Frostfish	0.48	5.18
				Squalus acanthias	Spiny dogfish	0.48	5.01
				Lepidotrigla brachyoptera	Scaly gurnard	0.45	4.66
				Chrysophrys auratus	Snapper	0.4	4.1
Macroalgae**		3	3	*na*	*na*	*na*	*na*
Reef fish		3	49	*Centroberyx affinis*	Nannygai	1	4
				Caprodon longimanus	Perch	1	4
				Hypoplectrodes sp B	Perch	1	4
				Pseudocaranx dentex	Trevally	1	4
				Pagrus auratus	Snapper	1	4
				Scorpis violaceus	Sea chub	1	4
				Amphichaetodon howensis	Butterflyfish	1	4
				Chromis dispilus	Damselfish	1	4
				Parma alboscapularis	Damselfish	1	4
				Aplodactylus arctidens	Marblefish	1	4
				Cheilodactylus spectabilis	Morwong	1	4
				Nemadactylus douglasii	Morwong	1	4
				Pseudolabrus luculentus	Wrasse	1	4
				Bodianus vulpinus	Hogfish	1	4

	Odax pullus	Butterfish	1	4
	Forsterygion flavonigrum	Triplefin	1	4
	Parablennius laticlavius	Blenny	1	4
	Parika scaber	Leatherjacket	1	4

***** Insufficient data to run SIMPER analysis***

30.6 Uncertainty ranges

Table 93: Mean uncertainty values for group 30 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.642	High
Demersal fish	0.003	Moderate	0.606	High
Macroalgae	0.002	Moderate	0.138	High
Reef fish	0.004	Low	0.322	High
Combined	0.003	Moderate	0.623	High

31 Group 31

31.1 Geographic location

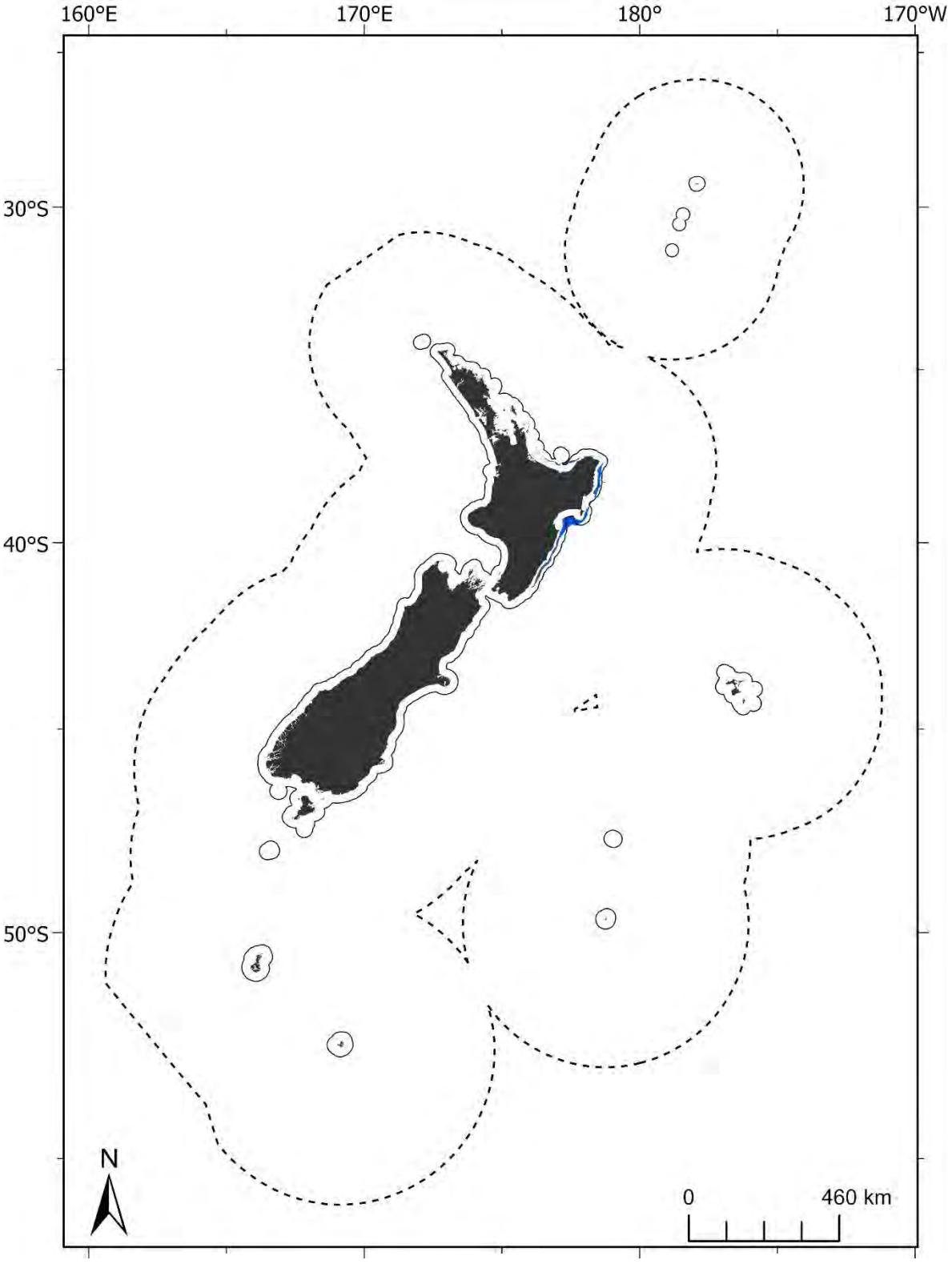

Figure 33: Geographic distribution of group 31 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

31.2 Group description

Group 31 is a large widespread group (Figure 33) occurring on the south east coast of the North Island continental shelf in coastal waters with high bottom temperature (Table 94). This group is also characterised by moderate productivity and dissolved oxygen concentrations, and low silicate and nitrate concentration at depth. Benthic invertebrate assemblages are characterised by high frequency occurrence of squid, and moderate frequency occurrence of an amphipod and sea cucumber (primarily sampled with the large LLG.LMG sampling gear types, Table 95). Demersal fish assemblages are characterised by high frequency occurrence of barracouta, gurnard and tarakihi (Table 95). This group has a moderate number of samples for benthic invertebrates sampled using LLG.LMG gear types and demersal fish but low samples for benthic invertebrates sampled using other gear types and no samples for macroalgae or reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 96).

31.3 Similar groups

Closely related to group 30; more loosely related to group 32.

31.4 Characterising environmental conditions

Table 94: Group 31 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	87 m	Shelf depth
Slope	0.28 °	Low slope
Bottom silicate	3.32 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.3 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	14.34 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	48.61 mg C m^{-2} d^{-1}	High productivity
Tidal current	0.036 m s-1	Low tidal current speed

31.5 Characterising species

Table 95: Species name, mean frequency occurrence and % contribution to group 31 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	114	18	*Nototodarus*	Squid	0.96	97.36
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	9	23	*Ampelisca*	Amphipod	0.32	41.04
				Heterothyone	Sea cucumber	0.26	29.93
	SSG**	2	6	*na*	*na*	*na*	*na*
		148	71	*Thyrsites atun*	Barracouta	0.89	11.85

Demersal fish			*Chelidonichthys kumu*	Red gurnard	0.86	11.53
			Nemadactylus macropterus	Tarakihi	0.73	7.74
			Lepidopus caudatus	Frostfish	0.7	7.19
			Zeus faber	John Dory	0.68	7.01
			Trachurus novaezelandiae	Yellowtail Jack mackerel	0.68	6.35
			Chrysophrys auratus	Snapper	0.6	5.88
			Cephaloscyllium isabellum	Carpet shark	0.61	5.28
			Genypterus blacodes	Ling	0.54	4.18
			Trachurus declivis	Jack mackerel	0.53	4.16
Macroalgae*	0	0	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

31.6 Uncertainty ranges

Table 96: Mean uncertainty values for group 31 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.737	High
Demersal fish	0.003	Moderate	0.691	High
Macroalgae	0.002	Moderate	0.58	High
Reef fish	0.005	Low	0.3	Moderate
Combined	0.003	Moderate	0.71	High

32 Group 32

32.1 Geographic location

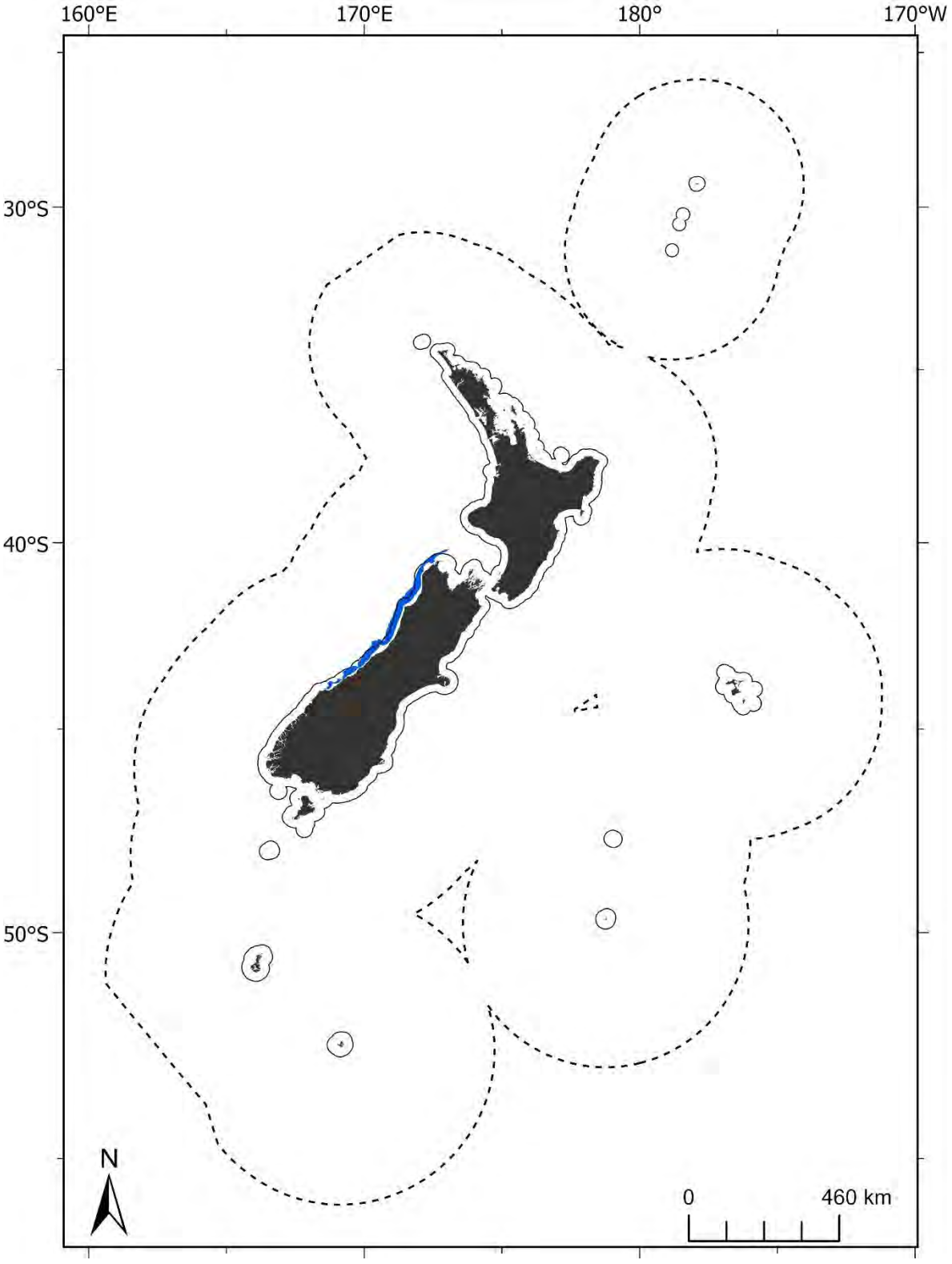

Figure 34: Geographic distribution of group 32 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

32.2 Group description

Group 32 occurs on the north west coast of the South Island continental shelf (Figure 34) in highly productive coastal waters (Table 97). This group is characterized by moderate concentrations of oxygen and nitrate, and high temperatures at depth (Table 97). Benthic invertebrate assemblages are characterised by high frequency occurrence of polychaetes and echinoderms (Table 98). Demersal fish assemblages are characterised by high frequency occurrence of dogfish, barracouta and cod, and macroalgal assemblages are characterised by a red algae species (Table 98). This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish but low samples for benthic invertebrates sampled with other gear types and macroalgae and no samples for reef fish. Overall confidence in modelled relationships is moderate – high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 99).

32.3 Similar groups

Loosely related to groups 30 and 31.

32.4 Characterising environmental conditions

Table 97: Group 32 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	109 m	Shelf depth
Slope	0.39 °	Low slope
Bottom nitrate	7.54 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	5.54 µmol L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	13.49 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	50.17 mg C m^{-2} d^{-1}	High productivity
Benthic position index	-90.605 m	Low seafloor evenness

32.5 Characterising species

Table 98: Species name, mean frequency occurrence and % contribution to group 32 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	691	41	*Nototodarus*	Squid	0.96	99.4
	MMG	3	10	*Psilaster*	Sea star	0.67	100
	SMG	16	40	*Aglaophamus*	Polychaete	0.44	21.05
				Heterothyone	Sea cucumber	0.25	8.71
				Maldane	Polychaete	0.31	8.6
				Diplocirrus	Polychaete	0.31	7.38
				Asychis	Polychaete	0.25	6.22
				Echinocardium	Sea urchin	0.13	6.19
				Natatolana	Isopod	0.25	5.85

				Glycera	Polychaete	0.25	5.27
				Ampelisca	Amphipod	0.25	4.36
	SSG	4	5	*Otionellina*	Bryozoan	0.43	54.98
				Maldane	Polychaete	0.43	21.3
Demersal fish		792	88	*Squalus acanthias*	Spiny dogfish	0.94	10.83
				Thyrsites atun	Barracouta	0.9	9.65
				Pseudophycis bachus	Red cod	0.82	7.9
				Galeorhinus galeus	School shark	0.79	7.26
				Nemadactylus macropterus	Tarakihi	0.77	7.15
				Cephaloscyllium isabellum	Carpet shark	0.74	6.31
				Chelidonichthys kumu	Red gurnard	0.68	5.52
				Mustelus lenticulatus	Rig	0.68	5.33
				Lepidotrigla brachyoptera	Scaly gurnard	0.61	4
Macroalgae		2	3	*Pterocladiella capillacea*	Red algae	1	100
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

32.6 Uncertainty ranges

Table 99: Mean uncertainty values for group 32 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.814	High
Demersal fish	0.003	Moderate	0.81	High
Macroalgae	0.002	Moderate	0.301	Moderate
Reef fish	0.005	Low	0.245	Moderate
Combined	0.003	Moderate	0.846	High

33 Group 33

33.1 Geographic location

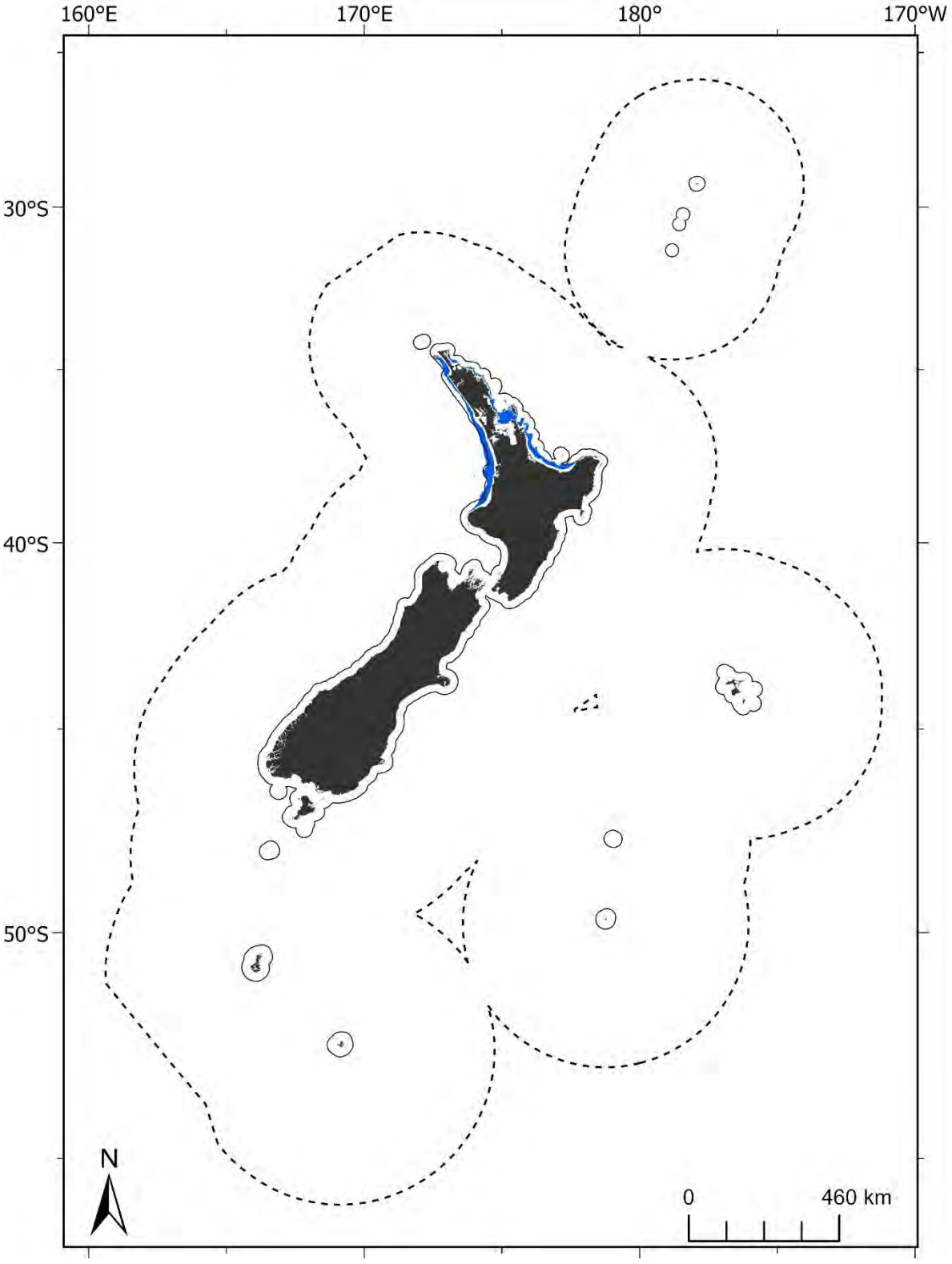

Figure 35: Geographic distribution of group 33 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

33.2 Group description

Group 33 occurs on the northern coast of both the west and east of the North Island continental shelf in shallow coastal waters (Figure 35, Table 100). This group is characterized by moderate concentrations of oxygen, low levels of dissolved nitrate, and high water temperatures at depth. Benthic invertebrate assemblages are relatively diverse (despite low sampling using LMG gear types), characterised by corals and sea stars, and high frequency bryozoan and polychaete species (Table 101). Demersal fish assemblages are characterised by the very high frequency occurrence of gurnard and snapper, and reef fish assemblages of damselfish and leatherjacket are predominant (Table 101). This group has diverse macroalgal assemblages which are characterised by various species of brown algae (Table 101). This group has a high number of samples for benthic invertebrates (overall across all gear types), demersal fish and macroalgae and a low number of samples for reef fish (Table 101). Overall confidence in modelled relationships is moderate – high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 102).

33.3 Similar groups

Closely related to group 34; more loosely related to group 35.

33.4 Characterising environmental conditions

Table 100: Group 33 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	64 m	Shelf depth
Bottom nitrate	3.39 µmol L^{-1}	Low concentrations of nitrate at depth
Salinity at depth	35.31 psu	High salinity at depth
Dissolved oxygen at depth	5.38 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	15.6 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	50.01 mg C m^{-2} d^{-1}	High productivity
Chlorophyll *a* concentration spatial gradient	0.022 mg m-3 m-1	Moderate Chlorophyll *a* gradient

33.5 Characterising species

Table 101: Species name, mean frequency occurrence and % contribution to group 33 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	361	70	*Nototodarus*	Squid	0.72	89.88
	MMG	15	67	*Astropecten*	Sea star	0.53	21.9
				Ophiactis	Brittle star	0.47	16.2
				Ophiozonoida	Brittle star	0.4	8.01
				Perissogorgia	Soft coral	0.4	7.65
				Luidia	Sea star	0.2	7.43
				Ophionereis	Brittle star	0.33	5
	SMG	73	140	*Talochlamys*	Bivalve	0.12	16.08

				Sphenotrochus	Stony coral	0.1	15.27
				Kionotrochus	Stony coral	0.08	6.5
				Herpetopoma	Gastropod	0.07	5.42
	SSG	14	12	Otionellina	Bryozoan	0.43	54.98
				Maldane	Polychaete	0.43	21.3
Demersal fish		715	99	*Chelidonichthys kumu*	Red gurnard	0.94	25.42
				Chrysophrys auratus	Snapper	0.88	22.42
				Zeus faber	John Dory	0.68	12.14
				Meuschenia scaber	Leatherjacket	0.59	9.36
Macroalgae		103	132	*Ecklonia radiata*	Kelp	0.27	29.24
				Carpophyllum maschalocarpum	Brown algae	0.24	19.27
				Carpophyllum flexuosum	Brown algae	0.14	6.18
				Xiphophora chondrophylla	Brown algae	0.17	5.75
Reef fish		32	78	*Chromis dispilus*	Damselfish	1	8.63
				Parika scaber	Leatherjacket	0.88	6.42
				Cheilodactylus spectabilis	Morwong	0.84	5.99
				Notoclinops segmentatus	Triplefin	0.78	4.67

33.6 Uncertainty ranges

Table 102: Mean uncertainty values for group 33 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.725	High
Demersal fish	0.003	Moderate	0.755	High
Macroalgae	0.002	Moderate	0.899	High
Reef fish	0.005	Low	0.359	Moderate
Combined	0.003	Moderate	0.759	High

34 Group 34

34.1 Geographic location

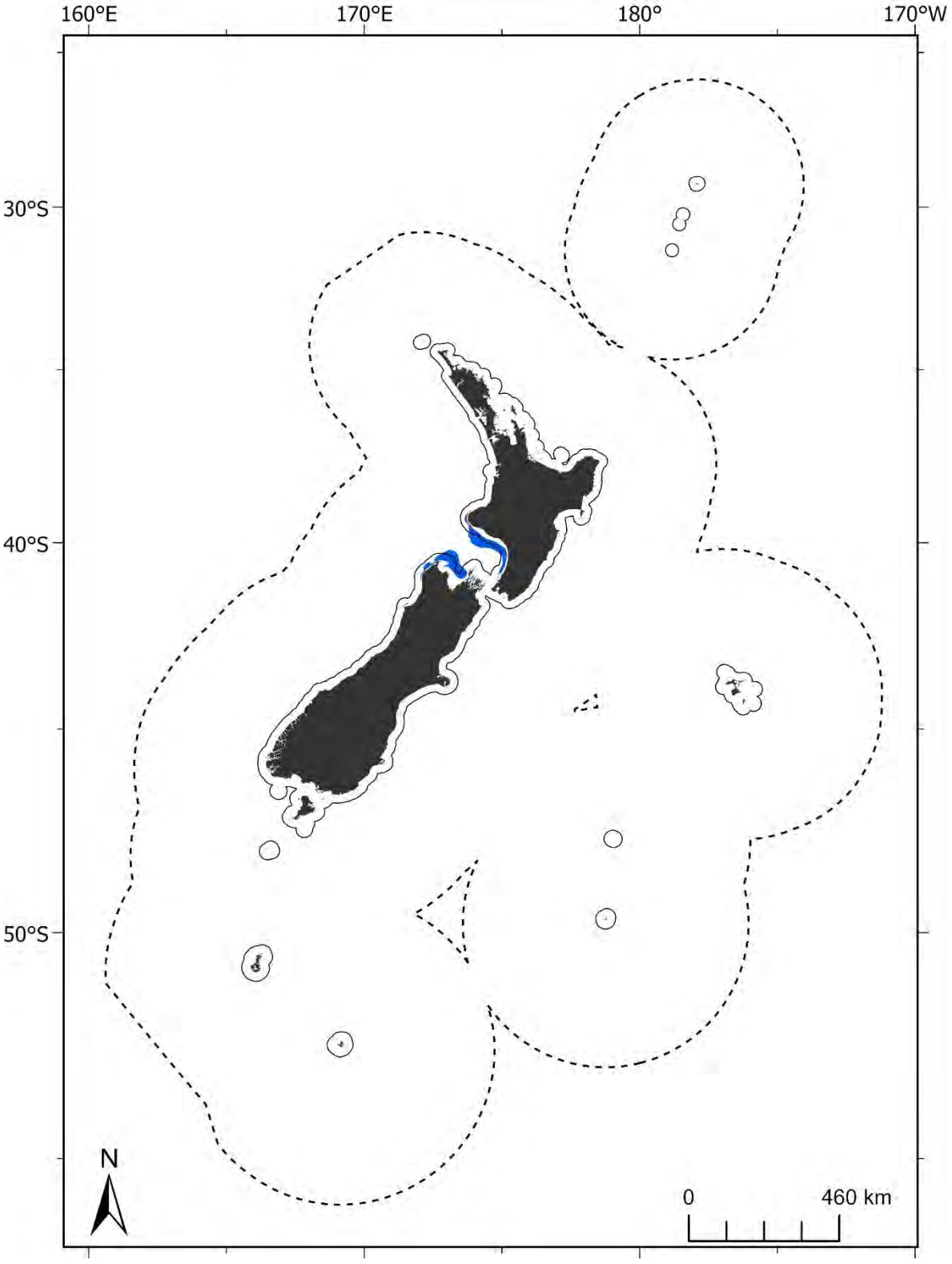

Figure 36: Geographic distribution of group 34 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

34.2 Group description

Group 34 is a localised group (Figure 36) occurring west of the Cook Strait in shallow coastal waters on the northern part of the South Island and southern part of the North Island (Table 103). This group is characterised by moderate concentrations of oxygen, low levels of dissolved nitrate, and high temperatures associated with elevated productivity (Table 103). Benthic invertebrate assemblages are primarily characterised by sponges and brittle stars (Table 104). Demersal fish assemblages are characterised by very high frequency occurrence of the barracouta, gurnard and dogfish, and reef fish assemblages are characterised by wrasse and triplefin (Table 104). Kelp and the a single green algae characterise macroalgal assemblages (Table 104). This group has a high number of samples for benthic invertebrates (bar samples collected using LMG gear types) and demersal fish but a low number of samples for macroalgae and reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 105).

34.3 Similar groups

Closely related to group 33; more loosely related to group 35.

34.4 Characterising environmental conditions

Table 103: Group 34 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	59 m	Shelf depth
Bottom nitrate	3.14 µmol L^{-1}	Low concentrations of nitrate at depth
Salinity at depth	35.11 psu	High salinity at depth
Tidal current	0.134 m s^{-1}	Moderate tidal current speed
Temperature at depth	14.06 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	53.93 mg C m^{-2} d^{-1}	High productivity
Benthic position index	-49.205 m	Low seafloor unevenness

34.5 Characterising species

Table 104: Species name, mean frequency occurrence and % contribution to group 34 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	243	62	*Nototodarus*	Squid	0.84	96.37
	MMG**	3	6	*na*	*na*	*na*	*na*
	SMG	49	63	*Ophiopsammus*	Brittle star	0.1	17.07
				Mycale	Sponge	0.08	9.79
				Iophon	Sponge	0.06	9.37
				Favosipora	Bryozoan	0.08	8.18
				Stelletta	Sponge	0.1	7.38
				Ophiomyxa	Brittle star	0.08	7.26
				Amphiura	Brittle star	0.06	5.73
				Taeniogyrus	Sea cucumber	0.06	5.73

	SSG	20	18	*Amphiura*	Brittle star	0.25	44.09
				Dittosa	Crab	0.2	18.99
				Ophiocentrus	Brittle star	0.2	9.63
Demersal fish		315	82	*Thyrsites atun*	Barracouta	0.81	11.64
				Chelidonichthys kumu	Red gurnard	0.75	9.42
				Squalus acanthias	Spiny dogfish	0.69	7.96
				Nemadactylus macropterus	Tarakihi	0.62	7.64
				Galeorhinus galeus	School shark	0.64	6.89
				Meuschenia scaber	Leatherjacket	0.61	6.3
				Trachurus declivis	Jack mackerel	0.57	5.84
				Zeus faber	John Dory	0.58	5.41
				Mustelus lenticulatus	Rig	0.56	5.16
				Cephaloscyllium isabellum	Carpet shark	0.56	4.79
Macroalgae		8	43	*Codium convolutum*	Green algae	0.25	65.93
				Ecklonia radiata	Kelp	0.25	17.58
Reef fish		5	34	*Notolabrus celidotus*	Wrasse	1	10.91
				Notolabrus fucicola	Wrasse	1	10.91
				Parapercis colias	Blue cod	1	10.91
				Cheilodactylus spectabilis	Morwong	0.8	6.35
				Pseudolabrus miles	Wrasse	0.8	6.24
				Caesioperca lepidoptera	Perch	0.8	5.92
				Nemadactylus macropterus	Tarakihi	0.8	5.92
				Forsterygion malcolmi	Triplefin	0.8	5.92
				Forsterygion varium	Triplefin	0.8	5.92
				Parika scaber	Leatherjacket	0.8	5.92

***** Insufficient data to run SIMPER analysis.***

34.6 Uncertainty ranges

Table 105: Mean uncertainty values for group 34 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.715	High
Demersal fish	0.003	Moderate	0.694	High
Macroalgae	0.002	Moderate	0.962	High
Reef fish	0.005	Low	0.31	Moderate
Combined	0.003	Moderate	0.726	High

35 Group 35

35.1 Geographic location

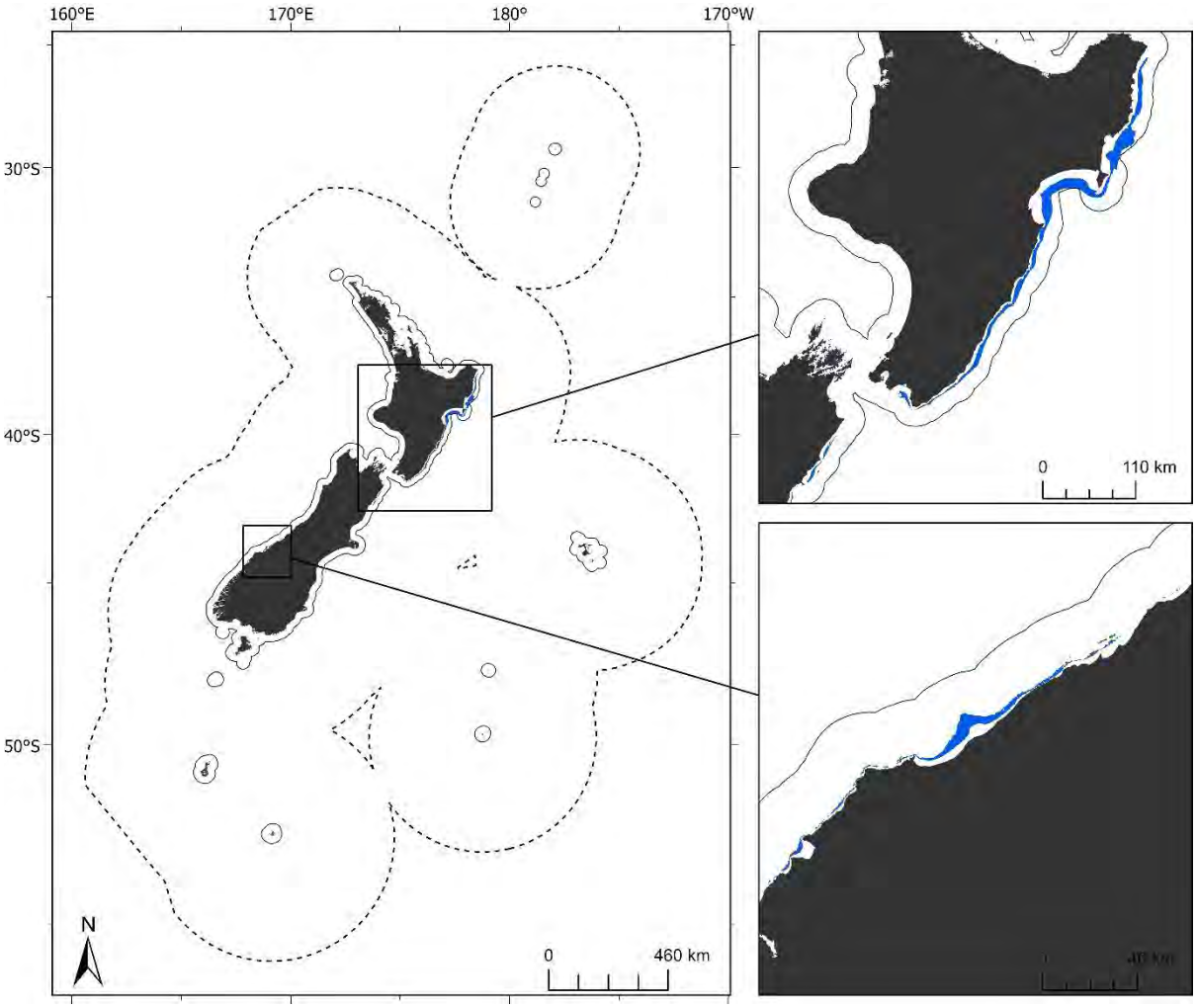

Figure 37: Geographic distribution of group 35 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

35.2 Group description

Group 35 is a small but widespread group occurring in shallow continental shelf waters on both the east coast of the North Island and the west coast of the South Island (Figure 37). These waters have moderate concentrations of oxygen, high temperatures and annual temperature fluctuations, high rates of productivity and low dissolved solutes (Table 106). Benthic invertebrate assemblages are characterised by bryozoans, hydrozoans, crabs and corals (Table 107). Demersal fish assemblages are characterised by high frequency occurrence of barracouta and gurnard, and the diverse reef fish assemblages are characterised by wrasse and triplefin (Table 107). Brown macroalgae are predominant in these waters (Table 107). This group has a low-moderate number of samples for benthic invertebrates, moderate number of samples for demersal fish and macroalgae, and a low number of samples for reef fish. Despite relatively low samples across biotic groups, overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 108).

35.3 Similar groups

Loosely related to groups 33 and 34.

35.4 Characterising environmental conditions

Table 106: Group 35 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	52 m	Shelf depth
Bottom nitrate	2.16 µmol L^{-1}	Low concentrations of nitrate at depth
Annual amplitude of sea floor temperature	2.72 °C	High. Large seasonal differences in bottom temperature
Dissolved oxygen at depth	5.46 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	14.78 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	55.64 mg C m^{-2} d^{-1}	High productivity
Tidal current	0.034 m s^{-1}	Low tidal current speed
Detrital absorption	0.049 m^{-1}	Moderate detrital absorption

35.5 Characterising species

Table 107: Species name, mean frequency occurrence and % contribution to group 35 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	52	9	*Nototodarus*	Squid	0.92	98.74
	MMG	2	87	*Aetea*	Bryozoan	1	2.22
	All species contribute <4% to similarity			*Alcithoe*	Gastropod	1	2.22
				Alpheus	Shrimp	1	2.22
				Amphiura	Brittle star	1	2.22
				Astraea	Gastropod	1	2.22
				Austrofusus	Gastropod	1	2.22
				Bellidilia	Crab	1	2.22
				Calloria	Brachiopod	1	2.22
				Cardita	Bivalve	1	2.22
				Cellaria	Bryozoan	1	2.22
				Celleporaria	Bryozoan	1	2.22
				Celleporina	Bryozoan	1	2.22
				Chaperiopsis	Bryozoan	1	2.22
				Cominella	Gastropod	1	2.22
				Cornuticella	Bryozoan	1	2.22
				Cryptolaria	Hydrozoan	1	2.22
				Diacanthurus	Crab	1	2.22
				Diaperoecia	Bryozoan	1	2.22
				Ellisina	Bryozoan	1	2.22
				Eudendrium	Hydrozoan	1	2.22
				Galeopsis	Bryozoan	1	2.22
				Idmidronea	Bryozoan	1	2.22

				Macropora	Coral	1	2.22
				Magasella	Brachiopod	1	2.22
				Malakosaria	Bryozoan	1	2.22
				Maoricolpus	Gastropod	1	2.22
				Menipea	Bryozoan	1	2.22
				Metadromia	Crab	1	2.22
				Modiolus	Bivalve	1	2.22
				Monomyces	Coral	1	2.22
				Notomithrax	Crab	1	2.22
				Ophiactis	Brittle star	1	2.22
	SMG	17	25	*Heterothyone*	Sea cucumber	0.41	86.47
	SSG	4	8	*Dittosa*	Crab	0.5	60
				Echinocardium	Sea urchin	0.5	40
Demersal fish		88	65	*Chelidonichthys kumu*	Red gurnard	0.89	15.7
				Thyrsites atun	Barracouta	0.81	12.29
				Mustelus lenticulatus	Rig	0.68	8.33
				Trachurus novaezelandiae	Yellowtail Jack mackerel	0.61	7.07
				Zeus faber	John Dory	0.58	6.14
				Pseudocaranx dentex	Trevally	0.53	5.51
				Squalus acanthias	Spiny dogfish	0.5	4.21
Macroalgae		33	67	*Sargassum sinclairii*	Brown algae	0.15	23.52
				Ecklonia radiata	Kelp	0.12	15.28
				Carpophyllum flexuosum	Brown algae	0.12	13.32
				Landsburgia quercifolia	Brown algae	0.12	10.86
				Anotrichium crinitum	Red algae	0.12	7.76
Reef fish		11	46	*Forsterygion varium*	Triplefin	0.73	9.34
				Forsterygion malcolmi	Triplefin	0.73	9.15
				Notolabrus celidotus	Wrasse	0.73	8.76
				Parapercis colias	Blue cod	0.73	8.69
				Pseudolabrus miles	Wrasse	0.73	8.28
				Obliquichthys maryannae	Triplefin	0.64	6.68
				Notolabrus fucicola	Wrasse	0.64	5.96
				Forsterygion flavonigrum	Triplefin	0.55	4.78
				Lotella rhacinus	Cod	0.55	4.73
				Notoclinops segmentatus	Triplefin	0.55	4.67

35.6 Uncertainty ranges

Table 108: Mean uncertainty values for group 35 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.59	High
Demersal fish	0.003	Moderate	0.544	High
Macroalgae	0.002	Moderate	0.961	High
Reef fish	0.004	Low	0.372	Moderate
Combined	0.003	Moderate	0.553	High

36 Group 36

36.1 Geographic location

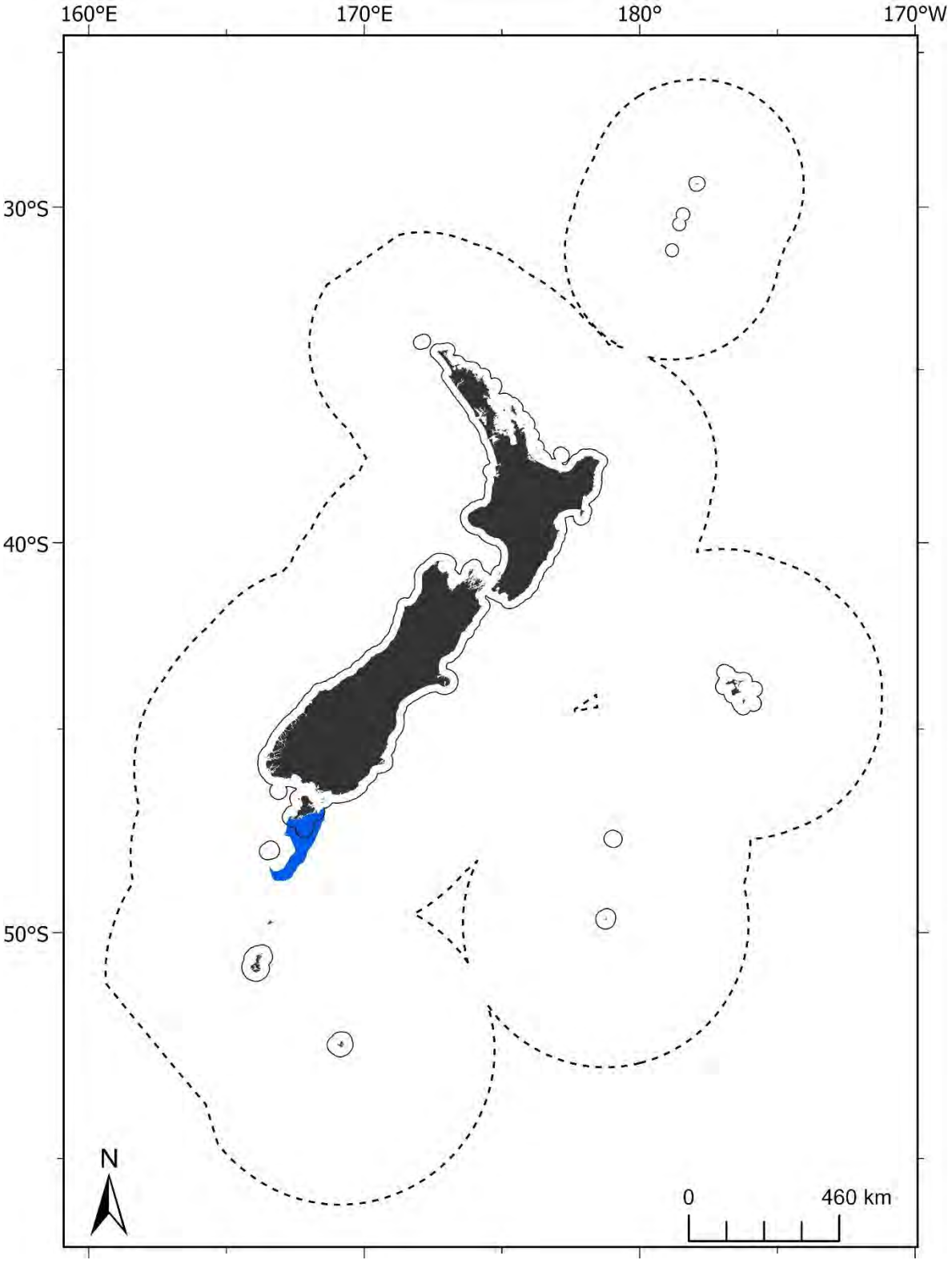

Figure 38: Geographic distribution of group 36 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

36.2 Group description

Group 36 occurs on the shelf south of Stewart Island (Figure 38). This group is characterised by moderate temperature at depth, high oxygen concentrations, moderate rates of productivity, and strong tidal currents (Table 109). Benthic invertebrate assemblages are characterised by sea stars, brachiopods and crabs (Table 110). Demersal fish assemblages are characterised by the very high frequency occurrence of barracouta, dogfish and stargazers (Table 110). This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish, but low samples for benthic invertebrates sampled with other gear types and macroalgae, and no samples for reef fish (Table 110). Despite relatively low samples across biotic groups, overall confidence in modelled relationships is moderate – high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 111).

36.3 Similar groups

Loosely related to groups 37 and 38.

36.4 Characterising environmental conditions

Table 109: Group 36 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	124 m	Shelf depth
Tidal current	0.4 m s^{-1}	High tidal current speeds
Dissolved oxygen at depth	6.01 mg L^{-1}	High concentrations of oxygen at depth
Temperature at depth	10.93 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	42.84 mg C m^{-2} d^{-1}	Moderate productivity
Detrital absorption	0.022 m^{-1}	Low detrital absorption
Turbidity	0.002 m^{-1}	Low turbidity

36.5 Characterising species

Table 110: Species name, mean frequency occurrence and % contribution to group 36 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	117	8	*Nototodarus*	Squid	0.95	99.45
	MMG	5	32	*Odontaster*	Sea star	0.8	40.44
				Neothyris	Brachiopod	0.6	16.46
				Leptomithrax	Crab	0.4	8.03
				Goniocidaris	Sea urchin	0.4	7.58
	SMG	18	31	*Neothyris*	Brachiopod	0.67	80.91
	SSG**	1	2	*na*	*na*	*na*	*na*
Demersal fish		145	46	*Thyrsites atun*	Barracouta	0.86	19.72

			Squalus acanthias	Spiny dogfish	0.85	18.37
			Kathetostoma giganteum	Giant stargazer	0.75	13.1
			Polyprion oxygeneios	Hāpuku	0.69	11
			Galeorhinus galeus	School shark	0.64	9.39
Macroalgae**	2	12	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

***** Insufficient data to run SIMPER analysis***

36.6 Uncertainty ranges

Table 111: Mean uncertainty values for group 36 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.602	High
Demersal fish	0.003	Moderate	0.56	High
Macroalgae	0.002	Moderate	0.744	High
Reef fish	0.005	Low	0.126	Moderate
Combined	0.003	Moderate	0.567	High

37 Group 37

37.1 Geographic location

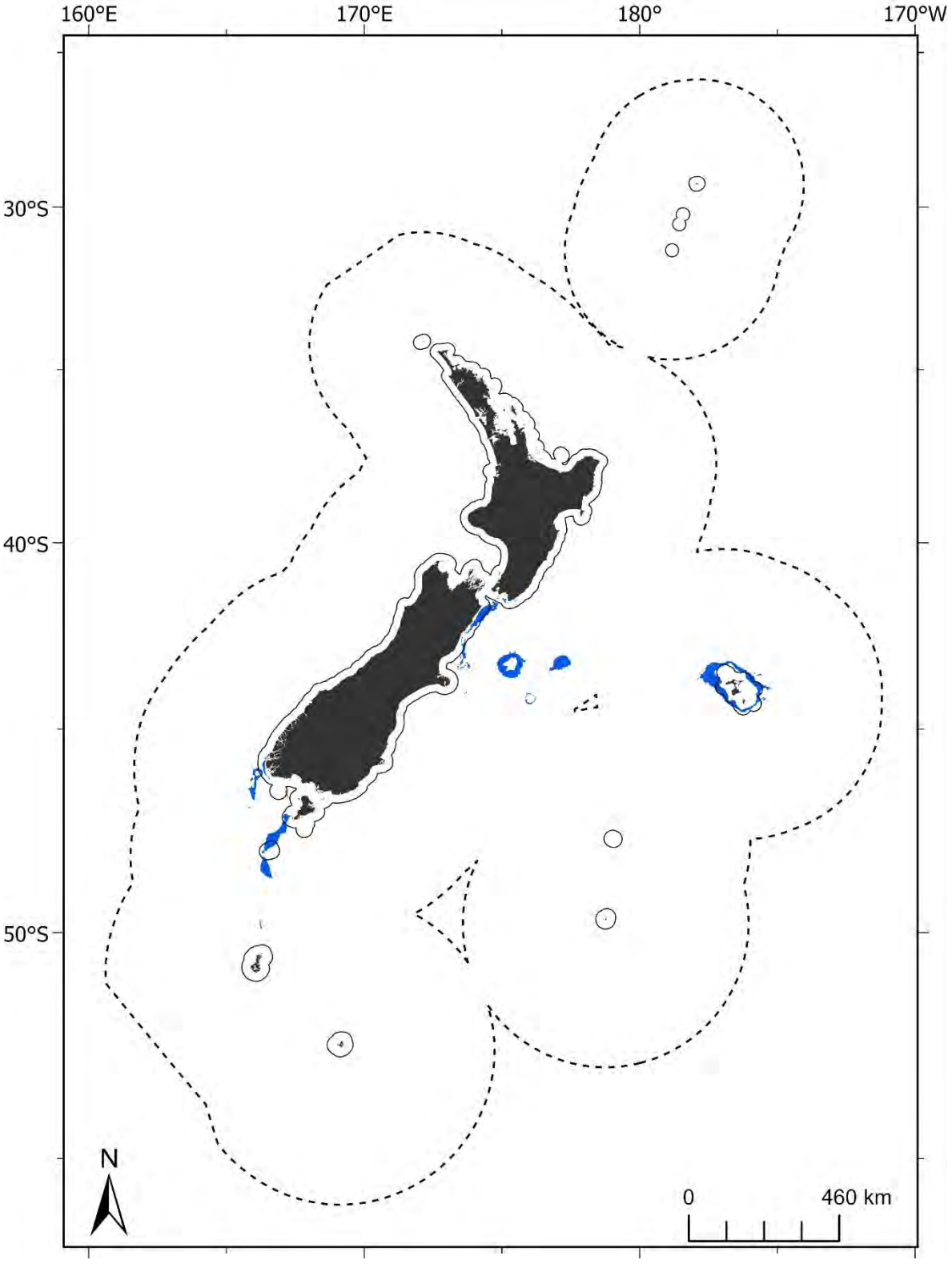

Figure 39: Geographic distribution of group 37 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

37.2 Group description

Group 37 is a widespread group throughout the moderate temperature waters on the Chatham Rise (including the Mernoo and Reserve banks) and South Island continental shelf (Figure 39). This group is characterised by moderate productivity, and moderate concentrations of oxygen and nitrate at depth (Table 112). Benthic invertebrate assemblages are relatively diverse and are characterised by crustacea and echinoderms, with polychaete, gastropod and brachiopods (Table 113). Demersal fish assemblages are also diverse and are characterised by very high frequency occurrence of the demersal barracouta, stargazers and tarakihi (Table 113). This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish but low samples for benthic invertebrates sampled with other gear types and no samples for macroalgae or reef fish (Table 113). Overall confidence in modelled relationships is moderate – high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 113).

37.3 Similar groups

Closely related to group 38; more loosely related to group 36.

37.4 Characterising environmental conditions

Table 112: Group 37 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	186 m	Shelf depth
Tidal current	0.16 m s^{-1}	Moderate tidal current speed
Bottom nitrate	11.15 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	5.65 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	10.81 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	40.92 mg C m^{-2} d^{-1}	Moderate productivity
Turbidity	0.002 m^{-1}	Low turbidity

37.5 Characterising species

Table 113: Species name, mean frequency occurrence and % contribution to group 37 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	666	120	*Nototodarus*	Squid	0.87	98.84
	MMG	21	148	*Leptomithrax*	Crab	0.33	9.44
				Phylladiorhynchus	Squat lobster	0.33	9.17
				Munida	Squat lobster	0.29	8.78
				Neothyris	Brachiopod	0.24	5.69
				Mediaster	Sea star	0.24	4.77
				Diacanthurus	Crab	0.29	4.77
				Psilaster	Sea star	0.24	4.74

				Astrothorax	Brittle star	0.19	4.59
				Sclerasterias	Sea star	0.29	4.53
	SMG	44	87	*Neothyris*	Brachiopod	0.23	19.31
				Astromesites	Sea star	0.2	13.56
				Spirobranchus	Polychaete	0.18	11.38
				Munida	Squat lobster	0.07	7.12
				Cominella	Gastropod	0.09	5.75
				Pentadactyla	Sea cucumber	0.07	4.27
				Liothyrella	Brachiopod	0.11	4.14
	SSG	5	7	*Monomyces*	Coral	0.4	100
Demersal fish		730	138	*Thyrsites atun*	Barracouta	0.75	14.53
				Kathetostoma giganteum	Giant stargazer	0.75	13.1
				Nemadactylus macropterus	Tarakihi	0.62	10.55
				Squalus acanthias	Spiny dogfish	0.65	9.41
				Seriolella punctata	Silver warehou	0.61	8.21
				Polyprion oxygeneios	Hāpuku	0.53	7.43
				Macruronus novaezelandiae	Hoki	0.48	4.94
				Pseudophycis bachus	Red cod	0.48	4.66
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

37.6 Uncertainty ranges

Table 114: Mean uncertainty values for group 37 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.721	High
Demersal fish	0.003	Moderate	0.685	High
Macroalgae	0.002	Moderate	0.039	Low
Reef fish	0.004	Low	0.051	Low
Combined	0.003	Moderate	0.698	High

38 Group 38

38.1 Geographic location

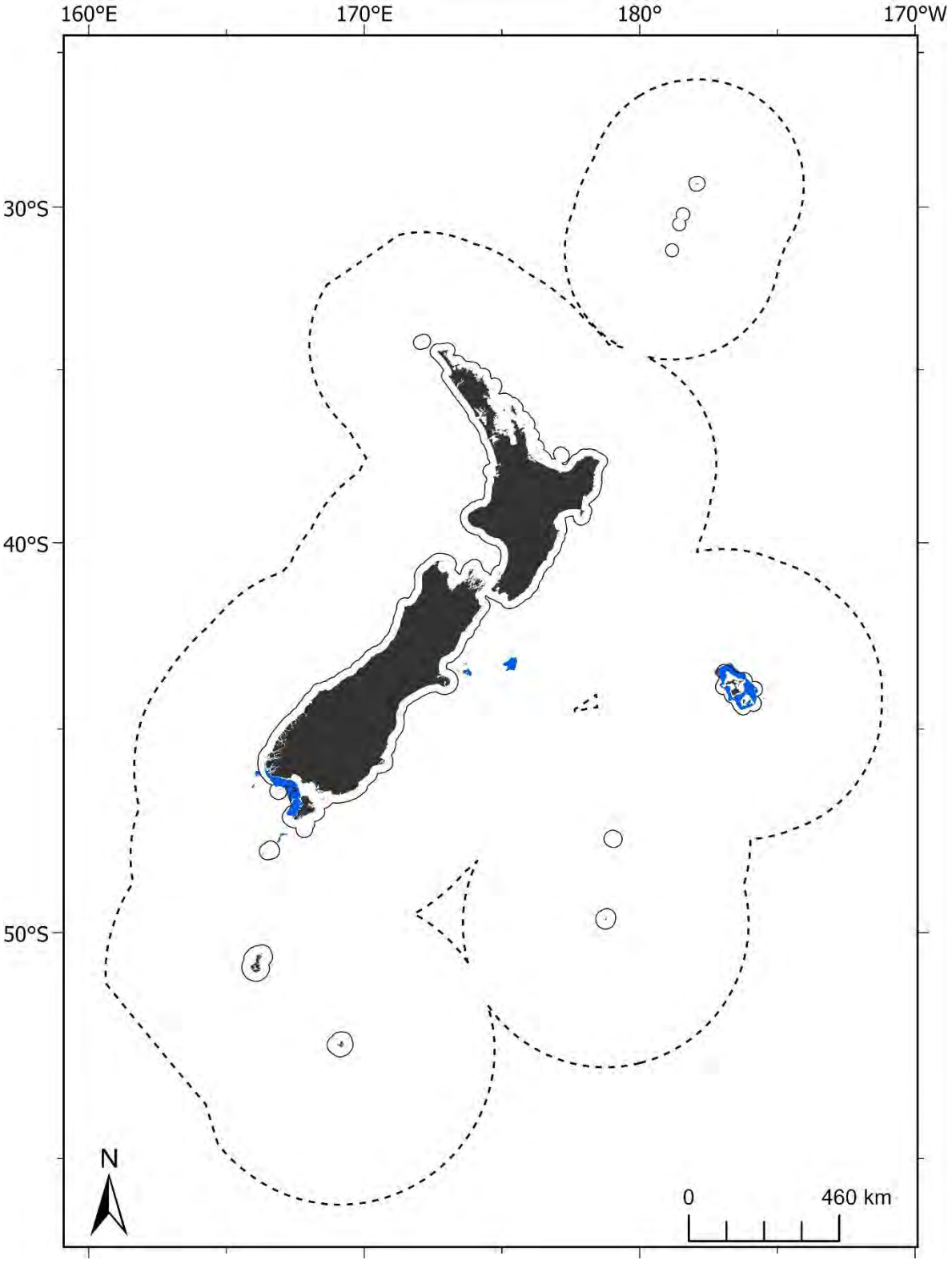

Figure 40: Geographic distribution of group 38 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

38.2 Group description

Group 38 is a widespread group throughout moderate temperature waters on the Chatham Rise, particularly around the Chatham Islands, and South Island continental shelf (Figure 40). This group is characterised by moderate productivity, moderate to high oxygen and low silicate concentrations at depth (Table 115). Benthic invertebrate assemblages are characterised by brachiopods and hydrozoans, with squat lobster, zoanthid and sponge present in lower frequencies (Table 116). Demersal fish assemblages are characterised by the very high frequency occurrence of the demersal barracouta, stargazer and tarakihi (Table 116). Despite low sample number, macroalgal assemblages are diverse and are characterised by several species of brown algae (Table 116). This group has a high number of samples for benthic invertebrates and demersal fish, low samples of macroalgae and no samples for reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 117).

38.3 Similar groups

Closely related to group 37; more loosely related to group 36.

38.4 Characterising environmental conditions

Table 115: Group 38 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	101 m	Shelf depth
Tidal current	0.19 m s^{-1}	Moderate tidal current speed
Bottom silicate	3.09 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.81 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Temperature at depth	11.89 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	44.25 mg C m^{-2} d^{-1}	Moderate productivity
Turbidity	0.002 m^{-1}	Low turbidity

38.5 Characterising species

Table 116: Species name, mean frequency occurrence and % contribution to group 38 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	198	61	*Nototodarus*	Squid	0.91	98.41
	MMG	11	74	*Phylladiorhynchus*	Squat lobster	0.36	22.29
				Neothyris	Brachiopod	0.27	17.74
				Dictyocladium	Hydrozoan	0.27	9.12
				Cryptolaria	Hydrozoan	0.27	7.67
				Epizoanthus	Zoanthid	0.18	7.1
	SMG	40	92	*Neothyris*	Brachiopod	0.28	43.8
				Calloria	Brachiopod	0.15	7.86

				Notosaria	Brachiopod	0.15	7.62
				Haliclona	Sponge	0.13	5.08
	SSG	8	6	*Neothyris*	Brachiopod	0.25	50
				Otionellina	Bryozoan	0.25	50
Demersal fish		244	70	*Kathetostoma giganteum*	Giant stargazer	0.9	18.97
				Thyrsites atun	Barracouta	0.89	18.27
				Nemadactylus macropterus	Tarakihi	0.81	14.18
				Polyprion oxygeneios	Hāpuku	0.72	10.47
				Squalus acanthias	Spiny dogfish	0.7	10.32
Macroalgae		12	90	*Carpomitra costata*	Brown algae	0.42	21.91
				Ecklonia radiata	Kelp	0.33	18.7
				Landsburgia quercifolia	Brown algae	0.25	6.89
				Carpophyllum flexuosum	Brown algae	0.25	6.75
				Euptilota formosissima	Red algae	0.17	5.61
				Zonaria turneriana	Brown algae	0.17	4.75
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

38.6 Uncertainty ranges

Table 117: Mean uncertainty values for group 38 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.625	High
Demersal fish	0.003	Moderate	0.561	High
Macroalgae	0.002	Moderate	0.585	High
Reef fish	0.003	Moderate	0.079	Low
Combined	0.003	Moderate	0.576	High

39 Group 39

39.1 Geographic location

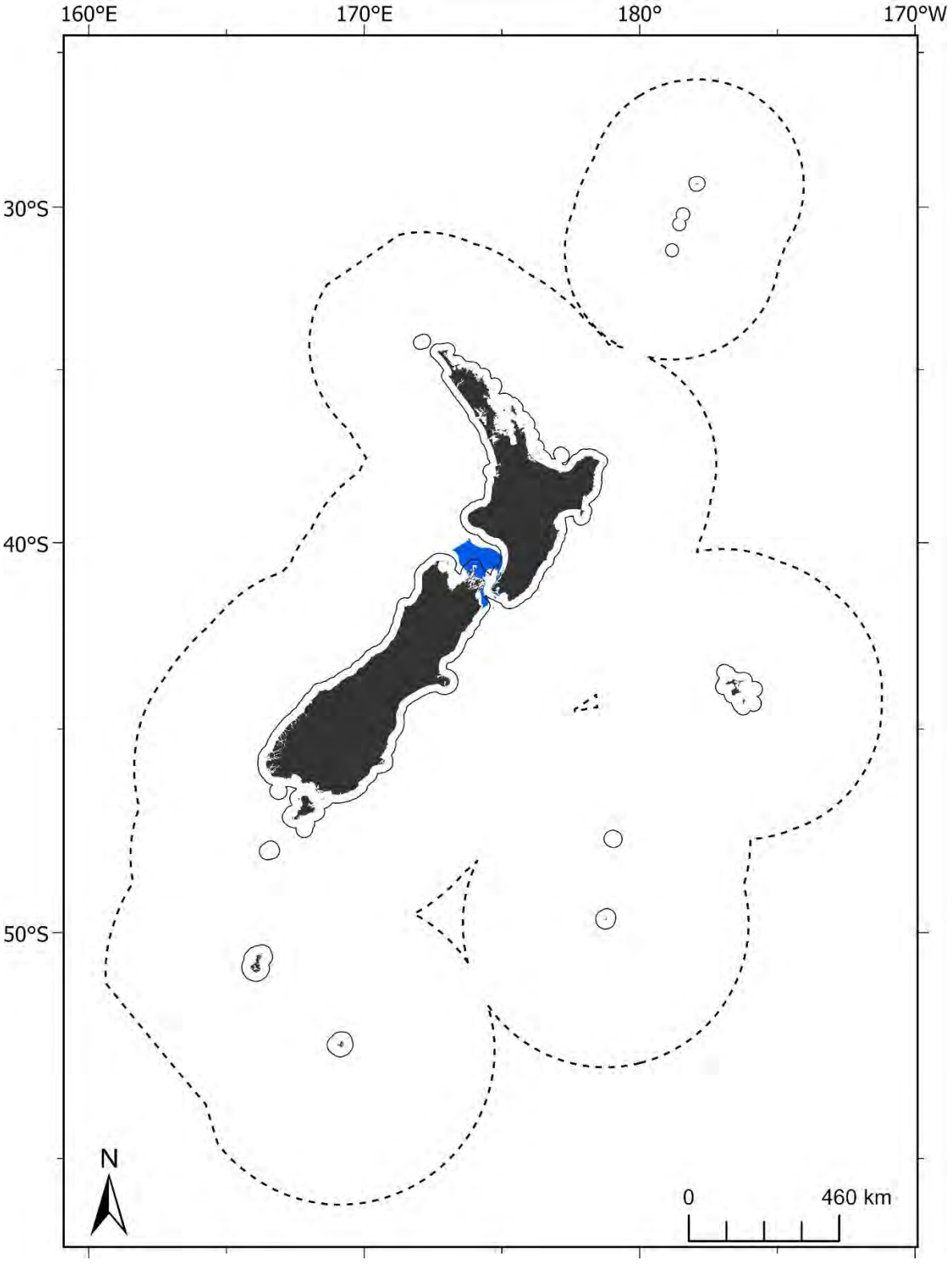

Figure 41: Geographic distribution of group 39 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

39.2 Group description

Group 39 occurs in the warm shelf waters west of the Cook Strait (Figure 41). This group is characterised by high productivity, high salinity at depth, moderate oxygen concentrations and strong tidal currents (Table 116). Benthic invertebrate assemblages are characterised by brachiopods with crab, coral and urchin present in lower frequencies (Table 119). Fish assemblages are diverse. Demersal fish assemblages are characterised by the very high frequency occurrence of barracouta, mackerel, dogfish and tarakihi. Reef fish assemblages are diverse and characterised by blue cod, butterfly perch and several species of reef dwelling triplefins, wrasse and moki (Table 119). Macroalgal assemblages are also diverse and are characterised by several species of red, brown and green algae (Table 119). This group has a high number of samples for benthic invertebrates (except for samples from MMG sampling gear types) and demersal fish, a moderate number of macroalgal samples and low samples for reef fish. Overall confidence in modelled relationships is moderate to high for this group (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 120).

39.3 Similar groups

Closely related to group 40.

39.4 Characterising environmental conditions

Table 118: Group 39 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	92 m	Shelf depth
Tidal current	0.25 m s^{-1}	High tidal current speed
Salinity at depth	35.06 µmol L^{-1}	High salinity at depth
Dissolved oxygen at depth	5.44 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	13.13 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	48.37 mg C m^{-2} d^{-1}	High productivity
Benthic sediment disturbance	0.00051 m s-1	Low benthic sediment disturbance by wave actions
Benthic position index	-30.263 m	Moderate seafloor unevenness

39.5 Characterising species

Table 119: Species name, mean frequency occurrence and % contribution to group 39 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	170	56	*Nototodarus*	Squid	0.84	98.84
	MMG**	3	11	*na*	*na*	*na*	*na*
	SMG	17	64	*Neothyris*	Brachiopod	0.41	30.42
				Dittosa	Crab	0.29	15.93
				Monomyces	Coral	0.18	9.57
				Calloria	Brachiopod	0.18	6.99
				Echinocardium	Sea urchin	0.18	5.84

				Saccella	Bivalve	0.18	5.07
	SSG	10	18	*Magasella*	Brachiopod	0.4	52.96
				Ampelisca	Amphipod	0.2	9.96
				Notosaria	Brachiopod	0.2	9.96
Demersal fish		221	77	*Thyrsites atun*	Barracouta	0.71	11.76
				Nemadactylus macropterus	Tarakihi	0.63	10.14
				Trachurus declivis	Jack mackerel	0.63	9.68
				Squalus acanthias	Spiny dogfish	0.61	8.4
				Lepidopus caudatus	Frostfish	0.53	6.71
				Trachurus novaezelandiae	Yellowtail Jack mackerel	0.56	6.68
				Galeorhinus galeus	School shark	0.53	6.13
				Zeus faber	John Dory	0.52	5.66
				Parapercis colias	Blue cod	0.28	5.27
Macroalgae		19	50	*Ecklonia radiata*	Kelp	0.26	33.82
				Caulerpa geminata	Green algae	0.16	10.53
				Carpomitra costata	Brown algae	0.21	8.98
				Stenogramma interruptum	Red algae	0.21	8.09
				Carpophyllum flexuosum	Brown algae	0.11	5.62
				Hymenena multipartita	Red algae	0.16	4.84
Reef fish		10	39	*Parapercis colias*	Blue cod	1	7.72
				Forsterygion varium	Triplefin	1	7.72
				Notolabrus celidotus	Wrasse	0.9	6.16
				Caesioperca lepidoptera	Perch	0.9	5.97
				Forsterygion malcolmi	Triplefin	0.9	5.97
				Pseudolabrus miles	Wrasse	0.9	5.74
				Notoclinops segmentatus	Triplefin	0.9	5.74
				Obliquichthys maryannae	Triplefin	0.9	5.74
				Forsterygion flavonigrum	Triplefin	0.8	4.54
				Latridopsis ciliaris	Moki	0.8	4.41
				Notolabrus fucicola	Wrasse	0.8	4.41

***** Insufficient data to run SIMPER analysis***

39.6 Uncertainty ranges

Table 120: Mean uncertainty values for group 39 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.611	High
Demersal fish	0.003	Moderate	0.653	High
Macroalgae	0.002	Moderate	0.805	High
Reef fish	0.005	Low	0.47	High
Combined	0.003	Moderate	0.691	High

40 Group 40

40.1 Geographic location

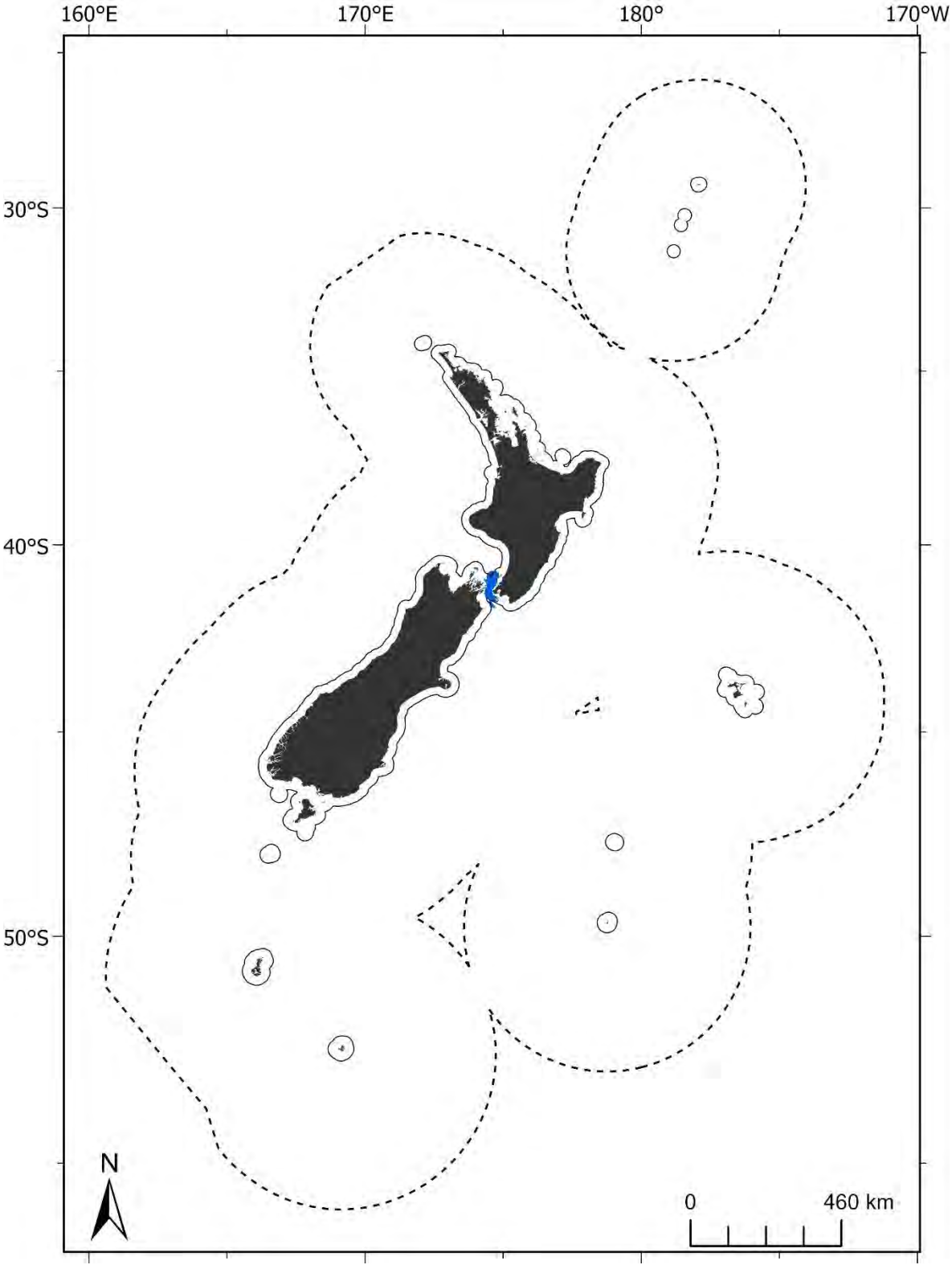

Figure 42: Geographic distribution of group 40 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

40.2 Group description

Group 40 occurs in the moderately warm shelf waters of the Cook Strait (Figure 42). This group is highly productive, with moderate levels of oxygen, moderate salinity at depth and strong tidal currents (Table 121). Benthic invertebrate assemblages are characterised by low frequency occurrence of coral, brittle stars and bivalves (Table 122). Demersal fish assemblages are characterised by the high frequency occurrence of hoki, dogfish and red cod, and reef fish assemblages are characterised by several species of reef dwelling wrasse, cod and perch (Table 122). This group has a high number of samples for demersal fish, a moderate number of samples for benthic invertebrates (except for samples from MMG gear types, which are low) and a low number of samples for macroalgae and reef fish (Table 122). Despite the variable number of sample across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 123).

40.3 Similar groups

Closely related to group 39.

40.4 Characterising environmental conditions

Table 121: Group 40 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	165 m	Shelf depth
Tidal current	0.42 m s^{-1}	High tidal current
Salinity at depth	34.89 µmol L^{-1}	Moderate salinity at depth
Dissolved oxygen at depth	5.34 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	11.85 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	45.95 mg C m^{-2} d^{-1}	High productivity
Benthic sediment disturbance	0.00010 m s^{-1}	Low Benthic sediment disturbance by wave action

40.5 Characterising species

Table 122: Species name, mean frequency occurrence and % contribution to group 40 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	35	5	*Nototodarus*	Squid	0.77	97.28
	MMG**	1	3	*na*	*na*	*na*	*na*
	SMG	44	80	*Monomyces*	Coral	0.14	20.33
				Ophiopeza	Brittle star	0.09	7.31
				Clarkcoma	Brittle star	0.11	6.65
				Nemertesia	Hydrozoan	0.11	5.93
				Odontaster	Sea star	0.11	4.89
				Pratulum	Bivalve	0.11	4.79

				Saccella	Bivalve	0.11	4.63
				Dittosa	Crab	0.11	4.35
	SSG**	2	2	*na*	*na*	*na*	*na*
Demersal fish		112	68	*Macruronus novaezelandiae*	Hoki	0.88	28.64
				Squalus acanthias	Spiny dogfish	0.77	20
				Pseudophycis bachus	Red cod	0.65	12.39
				Lepidopus caudatus	Frostfish	0.53	8.48
				Coelorinchus biclinozonalis	Rattail	0.46	6.41
Macroalgae**		1	1	*na*	*na*	*na*	*na*
Reef fish		3	27	*Scorpaena papillosus*	Cod	1	6.02
				Caesioperca lepidoptera	Perch	1	6.02
				Hypoplectrodes huntii	Perch	1	6.02
				Aplodactylus arctidens	Marblefish	1	6.02
				Latridopsis ciliaris	Moki	1	6.02
				Mendosoma lineatum	Trumpeter	1	6.02
				Notolabrus celidotus	Wrasse	1	6.02
				Notolabrus cinctus	Wrasse	1	6.02
				Notolabrus fucicola	Wrasse	1	6.02
				Pseudolabrus miles	Wrasse	1	6.02
				Parapercis colias	Blue cod	1	6.02
				Forsterygion malcolmi	Triplefin	1	6.02

***** Insufficient data to run SIMPER analysis***

40.6 Uncertainty ranges

Table 123: Mean uncertainty values for group 40 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.668	High
Demersal fish	0.003	Moderate	0.704	High
Macroalgae	0.002	Moderate	0.255	Moderate
Reef fish	0.005	Low	0.365	Moderate
Combined	0.003	Moderate	0.65	High

41 Group 41

41.1 Geographic location

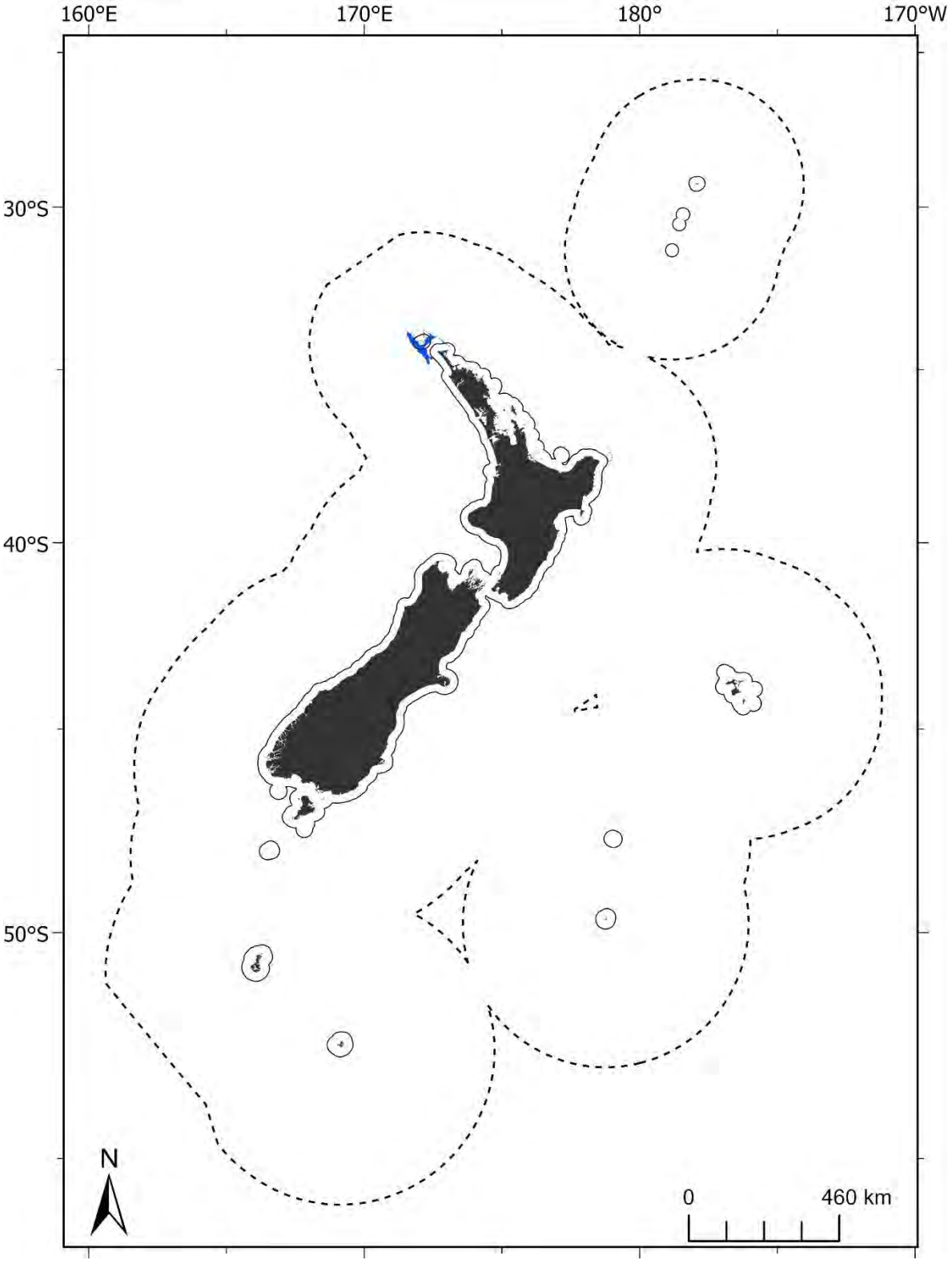

Figure 43: Geographic distribution of group 41 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

41.2 Group description

Group 41 occurs in the warm shelf waters off the tip of the North Island around the Three Kings Islands (Figure 43). This group is characterised by low oxygen concentration, moderate nitrate and productivity and strong tidal currents (Table 124). Benthic invertebrate assemblages are characterised predominantly by hydrozoans, with high frequency occurrence of squat lobster and low frequency occurrence of stony coral (Table 125). Demersal fish assemblages are characterised by high frequency occurrence of gurnard, dogfish, cucumber fish and snapper (Table 125). This group has a moderate number of samples for benthic invertebrates (except for samples using MMG and SSG gear types), a low number of samples for demersal fish and no samples for macroalgae or reef fish. Despite the proximity of this group to the coastline, the overall confidence in modelled relationships is moderate due to the low sample number across biotic groups (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD), Table 126).

41.3 Similar groups

Closely related to group 42; more loosely related to group 43.

41.4 Characterising environmental conditions

Table 124: Group 41 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	253 m	Intermediate depth
Tidal current	0.25 m s^{-1}	High tidal current
Bottom nitrate	11.66 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	4.69 mg L^{-1}	Low concentrations of oxygen at depth
Temperature at depth	13.33 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	35.83 mg C m^{-2} d^{-1}	Moderate productivity
Detrital absorption	0.013 m^{-1}	Low detrital absorption
Turbidity	0.001 m^{-1}	Low turbidity

41.5 Characterising species

Table 125: Species name, mean frequency occurrence and % contribution to group 41 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	10	36	*Nototodarus*	Squid	0.3	68.41
				Ibacus	Squat lobster	0.2	14.66
	MMG	5	35	*Lytocarpia*	Hydrozoan	0.4	18.77
				Liothyrella	Brachiopod	0.4	14.35
				Zygophylax	Hydrozoan	0.4	14.35
				Munida	Squat lobster	0.4	11.62
				Nemertesia	Hydrozoan	0.4	11.62
	SMG	32	115	*Lepidopora*	Hydrozoan	0.13	19.69
				Nemertesia	Hydrozoan	0.19	12.42

				Sphenotrochus	Stony coral	0.09	11.91
				Stylaster	Hydrozoan	0.13	4.8
				Lytocarpia	Hydrozoan	0.13	4.16
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		3	17	*Pterygotrigla picta*	Spotted gurnard	1	36.18
				Squalus griffini	Northern spiny dogfish	0.67	14.88
				Paraulopus nigripinnis	Cucumber fish	0.67	12.09
				Chrysophrys auratus	Snapper	0.67	9.21
Macroalgae*		0	0	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

41.6 Uncertainty ranges

Table 126: Mean uncertainty values for group 41 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.472	High
Demersal fish	0.003	Moderate	0.167	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0.043	Low
Combined	0.003	Moderate	0.197	Moderate

42 Group 42

42.1 Geographic location

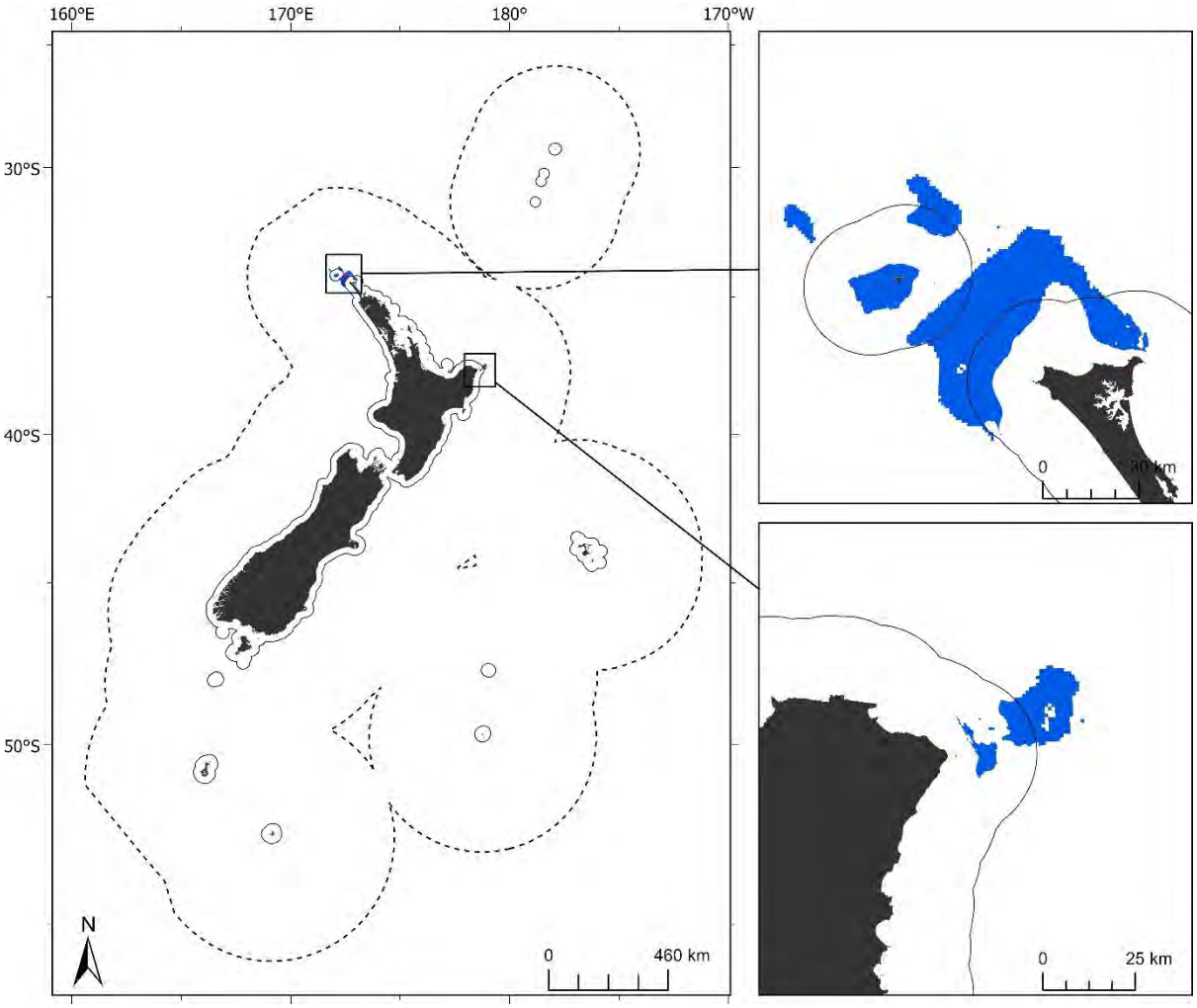

Figure 44: Geographic distribution of group 42 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

42.2 Group description

Group 42 occurs in the warm shelf waters off the northern North Island around and between the Three Kings Islands and North Cape, and off East Cape (Figure 44). This group is characterised by moderate productivity, bottom oxygen concentration and strong tidal currents (Table 127). The low concentrations of nitrate, silicate and phosphate are consistent with productive, warm waters north of the Subtropical Front. Benthic invertebrate assemblages are characterised predominantly by hydrozoans, with low frequency occurrence of the a genus of squat lobster genus (Table 128). Demersal fish assemblages are characterised by high frequency occurrence of demersal school sharks and gurnard, and reef fish assemblages are diverse and characterised by high frequency occurrence of butterfish, perch and several wrasse species (Table 128). Macroalgal assemblages are diverse; characterised by several species of red, brown and green algae (Table 128). This group has a moderate number of samples for benthic invertebrates (except for a low number of samples from SSG gear types), a low number of samples for demersal fish and a low number of samples for macroalgae and reef fish. Despite the relatively low number of samples across biotic groups, the

overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and model variability (SD) Table 129).

42.3 Similar groups

Closely related to group 41; more loosely related to group 43.

42.4 Characterising environmental conditions

Table 127: Group 42 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	112 m	Shelf depth
Tidal current	0.3 m s^{-1}	High tidal current
Salinity at depth	35.37 psu	High salinity at depth
Dissolved oxygen at depth	5.07 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	15.54 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	40.17 mg C m^{-2} d^{-1}	Moderate productivity
Turbidity	0.002 m^{-1}	Low turbidity

42.5 Characterising species

Table 128: Species name, mean frequency occurrence and % contribution to group 42 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	14	85	*Nototodarus*	Squid	0.36	81.16
	MMG	21	195	*Lytocarpia*	Hydrozoan	0.67	13.27
				Nemertesia	Hydrozoan	0.43	5.51
	SMG	27	90	*Lytocarpia*	Hydrozoan	0.19	43
				Phylladiorhynchus	Squat lobster	0.15	15.54
				Nemertesia	Hydrozoan	0.15	13.24
	SSG**	2	2	*na*	*na*	*na*	*na*
Demersal fish		6	33	*Galeorhinus galeus*	School shark	0.67	27.34
				Chelidonichthys kumu	Red gurnard	0.67	15.5
				Chrysophrys auratus	Snapper	0.5	10.67
				Nemadactylus macropterus	Tarakihi	0.5	9.45
				Thyrsites atun	Barracouta	0.5	7.05
Macroalgae		27	79	*Ecklonia radiata*	Kelp	0.26	14.04
				Sargassum johnsonii	Brown algae	0.33	13.92
				Nesophila hoggardii	Red algae	0.3	8.82
				Caulerpa geminata	Green algae	0.3	7.62

			Perithalia capillaris	Brown algae	0.26	5.92
			Caulerpa flexilis	Green algae	0.22	5.58
			Euptilota sp A	Red algae	0.22	4.71
Reef fish	14	50	*Notolabrus fucicola*	Wrasse	1	8.07
			Pseudolabrus miles	Wrasse	1	8.07
			Odax cyanoallix	Butterfish	0.93	7.11
			Caprodon longimanus	Perch	0.93	6.98
			Parika scaber	Leatherjacket	0.79	4.86
			Suezichthys aylingi	Wrasse	0.79	4.74
			Nemadactylus douglasii	Morwong	0.79	4.71
			Seriola lalandi	Kingfish	0.79	4.67
			Chromis dispilus	Damselfish	0.79	4.57
			Scorpis violaceus	Sea chub	0.79	4.54
			Aplodactylus arctidens	Marblefish	0.71	4.04

***** Insufficient data to run SIMPER analysis***

42.6 Uncertainty ranges

Table 129: Mean uncertainty values for group 42 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.522	High
Demersal fish	0.003	Moderate	0.265	Moderate
Macroalgae	0.002	Moderate	0.902	High
Reef fish	0.005	Low	0.69	High
Combined	0.003	Moderate	0.282	Moderate

43 Group 43

43.1 Geographic location

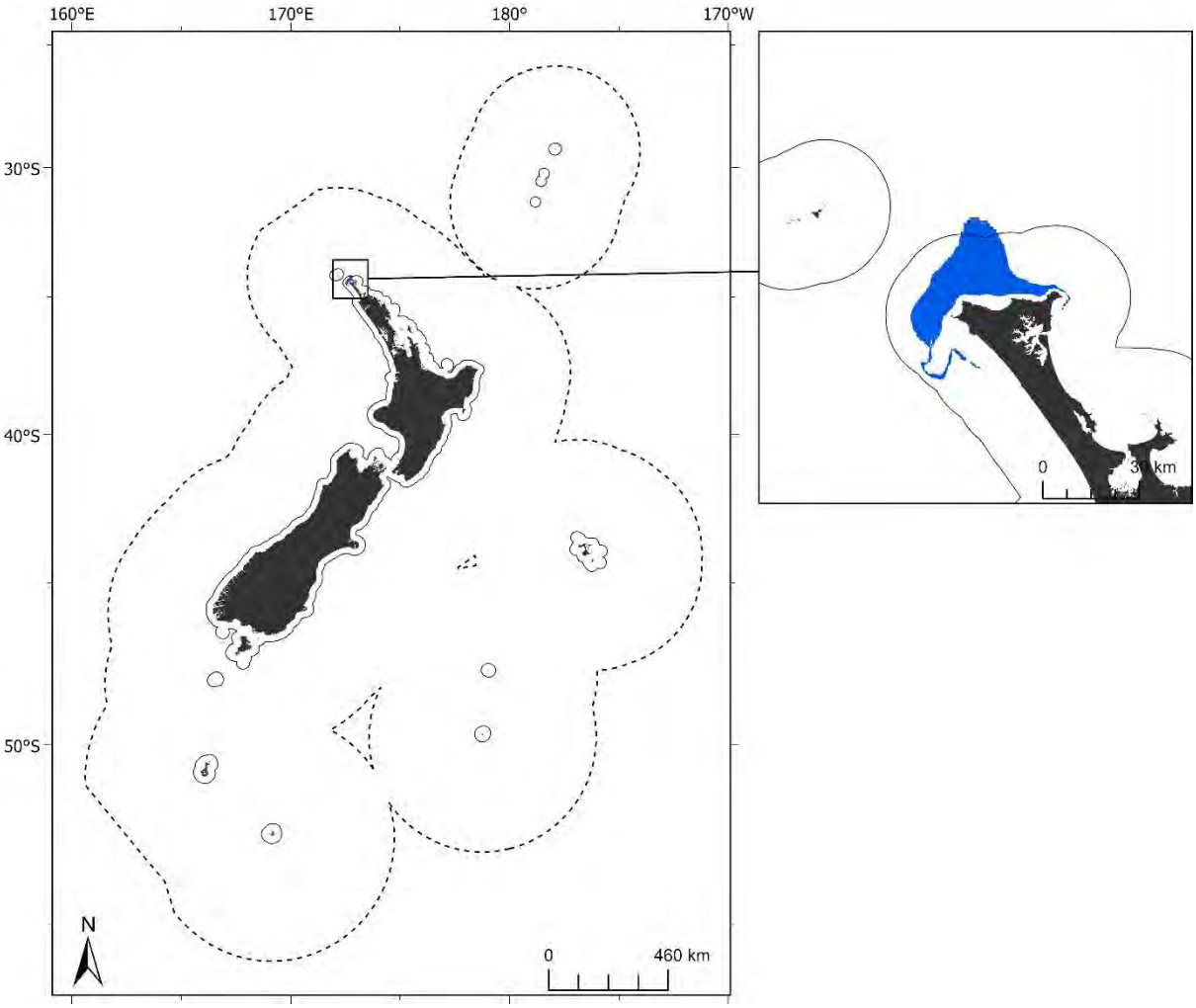

Figure 45: Geographic distribution of group 43 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

43.2 Group description

Group 43 occurs in the very warm shelf waters off North Cape at the northern end of the North Island (Figure 45). This group is characterised by moderate productivity, moderate concentrations of oxygen at depth, high seasonal temperature fluctuation and strong tidal currents (Table 130). The low concentrations of nitrate, silicate and phosphate are consistent with productive, warm waters north of the Subtropical Front. Benthic invertebrate assemblages are characterised predominantly by hydrozoans and sponges, with some cephalopods and very high frequency occurrence of brittle star (Table 131). Demersal fish assemblages are characterised by very high frequency occurrence of demersal leatherjacket, porcupinefish and snapper (Table 131). This group has a moderate number of samples for benthic invertebrates, a low number of samples for demersal fish and macroalgae, but no samples for reef fish. Despite the low to moderate number of samples across biotic groups, the overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 132).

43.3 Similar groups

Loosely related to groups 41 and 42.

43.4 Characterising environmental conditions

Table 130: Group 43 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	77 m	Shelf depth
Annual amplitude of sea floor temperature	2.16 °C	High. Large seasonal differences in bottom temperature
Bottom silicate	2.95 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.22 mg L^{-1}	Moderate concentrations of oxygen at depth
Tidal current	0.46 m s^{-1}	High tidal current
Temperature at depth	16.43 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	42.83 mg C m^{-2} d^{-1}	Moderate productivity

43.5 Characterising species

Table 131: Species name, mean frequency occurrence and % contribution to group 43 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	16	14	*Sepioteuthis*	Squid	0.31	61.18
				Nototodarus	Squid	0.25	35.29
	MMG	40	66	*Crateritheca*	Hydrozoan	0.45	28.85
				Aglaophenia	Hydrozoan	0.43	22.74
				Solanderia	Hydrozoan	0.28	11.31
				Lytocarpia	Hydrozoan	0.2	6.29
				Gonaxia	Hydrozoan	0.23	5.78
	SMG	64	126	*Tedania*	Sponge	0.38	7.13
				Iophon	Sponge	0.36	5.93
				Dactylia	Sponge	0.31	5.45
				Oceanapia	Sponge	0.31	5.16
				Chondropsis	Sponge	0.31	4.56
				Octopus	Octopus	0.16	4.49
				Raspailia	Sponge	0.3	4.45
				Clathria	Sponge	0.3	4.37
				Polymastia	Sponge	0.31	4.35
				Ciocalypta	Sponge	0.3	4.12
				Dysidea	Sponge	0.28	4.05
	SSG	17	2	*Amphiura*	Brittle star	0.94	98.36
Demersal fish		13	35	*Meuschenia scaber*	Leatherjacket	1	26.48
				Tragulichthys jaculiferus	Porcupinefish	0.81	16.21

			Chelidonichthys kumu	Red gurnard	0.69	12.22
			Chrysophrys auratus	Snapper	0.75	11.78
			Myliobatis tenuicaudatus	Eagle ray	0.63	8.27
Macroalgae**	2	9	*na*	*na*	*na*	*na*
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

43.6 Uncertainty ranges

Table 132: Mean uncertainty values for group 43 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.727	High
Demersal fish	0.003	Moderate	0.441	Moderate
Macroalgae	0.002	Moderate	0.919	High
Reef fish	0.006	Low	0.226	Moderate
Combined	0.003	Moderate	0.413	Moderate

44 Group 44

44.1 Geographic location

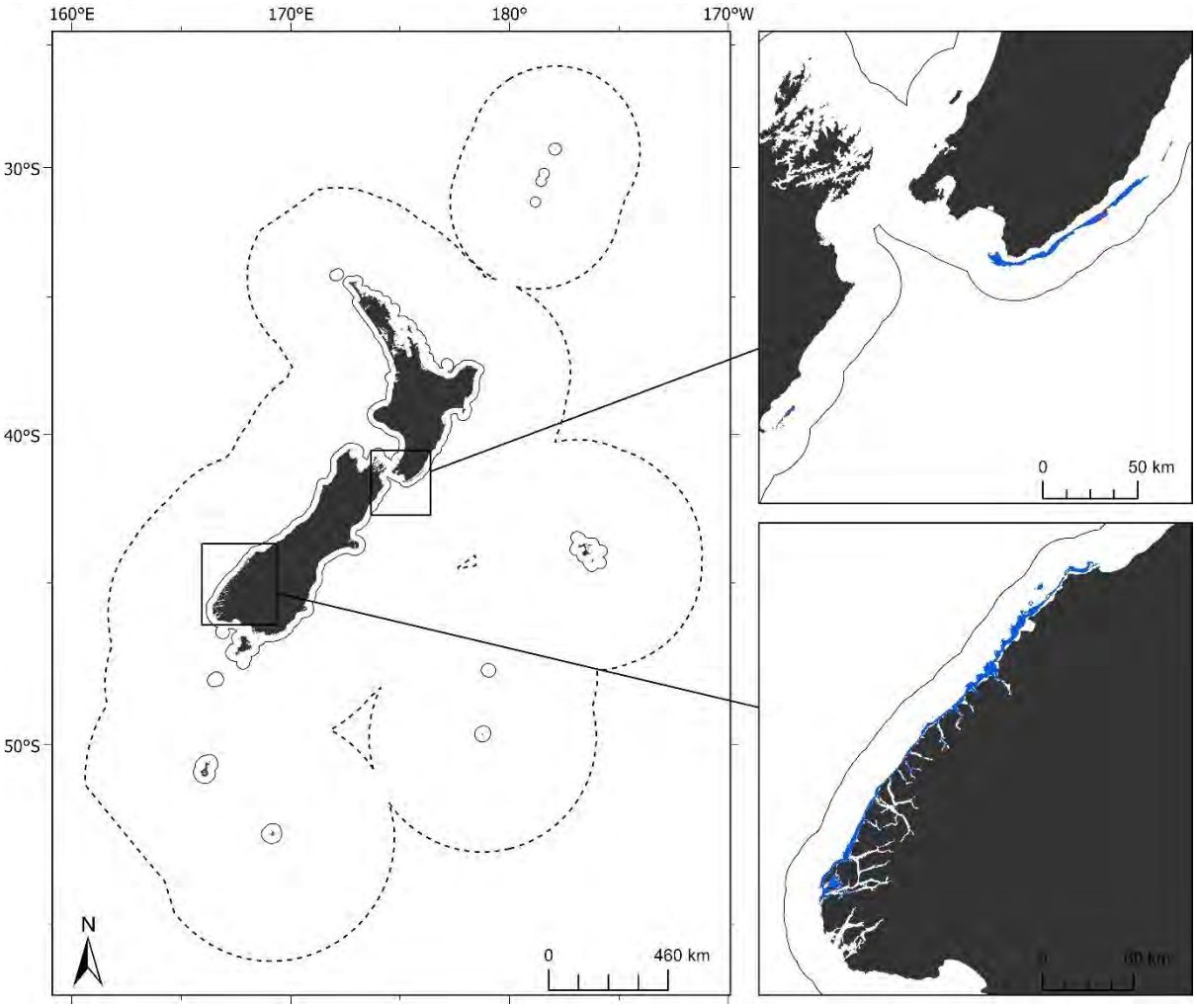

Figure 46: Geographic distribution of group 44 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

44.2 Group description

Group 44 is a localised group occurring on the steep margins of the continental shelf along the south east of the North Island and the east and west coast of the South Island (Figure 46). This group is characterised by moderate oxygen concentrations, high water temperatures at depth, and low silicate concentrations and productivity (Table 133). Benthic invertebrate assemblages are characterised predominantly by high frequency occurrence of brachiopods, squid, and brittle stars (Table 134). Demersal fish assemblages are characterised by high frequency occurrence of cod and wrasse, and reef assemblages are characterised by blue cod, perch, marblefish and several species of wrasse (Table 134). Macroalgal assemblages are diverse and are characterised by several species of red, brown and green algae albeit with low frequency occurrence (Table 134). This group has a low number of samples for all biotic groups. Despite the low number of samples, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 135).

44.3 Similar groups

Distantly related to group 45.

44.4 Characterising environmental conditions

Table 133: Group 44 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	75 m	Shelf depth
Slope	4.2 °	High slope
Bottom silicate	3.2 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.71 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	12.99 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	22.25 mg C m^{-2} d^{-1}	Low productivity
Chlorophyll *a* concentration spatial gradient	0.030 mg m^{-3} m^{-1}	Moderate chlorophyll *a* gradient

44.5 Characterising species

Table 134: Species name, mean frequency occurrence and % contribution to group 44 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	15	3	*Nototodarus*	Squid	0.73	91.45
	MMG**	1	19	*na*	*na*	*na*	*na*
	SMG	11	38	*Calloria*	Brachiopod	0.27	33.12
				Dittosa	Crab	0.27	28.11
				Notosaria	Brachiopod	0.18	20.72
	SSG	3	12	*Calloria*	Brachiopod	0.67	52.63
				Amphiura	Brittle star	0.67	47.37
Demersal fish		56	49	*Parapercis colias*	Blue cod	0.68	47.61
				Pseudolabrus miles	Wrasse	0.55	32.48
Macroalgae		38	89	*Carpophyllum flexuosum*	Brown algae	0.18	18.26
				Xiphophora gladiata	Brown algae	0.13	12.07
				Apophlaea lyallii	Red algae	0.08	9.13
				Ecklonia radiata	Kelp	0.13	7.98
				Corallina aff ferreyrae	Red algae	0.08	5.5
				Macrocystis pyrifera	Giant kelp	0.08	4.08
				Lessonia sp C	Kelp	0.08	4.02

Reef fish	7	32	*Scorpaena papillosus*	Cod	1	8.72
			Caesioperca lepidoptera	Perch	1	8.72
			Aplodactylus arctidens	Marblefish	1	8.72
			Notolabrus cinctus	Wrasse	1	8.72
			Notolabrus fucicola	Wrasse	1	8.72
			Pseudolabrus miles	Wrasse	1	8.72
			Forsterygion varium	Triplefin	0.86	6.23
			Odax pullus	Butterfish	0.86	6.1
			Notoclinops segmentatus	Triplefin	0.86	6.1

***** Insufficient data to run SIMPER analysis***

44.6 Uncertainty ranges

Table 135: Mean uncertainty values for group 44 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.697	High
Demersal fish	0.003	Moderate	0.626	High
Macroalgae	0.002	Moderate	0.858	High
Reef fish	0.004	Low	0.252	Moderate
Combined	0.003	Moderate	0.637	High

45 Group 45

45.1 Geographic location

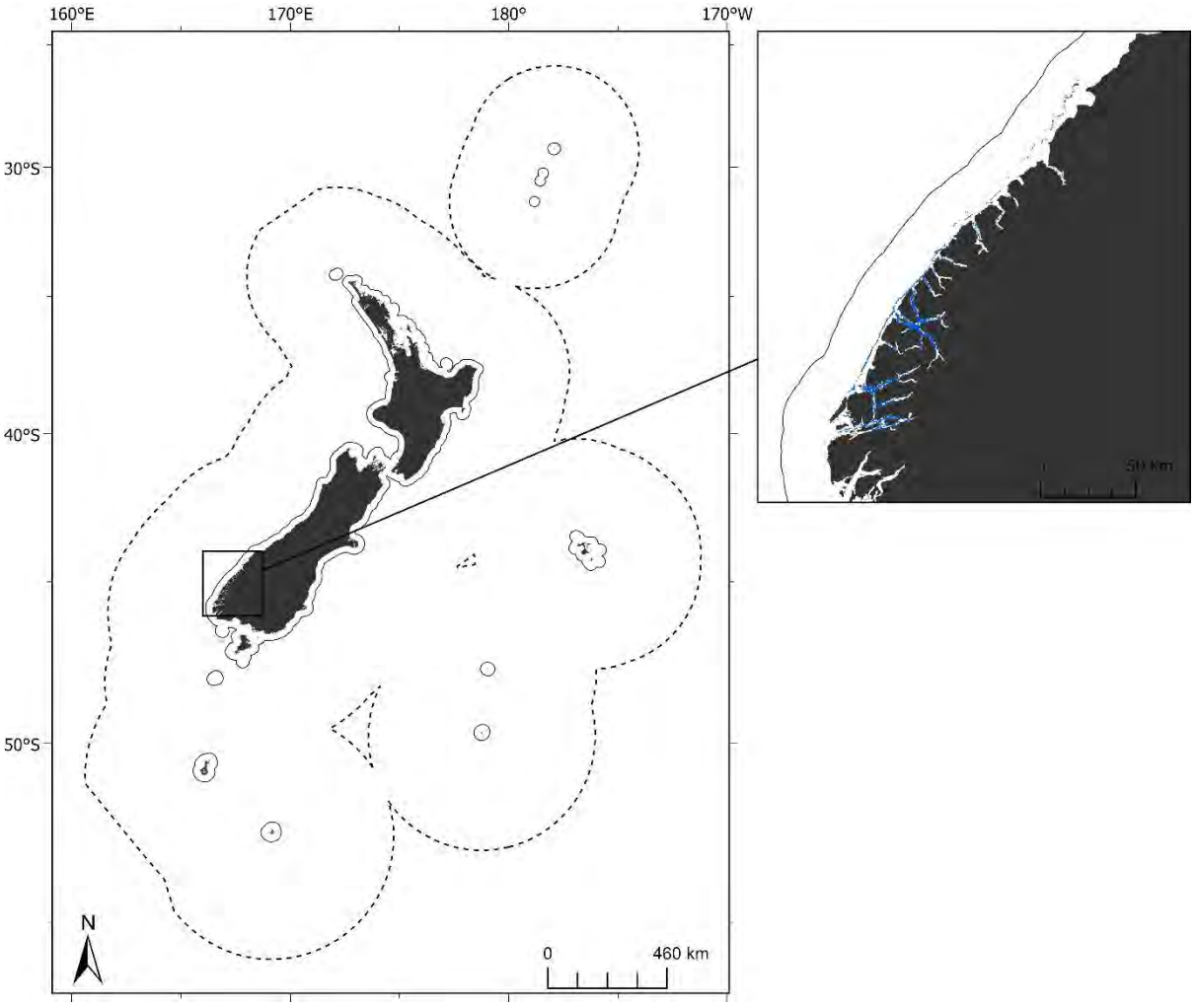

Figure 47: Geographic distribution of group 45 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

45.2 Group description

Group 45 is a small group located within Fiordland (Figure 47). Despite its proximity to shore, this group is characterised by intermediate water depths and high variability in seafloor elevation, strong gradient in chlorophyll *a* concentration (spatial gradient) and seasonal temperature variation (Table 136). Demersal fish assemblages are characterised by very high frequency occurrence of blue cod and wrasse, and reef assemblages are characterised by blue cod, perch, triplefin and wrasse (Table 137). Macroalgal assemblages are characterised by a single species of red algae (Table 137). This group has a low number of samples for all biotic groups. Despite the low number of samples across biotic groups, the overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 138).

45.3 Similar groups

Closely related to group 44.

45.4 Characterising environmental conditions

Table 136: Group 45 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	163 m	Shelf depth
Slope	17.06 °	High slope
Chlorophyll *a* concentration spatial gradient	0.23 mg m^{-3} m^{-1}	Strong gradient in chlorophyll *a* concentration
Sea surface temperature gradient	0.13 °C	High variability in sea surface temperature
Dissolved oxygen at depth	5.6 mg L^{-1}	Moderate concentrations of oxygen at depth
Downward vertical flux of particulate organic matter at the seabed	13.7 mg C m^{-2} d^{-1}	Low productivity
Detrital absorption	0.134 m^{-1}	High detrital absorption

45.5 Characterising species

Table 137: Species name, mean frequency occurrence and % contribution to group 45 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	1	1	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG**	3	15	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		12	7	*Parapercis colias*	Blue cod	0.75	55.7
				Pseudolabrus miles	Wrasse	0.67	36.25
Macroalgae		12	37	*Psaromenia berggrenii*	Red algae	0.33	90.95
Reef fish		4	22	*Helicolenus percoides*	Perch	1	10.71
				Caesioperca lepidoptera	Perch	1	10.71
				Notolabrus celidotus	Wrasse	1	10.71
				Pseudolabrus miles	Wrasse	1	10.71
				Parapercis colias	Blue cod	1	10.71
				Forsterygion flavonigrum	Triplefin	1	10.71
				Forsterygion malcolmi	Triplefin	0.75	5.74

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

45.6 Uncertainty ranges

Table 138: Mean uncertainty values for group 45 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.689	High
Demersal fish	0.004	Low	0.471	Moderate
Macroalgae	0.002	Moderate	0.569	High
Reef fish	0.005	Low	0.315	Moderate
Combined	0.003	Moderate	0.421	Moderate

46 Group 46

46.1 Geographic location

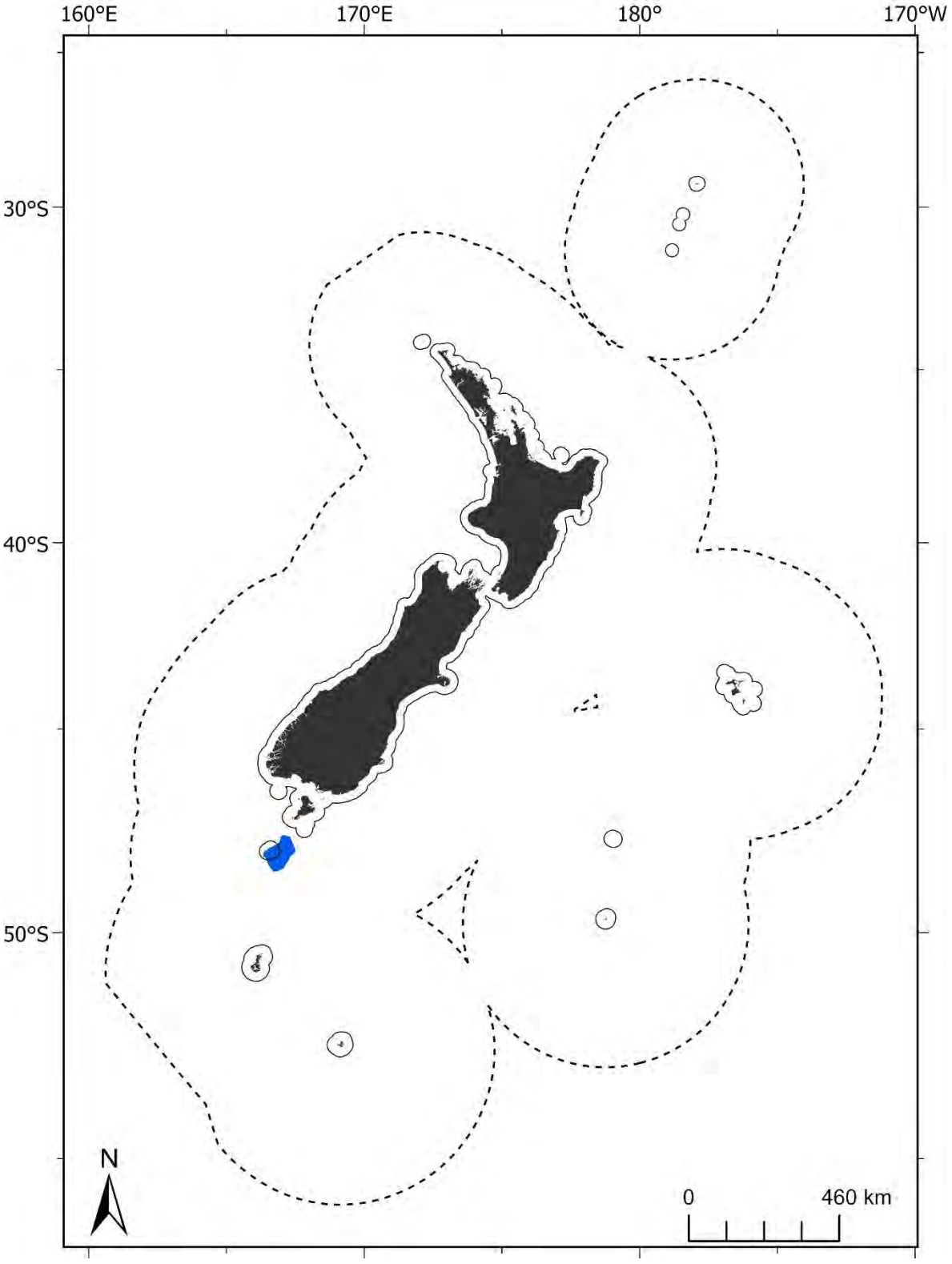

Figure 48: Geographic distribution of group 46 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

46.2 Group description

Group 46 is a localised group occurring on the continental shelf to the east of The Snares (Figure 48), where the shelf is subject to strong tidal currents and high rates of benthic sediment disturbance, as well as large seasonal differences in bottom temperature (Table 139). These waters are also characterised by high oxygen, and low silicate and nitrate concentrations at depth. Benthic invertebrates are characterised by several sea star species, very high frequency crab and hydrozoan presence, and high frequency brachiopod and bivalve presence (Table 140). Demersal fish assemblages are characterised by very high frequency occurrence of demersal dogfish, hāpuku and barracouta (Table 140). Macroalgal assemblages are characterised by a single species of red algae (Table 140). This group has a moderate number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish, and low samples for benthic invertebrates sampled with other gear types and macroalgae and no samples for reef fish. The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 141).

46.3 Similar groups

Loosely related to groups 47 and 48.

46.4 Characterising environmental conditions

Table 139: Group 46 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	159 m	Shelf depth
Slope	0.55 °	Low slope
Bottom silicate	3.39 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	6.16 mg L^{-1}	High concentrations of oxygen at depth
Benthic sediment disturbance	0.09 m s^{-1}	High rate of sediment disturbance
Annual amplitude of sea floor temperature	2.52 °C	High. Large seasonal differences in bottom temperature
Tidal current	0.34 m s^{-1}	High tidal current
Turbidity	0.002 m^{-1}	Low turbidity

46.5 Characterising species

Table 140: Species name, mean frequency occurrence and % contribution to group 46 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	80	8	*Nototodarus*	Squid	0.98	99.18
	MMG	2	25	*Leptomithrax*	Crab	1	50
				Symplectoscyphus	Hydrozoan	1	50
	SMG	9	35	*Sclerasterias*	Sea star	0.44	26.35
				Neothyris	Brachiopod	0.44	20.68
				Pleuromeris	Bivalve	0.44	13.56
				Odontaster	Sea star	0.33	8.67
				Astromesites	Sea star	0.22	7.21

SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish	90	41	*Squalus acanthias*	Spiny dogfish	0.88	21.66
			Polyprion oxygeneios	Hāpuku	0.83	18.75
			Thyrsites atun	Barracouta	0.82	18.69
			Galeorhinus galeus	School shark	0.72	12.46
Macroalgae	5	18	*Hymenena durvillaei*	Red algae	0.4	100
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

46.6 Uncertainty ranges

Table 141: Mean uncertainty values for group 46 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.661	High
Demersal fish	0.003	Moderate	0.526	High
Macroalgae	0.002	Moderate	0.917	High
Reef fish	0.005	Low	0.19	Moderate
Combined	0.003	Moderate	0.456	Moderate

47 Group 47

47.1 Geographic location

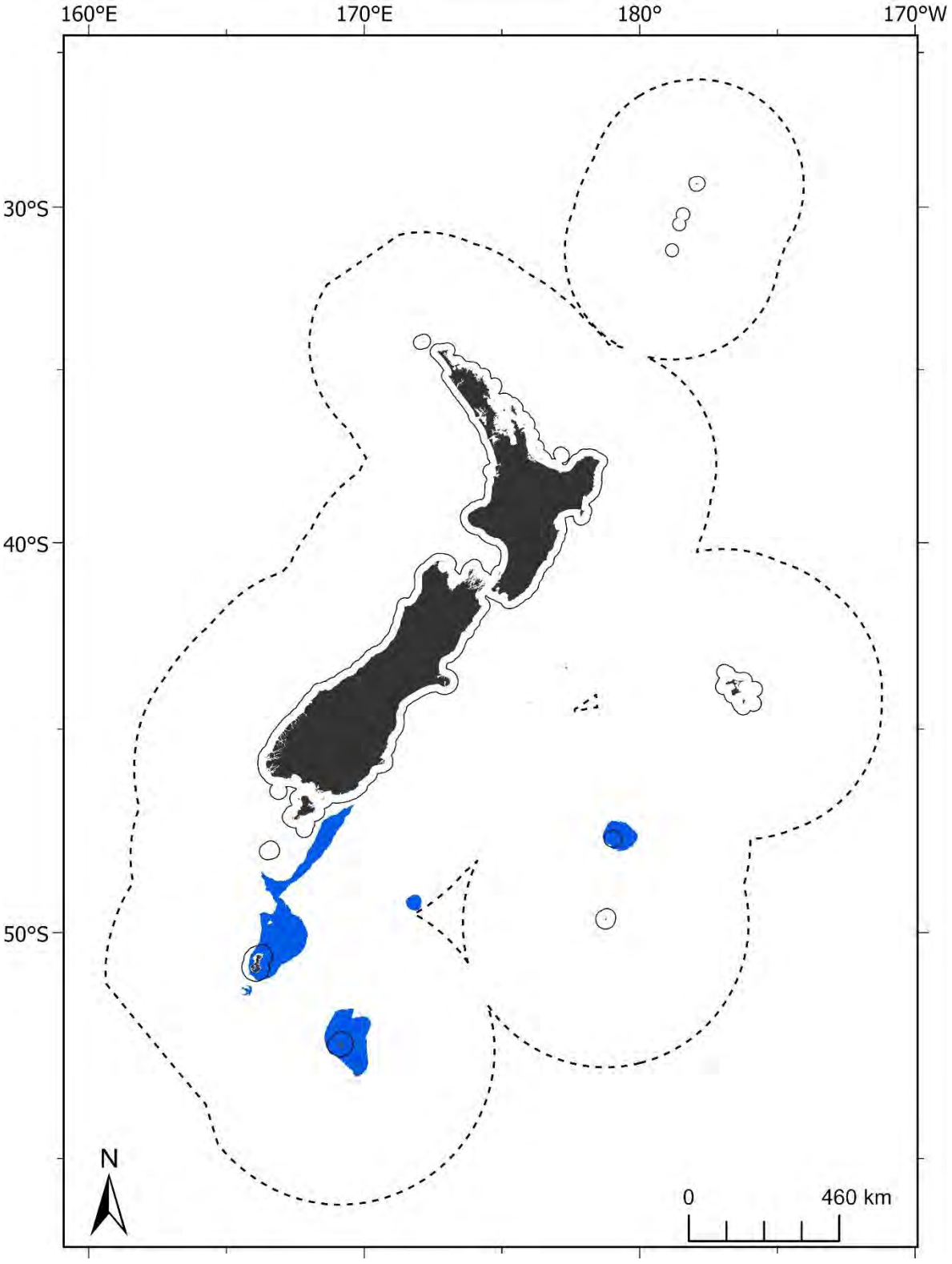

Figure 49: Geographic distribution of group 47 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

47.2 Group description

Group 47 is a large group located on the continental shelf south of the Subtropical Front, including around Auckland, Campbell, and Bounty islands (Figure 49). This group is characterised by low-moderate temperature waters and strong tidal currents (Table 142). These waters are high in oxygen, with moderate silicate and nitrate concentrations at depth, and moderate productivity. Benthic invertebrates are characterised by several bivalve and brachiopod species, with moderate frequency occurrence of squat lobster and sea star species (Table 143). Demersal fish assemblages are diverse and are characterised by high frequency occurrence of demersal ling, dogfish and stargazer (Table 143). Macroalgal assemblages are also diverse and are characterised by high occurrences of several species of red, green and brown algae (Table 143). This group has a high number of samples for benthic invertebrates and demersal fish but a low number of samples for macroalgae and no reef fish samples. The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 144).

47.3 Similar groups

Closely related to group 48; more loosely related to 46.

47.4 Characterising environmental conditions

Table 142: Group 47 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	172 m	Shelf depth
Tidal current	0.25 m s^{-1}	High tidal current
Bottom nitrate	14.41 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	6.31 mg L^{-1}	High concentrations of oxygen at depth
Temperature at depth	8.25 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	40.17 mg C m^{-2} d^{-1}	Moderate productivity
Detrital absorption	0.014 m^{-1}	Low detrital absorption
Turbidity	0.002 m^{-1}	Low turbidity

47.5 Characterising species

Table 143: Species name, mean frequency occurrence and % contribution to group 47 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	731	174	*Nototodarus*	Squid	0.7	96.44
	MMG	38	87	*Zygochlamys*	Bivalve	0.45	20.87
				Munida	Squat lobster	0.29	18.27
				Neothyris	Brachiopod	0.37	10.78
				Purpurocardia	Bivalve	0.29	8.11
				Pratulum	Bivalve	0.24	5.55
				Odontaster	Sea star	0.24	5.55

				Aulacomya	Bivalve	0.18	5.01
	SMG	92	178	*Neothyris*	Brachiopod	0.48	31.7
				Zygochlamys	Bivalve	0.4	19.01
				Pratulum	Bivalve	0.18	4.34
				Tawera	Bivalve	0.21	4
	SSG	3	3	*Gyrothyris*	Brachiopod	0.67	57.14
				Neothyris	Brachiopod	0.67	42.86
Demersal fish		577	116	*Genypterus blacodes*	Ling	0.59	16.77
				Kathetostoma giganteum	Giant stargazer	0.55	15.03
				Squalus acanthias	Spiny dogfish	0.56	14.43
				Pseudophycis bachus	Red cod	0.39	7.4
				Thyrsites atun	Barracouta	0.35	7.28
				Seriolella punctata	Silver warehou	0.38	7.25
				Macruronus novaezelandiae	Hoki	0.34	5.28
Macroalgae		21	55	*Dasyclonium adiantiforme*	Red algae	0.33	22.81
				Cladophora verticillata	Green algae	0.29	19.56
				Marginariella parsonsii	Brown algae	0.24	11.78
				Adenocystis utricularis	Brown algae	0.33	10.95
				Lessonia brevifolia	Kelp	0.29	7.96
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

47.6 Uncertainty ranges

Table 144: Mean uncertainty values for group 47 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.002	Moderate	0.4	Moderate
Demersal fish	0.003	Moderate	0.219	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.003	Moderate	0.217	Moderate

48 Group 48

48.1 Geographic location

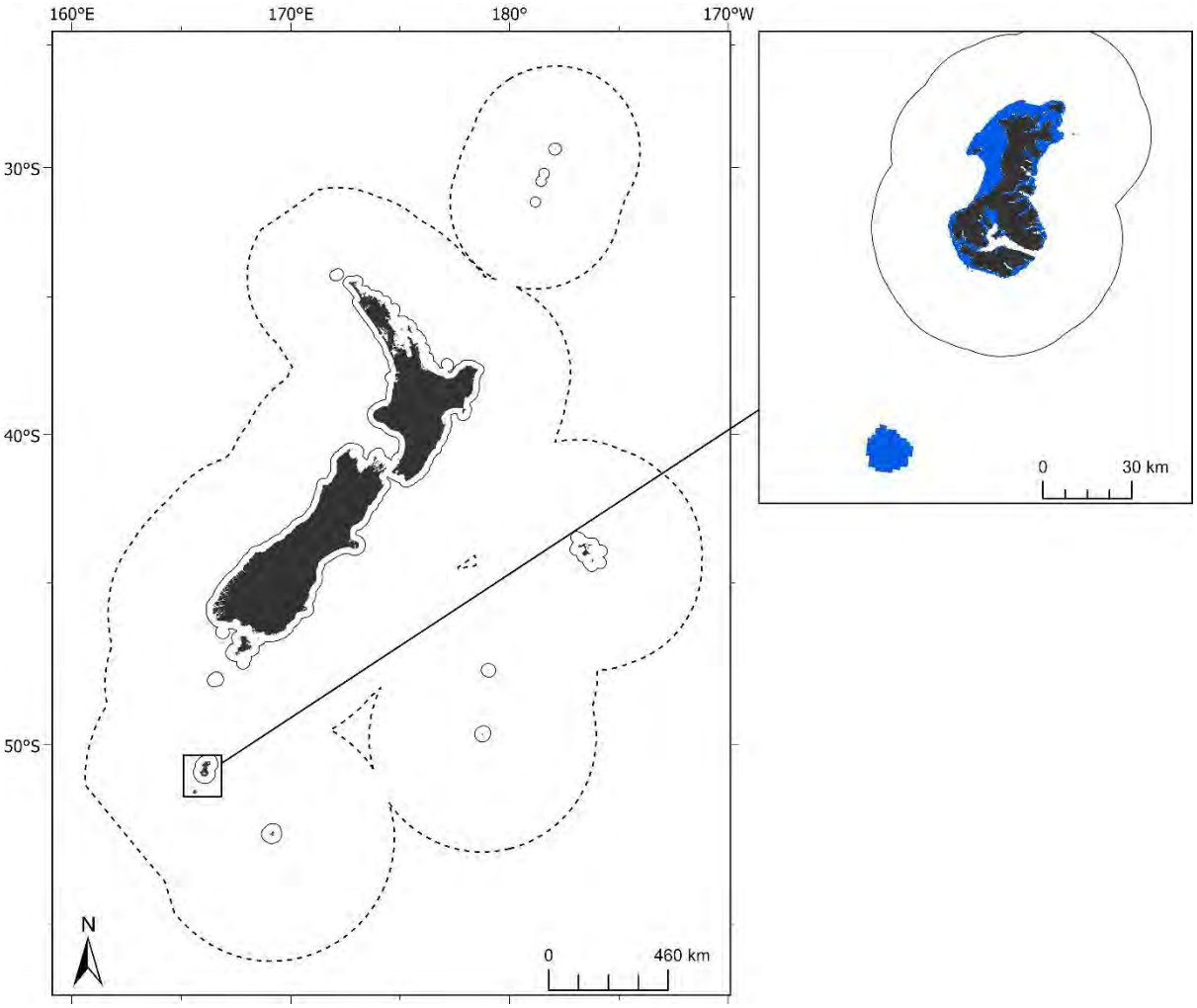

Figure 50: Geographic distribution of group 48 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

48.2 Group description

Group 48 is a small group in the shallow coastal waters surrounding the Auckland Islands (Figure 50). These cold waters are subject to strong tidal currents and have high concentrations of oxygen, moderate salinity at depth and high rates of sediment disturbance by wave action (Table 145). Benthic invertebrates are characterised by very high frequency occurrence of squat lobster and two species of bivalve (Table 146). Macroalgal assemblages are characterised by several species of brown and red algae (Table 146). This group has a moderate number of samples for macroalgae, low number of samples for benthic invertebrates and no samples for demersal fish or reef fish (Table 146). The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 147). Note that despite the moderate sampling for macroalgae, there was low confidence for macroalgae environmental coverage.

48.3 Similar groups

Closely related to group 47; more loosely related to 46.

48.4 Characterising environmental conditions

Table 145: Group 48 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	15 m	Shallow coastal
Salinity at depth	34.46 psu	Low salinity at depth
Benthic sediment disturbance	0.05 m s^{-1}	High rate of sediment disturbance
Dissolved oxygen at depth	6.58 mg L^{-1}	High concentrations of oxygen at depth
Temperature at depth	9.38 °C	Moderate bottom water temperature
Tidal current	0.24 m s^{-1}	High tidal current
Benthic position index	1335.946 m	High seafloor unevenness
Benthic sediment disturbance	0.045 m s^{-1}	High benthic sediment disturbance by wave action

48.5 Characterising species

Table 146: Species name, mean frequency occurrence and % contribution to group 48 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	1	0	*na*	*na*	*na*	*na*
	MMG	6	11	*Munida*	Squat lobster	0.83	82.73
	SMG	10	21	*Tawera*	Bivalve	0.4	63.64
				Aulacomya	Bivalve	0.2	11.36
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae		31	56	*Xiphophora gladiata*	Brown algae	0.19	17.88
				Durvillaea antarctica	Kelp	0.16	15.3
				Nothogenia variolosa	Red algae	0.19	11.56
				Cenacrum subsutum	Red algae	0.16	7.99
				Streblocladia glomerulata	Red algae	0.19	6.11
				Callophyllis atrosanguinea	Red algae	0.13	4.68
				Halopteris funicularis	Brown algae	0.1	4.13
Reef fish*		0	0	*na*	*na*	*na*	*na*

No samples with species present, ** insufficient data to run SIMPER analysis.

48.6 Uncertainty ranges

Table 147: Mean uncertainty values for group 48 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.574	High
Demersal fish	0.003	Moderate	0.111	Moderate
Macroalgae	0	High	0	Low
Reef fish	0	High	0	Low
Combined	0.003	Moderate	0.137	Moderate

49 Group 49

49.1 Geographic location

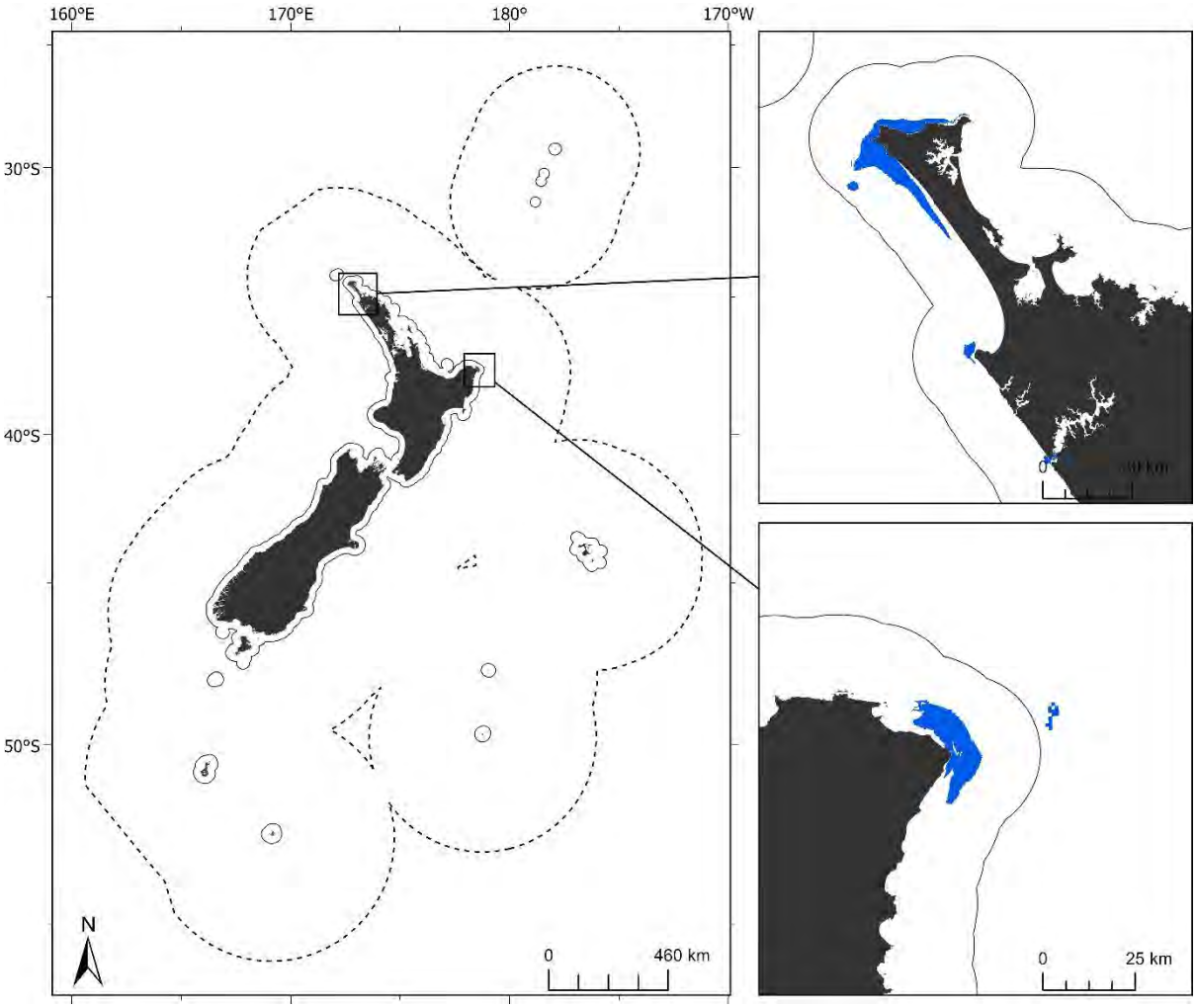

Figure 51: Geographic distribution of group 49 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

49.2 Group description

Group 49 is a small group in the shallow coastal waters of the North and East capes (Figure 51), where the warm waters are subject to strong tidal currents (Table 148). These highly saline, low nitrate concentration waters have large seasonal differences in bottom temperature. Benthic invertebrates are characterised by two genera of squid (note the low sample number across all gear types bar LLG.LMG, Table 149). Demersal fish assemblages are characterised by very high frequency occurrence of gurnard, snapper and rig (Table 149). Macroalgal assemblages are diverse and are characterised by several species of red and brown algae with similarly high frequency occurrences (Table 149). This group has a low number of samples for benthic invertebrates, demersal fish and macroalgae and no samples for reef fish. Despite the low sample number across biotic groups, the overall confidence for 'combined' biotic group environmental coverage is high suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups, but there is low confidence overall for model variability (i.e., there is high variability in model predictions) (Table 150).

49.3 Similar groups

Loosely related to groups 50-52.

49.4 Characterising environmental conditions

Table 148: Group 49 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	42 m	Shallow coastal
Bottom nitrate	1.56 µmol L^{-1}	Low concentrations of nitrate at depth
Annual amplitude of sea floor temperature	3.59 °C	High. Large seasonal differences in bottom temperature
Tidal current	0.26 m s^{-1}	High tidal current
Temperature at depth	16.73 °C	High bottom water temperature
Salinity at depth	35.44 psu	High salinity at depth

49.5 Characterising species

Table 149: Species name, mean frequency occurrence and % contribution to group 49 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	13	35	*Sepioteuthis*	Squid	0.62	54.24
				Nototodarus	Squid	0.62	45.6
	MMG**	2	7	*na*	*na*	*na*	*na*
	SMG**	6	21	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		29	44	*Chelidonichthys kumu*	Red gurnard	0.83	19.14
				Chrysophrys auratus	Snapper	0.72	12.68
				Mustelus lenticulatus	Rig	0.69	11.83
				Zeus faber	John Dory	0.66	11.03
				Pseudocaranx dentex	Trevally	0.62	10.1
				Myliobatis tenuicaudatus	Eagle ray	0.52	7.61
Macroalgae		28	84	*Ecklonia radiata*	Kelp	0.18	16.57
				Corallina aff ferreyrae	Red algae	0.18	15.31
				Catenella fusiformis	Red algae	0.14	14.34
				Carpophyllum maschalocarpum	Brown algae	0.18	9.62
				Xiphophora chondrophylla	Brown algae	0.14	5.23
				Gigartina atropurpurea	Red algae	0.14	4.86
				Clymene coleana	Red algae	0.11	4.63

Reef fish**	1	17	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

49.6 Uncertainty ranges

Table 150: Mean uncertainty values for group 49 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.004	Low	0.768	High
Demersal fish	0.004	Low	0.664	High
Macroalgae	0.002	Moderate	0.994	High
Reef fish	0.006	Low	0.347	Moderate
Combined	0.004	Low	0.673	High

50 Group 50

50.1 Geographic location

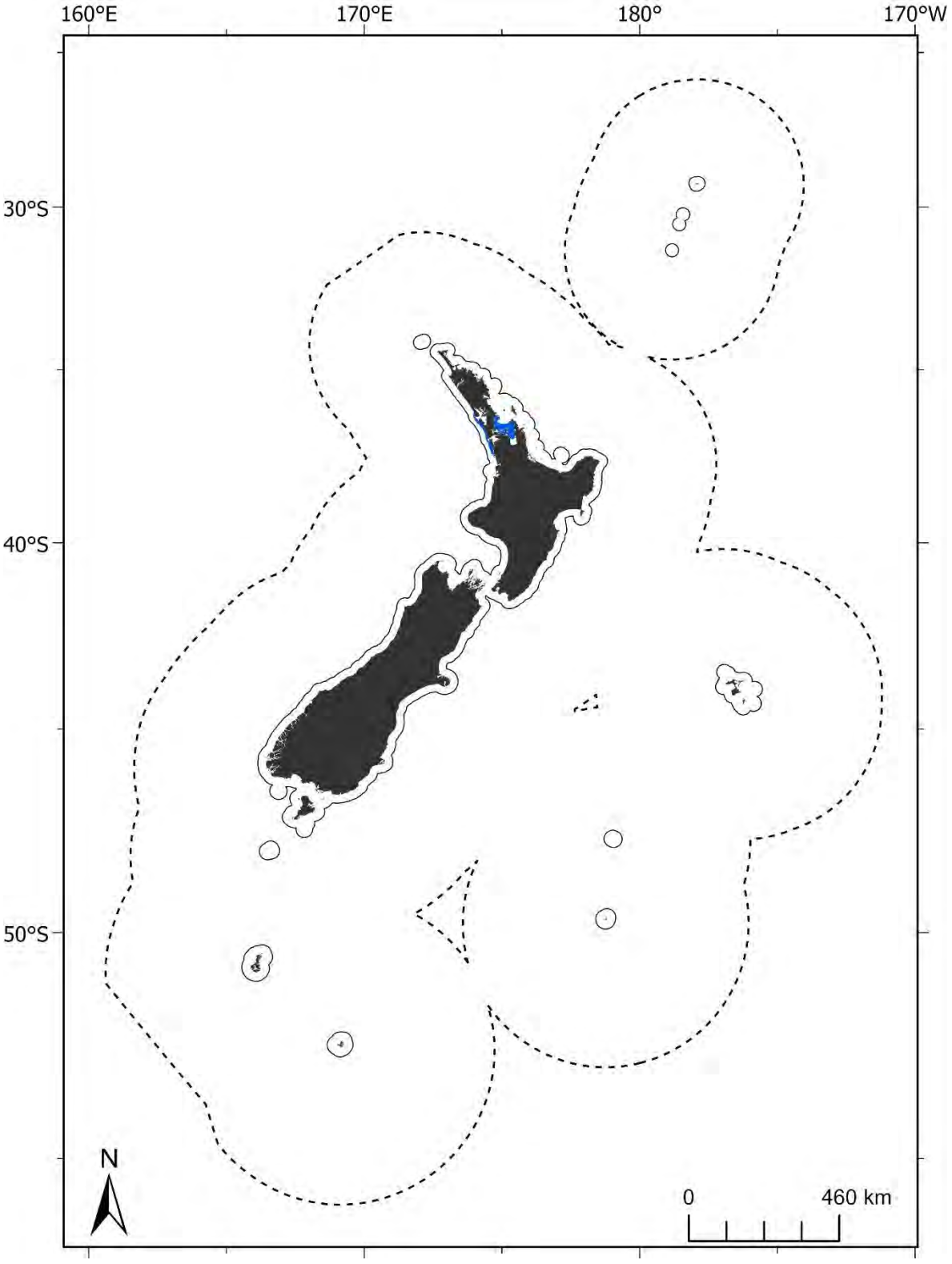

Figure 52: Geographic distribution of group 50 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

50.2 Group description

Group 50 is a localised group in the shallow coastal waters of the Hauraki Gulf and Auckland Harbour, and the shallow waters adjacent to the Kaipara and Manukau harbours (Figure 52). These high temperature coastal waters have low concentrations of nitrate, silicate and phosphate, consistent with productive, warm waters north of the Subtropical Front (Table 151). Benthic invertebrate assemblages are characterised by low frequency occurrence of molluscs, brittle stars and crabs (Table 152). Demersal fish assemblages are characterised by very high frequency occurrence of demersal gurnard, snapper and mackerel (Table 152). Reef fish assemblages are diverse and are characterised by very high frequency occurrence of triplefins, goatfish and wrasse (Table 152). Macroalgal assemblages are also diverse, characterised predominantly by low frequency occurrence brown algae and a single species of green algae (Table 152). This group has a high number of samples of macroalgae, moderate to high number of samples for benthic invertebrates, demersal fish and low number of samples for reef fish. The overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 153).

50.3 Similar groups

Loosely related to groups 49, and groups 51 – 52.

50.4 Characterising environmental conditions

Table 151: Group 50 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	21 m	Shallow coastal
Annual amplitude of sea floor temperature	5.59	High. Large seasonal differences in bottom temperature
Bottom nitrate	2.38 µmol L^{-1}	Low concentrations of nitrate at depth
Bottom silicate	3.43 µmol L^{-1}	Low concentrations of silicate at depth
Temperature at depth	17.22 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	67.24 mg C m^{-2} d^{-1}	High productivity
Turbidity	0.017 m^{-1}	High turbidity

50.5 Characterising species

Table 152: Species name, mean frequency occurrence and % contribution to group 50 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	179	23	*Sepioteuthis*	Squid	0.68	79.8
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	60	129	*Cominella*	Gastropod	0.17	20.84
				Amalda	Gastropod	0.15	11.68
				Amphiura	Brittle star	0.08	7.62

				Halicarcinus	Crab	0.08	5.08
				Notomithrax	Crab	0.08	4.7
				Dosinia	Bivalve	0.08	4.52
	SSG**	3	6	*na*	*na*	*na*	*na*
Demersal fish		618	63	*Chrysophrys auratus*	Snapper	0.97	28.26
				Chelidonichthys kumu	Red gurnard	0.83	18.8
				Trachurus novaezelandiae	Yellowtail Jack mackerel	0.64	11.55
				Zeus faber	John Dory	0.6	9.47
				Rhombosolea plebeia	Sand flounder	0.56	7.78
Macroalgae		273	164	*Ecklonia radiata*	Kelp	0.15	27.85
				Carpophyllum maschalocarpum	Brown algae	0.11	11.36
				Codium fragile	Green algae	0.07	8.34
				Carpophyllum flexuosum	Brown algae	0.09	6.8
Reef fish		19	47	*Ruanoho whero*	Triplefin	1	9.72
				Upeneichthys lineatus	Goatfish	0.95	8.79
				Forsterygion varium	Triplefin	0.89	7.77
				Notolabrus celidotus	Wrasse	0.89	7.58
				Scorpis lineolatus	Sea chub	0.84	6.69
				Forsterygion malcolmi	Triplefin	0.84	6.43
				Notoclinops segmentatus	Triplefin	0.79	5.74
				Parika scaber	Leatherjacket	0.79	5.72
				Optivus elongatus	Roughy	0.79	5.62
				Forsterygion lapillum	Triplefin	0.74	4.86
				Pagrus auratus	Snapper	0.68	4.51

**** No samples with species present, ** insufficient data to run SIMPER analysis***

50.6 Uncertainty ranges

Table 153: Mean uncertainty values for group 50 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.799	High
Demersal fish	0.004	Low	0.88	High
Macroalgae	0.002	Moderate	0.995	High
Reef fish	0.005	Low	0.415	Moderate
Combined	0.003	Moderate	0.873	High

51 Group 51

51.1 Geographic location

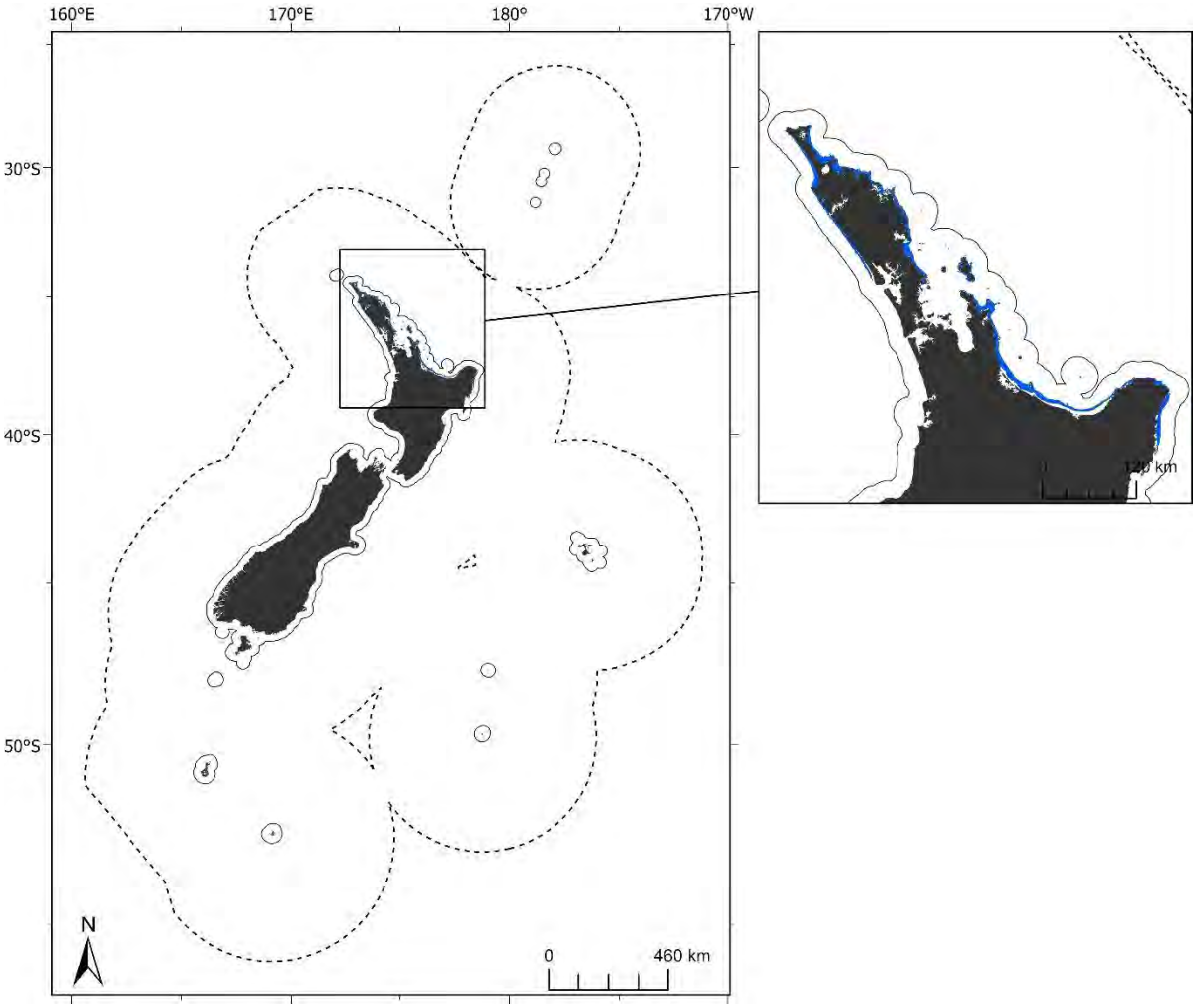

Figure 53: Geographic distribution of group 51 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

51.2 Group description

Group 51 is a small widespread group in the shallow coastal waters surrounding the northern North Island, mostly on the east coast (Figure 53). This group is characterised by low concentrations of nitrate, silicate and phosphate, consistent with productive, warm waters north of the Subtropical Front (Table 154). Benthic invertebrate assemblages are diverse (over 200 unique taxa) and are characterised by high frequency occurrence of echinoderms and polychaetes, and low frequency occurrence of molluscs (Table 155). Demersal fish assemblages are characterised by very high frequency occurrence of demersal gurnard, snapper and leatherjacket, and reef fish assemblages are characterised by high frequency occurrence of triplefins, damselfish, morwong and wrasse (Table 155). Macroalgal assemblages are also very diverse (over 200 unique taxa) and are characterised by several species of brown algae (Table 155). This group has a high number of samples for benthic invertebrates, demersal fish and macroalgae, and a low number of samples for reef fish. The overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 156).

51.3 Similar groups

Closely related to group 52; more loosely related to groups 49 and 50.

51.4 Characterising environmental conditions

Table 154: Group 51 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	21 m	Shallow coastal
Slope	1.02 °	Moderate slope
Annual amplitude of sea floor temperature	4.88 °C	High. Large seasonal differences in bottom temperature
Salinity at depth	35.36 psu	High salinity at depth
Temperature at depth	17.23 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	46.76 mg C m^{-2} d^{-1}	Moderate productivity
Tidal current	0.040 m s^{-1}	Low tidal current speed

51.5 Characterising species

Table 155: Species name, mean frequency occurrence and % contribution to group 51 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	159	20	*Sepioteuthis*	Squid	0.65	72.74
	MMG	8	26	*Ophiactis*	Brittle star	0.5	29.45
				Amphiura	Brittle star	0.38	15.14
				Cominella	Gastropod	0.38	11.72
				Echinocardium	Sea urchin	0.38	11.72
				Notocallista	Bivalve	0.38	11.72
	SMG	185	243	*Atrina*	Bivalve	0.07	7.14
				Pecten	Bivalve	0.08	7.07
				Alcithoe	Gastropod	0.05	6.69
				Myadora	Bivalve	0.1	6.67
				Nucula	Bivalve	0.1	4.36
	SSG	3	9	*Amphiura*	Brittle star	0.67	50
				Goniada	Polychaete	0.67	50
Demersal fish		320	81	*Chrysophrys auratus*	Snapper	0.95	22.9
				Chelidonichthys kumu	Red gurnard	0.88	18.46
				Meuschenia scaber	Leatherjacket	0.73	13.31
				Pseudocaranx dentex	Trevally	0.69	10.84
				Zeus faber	John Dory	0.67	9.95
Macroalgae		410	234	*Ecklonia radiata*	Kelp	0.18	25.21
				Carpophyllum maschalocarpum	Brown algae	0.15	15.31

			Carpophyllum plumosum	Brown algae	0.13	7.48
			Xiphophora chondrophylla	Brown algae	0.11	5.69
			Carpophyllum angustifolium	Brown algae	0.09	5.08
			Sargassum sinclairii	Brown algae	0.1	4.14
Reef fish	32	75	*Notoclinops segmentatus*	Triplefin	0.94	6.62
			Chromis dispilus	Damselfish	0.94	6.57
			Cheilodactylus spectabilis	Morwong	0.88	5.84
			Notolabrus fucicola	Wrasse	0.84	5.21
			Scorpis lineolatus	Sea chub	0.84	5.17
			Optivus elongatus	Roughy	0.84	5.16
			Parika scaber	Leatherjacket	0.84	5.16
			Ruanoho whero	Triplefin	0.84	5.15
			Pempheris adspersa	Sweep	0.78	4.3
			Notolabrus celidotus	Wrasse	0.75	4.05
			Upeneichthys lineatus	Goatfish	0.75	4.01

51.6 Uncertainty ranges

Table 156: Mean uncertainty values for group 51 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.783	High
Demersal fish	0.003	Moderate	0.764	High
Macroalgae	0.002	Moderate	0.995	High
Reef fish	0.005	Low	0.395	Moderate
Combined	0.003	Moderate	0.765	High

52 Group 52

52.1 Geographic location

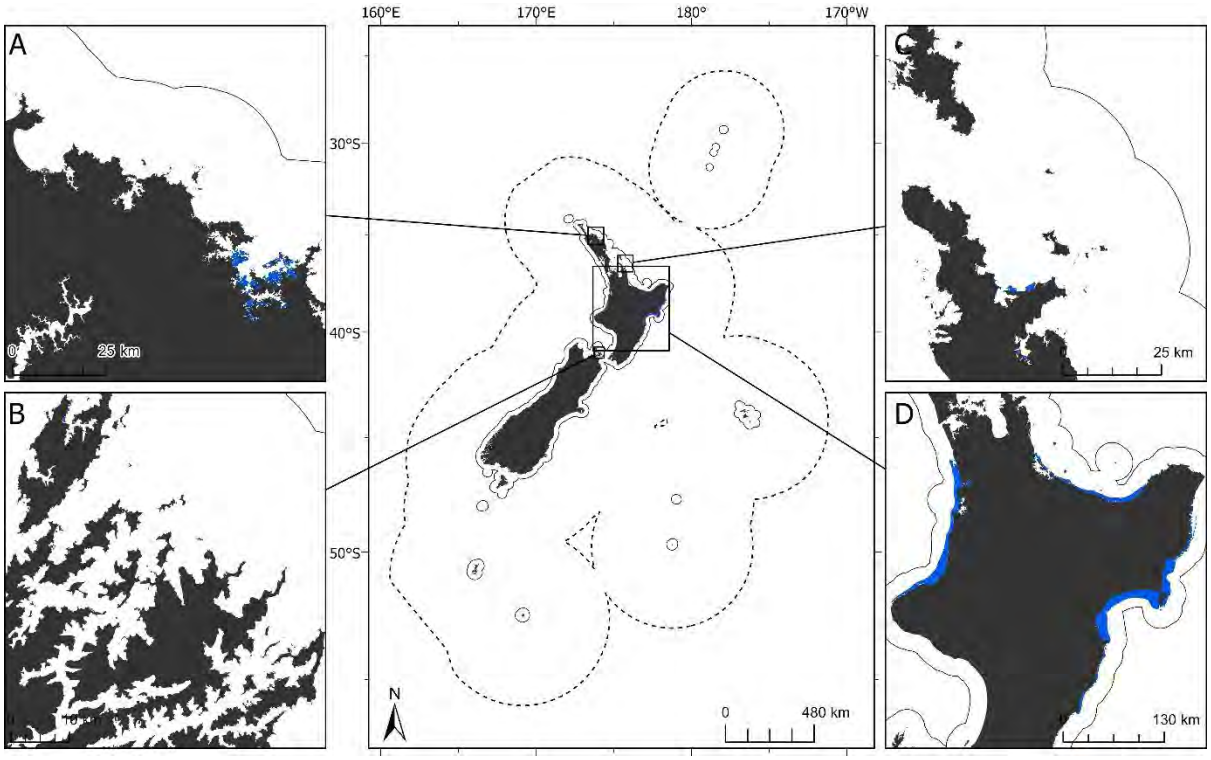

Figure 54: Geographic distribution of group 52 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

52.2 Group description

Group 52 is a small but widespread group in the shallow coastal waters predominately found on the eastern and western North Island, but also in Marlborough Sounds (Figure 54). These high temperature waters have the low concentrations of nitrate and silicate associated with elevated productivity and a large annual temperature variation (Table 157). Benthic invertebrate assemblages are characterised by low frequency occurrence of echinoderms, molluscs and small crustacea (cumaceans, amphipods) (Table 158). Demersal fish assemblages are characterised by very high frequency occurrence of demersal gurnard, snapper and trevally, and reef fish assemblages are characterised by high frequency occurrence of triplefins, morwong and wrasse (Table 158). Macroalgal assemblages are diverse and are characterise by several species of brown algae (Table 158). This group has low to moderate number of samples for benthic invertebrates and a moderate number of samples for demersal fish, macroalgae, and reef fish (Table 158). The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 159).

52.3 Similar groups

Closely related to group 51; more loosely related to groups 50 and 49.

52.4 Characterising environmental conditions

Table 157: Group 52 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	20 m	Shallow coastal
Bottom nitrate	1.05 µmol L^{-1}	Low concentrations of nitrate at depth
Bottom silicate	2.46 µmol L^{-1}	Low concentrations of silicate at depth
Annual amplitude of sea floor temperature	4.82 °C	High seasonal differences in bottom temperature
Temperature at depth	16.59 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	56.13 mg C m^{-2} d^{-1}	High productivity
Tidal current	0.030 m s^{-1}	Low velocity tidal current

52.5 Characterising species

Table 158: Species name, mean frequency occurrence and % contribution to group 52 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	43	11	*Nototodarus*	Squid	0.35	53.41
				Sepioteuthis	Squid	0.28	30.32
	MMG**	1	2	*na*	*na*	*na*	*na*
	SMG	83	147	*Amphiura*	Brittle star	0.13	13.5
				Amalda	Gastropod	0.13	10.35
				Cyclaspis	Cumacean	0.11	5.15
				Echinocardium	Sea urchin	0.1	4.91
				Diastylopsis	Cumacean	0.07	4.4
				Myadora	Bivalve	0.1	4.26
				Mactra	Bivalve	0.1	4.22
				Gammaropsis	Amphipod	0.1	4.15
	SSG**	4	4	*na*	*na*	*na*	*na*
Demersal fish		177	69	*Chelidonichthys kumu*	Red gurnard	0.92	22.2
				Chrysophrys auratus	Snapper	0.86	19.47
				Pseudocaranx dentex	Trevally	0.76	15.09
				Arripis trutta	Kahawai	0.58	8.19
				Zeus faber	John Dory	0.44	4.61
				Mustelus lenticulatus	Rig	0.44	4.41
Macroalgae		179	185	*Ecklonia radiata*	Kelp	0.25	34.03
				Carpophyllum maschalocarpum	Brown algae	0.23	31.61
				Carpophyllum flexuosum	Brown algae	0.13	7.18

Reef fish	59	60	*Forsterygion varium*	Triplefin	0.81	9.95
			Notolabrus fucicola	Wrasse	0.8	9.27
			Notolabrus celidotus	Wrasse	0.8	9.21
			Forsterygion malcolmi	Triplefin	0.8	9
			Cheilodactylus spectabilis	Morwong	0.71	7.52
			Pseudolabrus miles	Wrasse	0.71	7.04
			Ruanoho whero	Triplefin	0.64	5.74
			Scorpis lineolatus	Sea chub	0.63	5.54
			Scorpaena papillosus	Cod	0.58	4.29
			Parapercis colias	Blue cod	0.54	4.05

***** Insufficient data to run SIMPER analysis***

52.6 Uncertainty ranges

Table 159: Mean uncertainty values for group 52 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.575	High
Demersal fish	0.003	Moderate	0.51	High
Macroalgae	0.002	Moderate	0.99	High
Reef fish	0.005	Low	0.432	Moderate
Combined	0.003	Moderate	0.5	Moderate

53 Group 53

53.1 Geographic location

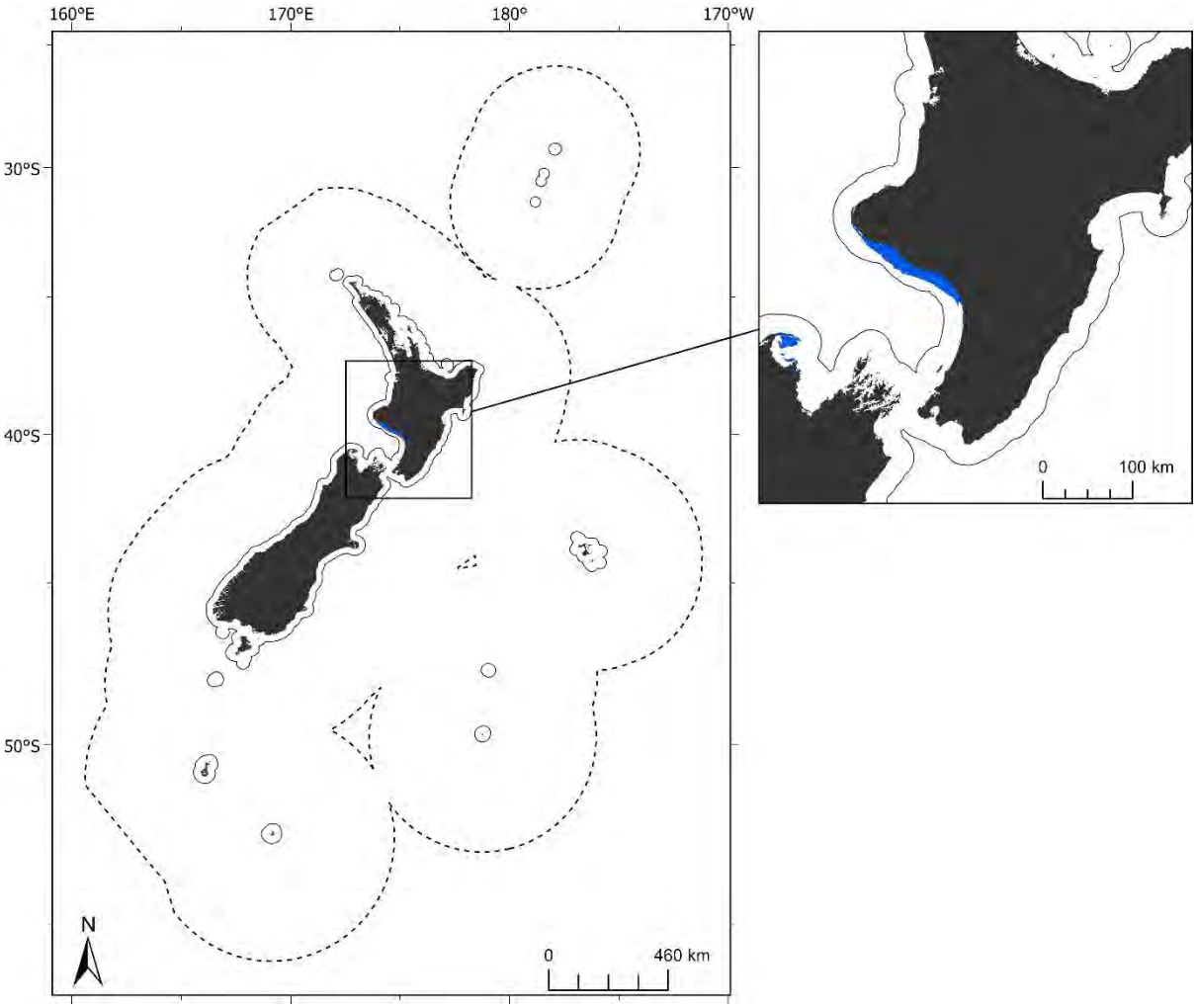

Figure 55: Geographic distribution of group 53 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

53.2 Group description

Group 53 occurs in the shallow coastal waters of the South Taranaki Bight and Golden Bay (Figure 55). These high temperature waters have low concentrations of nitrate and silicate associated with elevated productivity and have large seasonal differences in bottom temperature (Table 160). Benthic invertebrate assemblages are characterised by high frequency cephalopods and hydrozoans, and low frequency brachiopods (Table 161). Demersal fish assemblages are characterised by very high frequency occurrence of demersal cod, tarakihi and gurnard, and reef fish assemblages are characterised by high frequency occurrence of triplefins and wrasse (Table 161). Macroalgal assemblages are diverse, characterised by several species of brown algae (Table 161). This group has a low number of samples for benthic invertebrates and reef fish, and a moderate number of samples for demersal fish and macroalgae. The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 162).

53.3 Similar groups

Closely related to group 54; more loosely related to groups 55 – 57.

53.4 Characterising environmental conditions

Table 160: Group 53 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	17 m	Shallow coastal
Annual amplitude of sea floor temperature	4.53 °C	High seasonal differences in bottom temperature
Bottom nitrate	0.52 µmol L^{-1}	Low concentrations of nitrate at depth
Slope	0.36 °	
Temperature at depth	15.27 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	65.87 mg C m^{-2} d^{-1}	High productivity
Detrital absorption	0.104 m^{-1}	High detrital absorption
Turbidity	0.020 m^{-1}	High turbidity

53.5 Characterising species

Table 161: Species name, mean frequency occurrence and % contribution to group 53 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	20	10	*Nototodarus*	Squid	0.7	69.51
				Pinnoctopus	Octopus	0.35	18.34
	MMG	4	5	*Amphisbetia*	Hydrozoan	0.75	72.22
	SMG	9	20	*Calloria*	Brachiopod	0.22	100
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		34	54	*Parapercis colias*	Blue cod	0.76	24.99
				Nemadactylus macropterus	Tarakihi	0.68	12.92
				Chelidonichthys kumu	Red gurnard	0.62	6.52
				Meuschenia scaber	Leatherjacket	0.56	5.95
				Thyrsites atun	Barracouta	0.56	5.31
				Zeus faber	John Dory	0.53	4.62
				Rhombosolea plebeia	Sand flounder	0.53	4.48
				Notolabrus celidotus	Wrasse	0.5	4.18
Macroalgae		38	107	*Ecklonia radiata*	Kelp	0.32	41.95
				Carpophyllum maschalocarpum	Brown algae	0.24	19.66
				Carpophyllum flexuosum	Brown algae	0.16	10.45

Reef fish	5	35	*Notolabrus celidotus*	Wrasse	1	9.96
			Notolabrus fucicola	Wrasse	1	9.96
			Pseudolabrus miles	Wrasse	1	9.96
			Forsterygion varium	Triplefin	1	9.96
			Ruanoho whero	Triplefin	1	9.96
			Aplodactylus arctidens	Marblefish	0.8	5.92
			Parapercis colias	Blue cod	0.8	5.74
			Forsterygion malcolmi	Triplefin	0.8	5.74
			Notoclinops segmentatus	Triplefin	0.8	5.74

**** No samples with species present***

53.6 Uncertainty ranges

Table 162: Mean uncertainty values for group 53 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.579	High
Demersal fish	0.004	Low	0.419	Moderate
Macroalgae	0.002	Moderate	0.991	High
Reef fish	0.005	Low	0.413	Moderate
Combined	0.003	Moderate	0.497	Moderate

54 Group 54

54.1 Geographic location

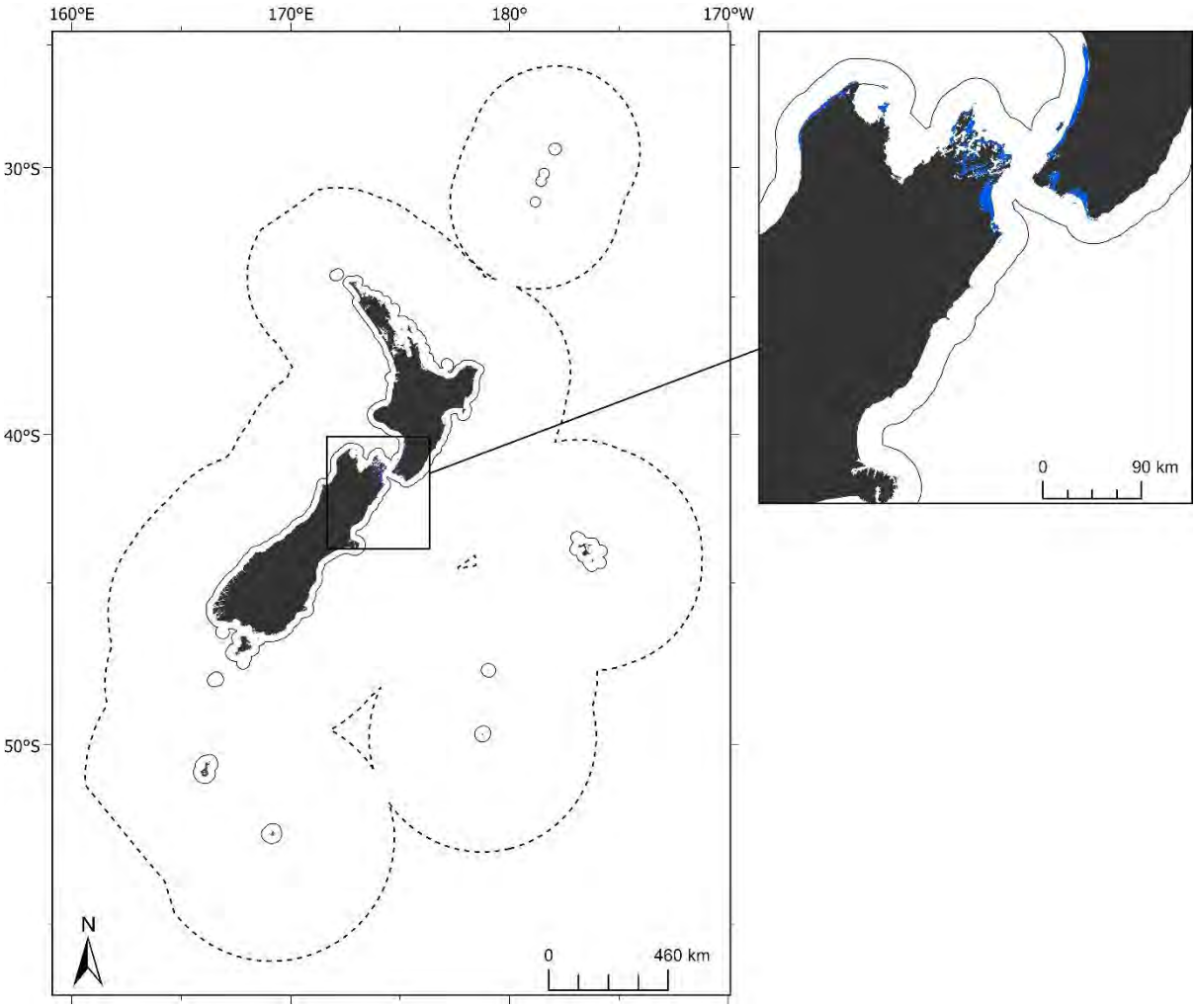

Figure 56: Geographic distribution of group 54 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

54.2 Group description

Group 54 occurs mostly in the shallow coastal waters of the South Taranaki Bight, Marlborough Sounds, and the Cook Strait (Figure 56). These high temperature waters have low concentrations of nitrate and silicate associated with elevated productivity and have large seasonal differences in bottom temperature (Table 163). Benthic invertebrate assemblages are characterised by high frequency occurrence of brittle star and isopods, moderate frequency occurrence of bivalves, and low frequency occurrence of brachiopods and amphipods (Table 164). Demersal fish assemblages are characterised by high frequency occurrence of blue cod, and reef fish assemblages are characterised by high frequency of triplefins and wrasse (Table 164). Macroalgal assemblages are very diverse and are characterised by several species of brown and red algae (Table 164). This group has a moderate number of samples for benthic invertebrates, demersal fish, macroalgae, and reef fish (Table 164). Despite the moderate number of samples across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 165).

54.3 Similar groups

Closely related to group 53; more loosely related to groups 55 – 57.

54.4 Characterising environmental conditions

Table 163: Group 54 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	20 m	Shallow coastal
Bottom nitrate	0.6 µmol L^{-1}	Low concentrations of nitrate at depth
Bottom silicate	2.57 µmol L^{-1}	Low concentrations of silicate at depth
Annual amplitude of sea floor temperature	4.37 °C	High seasonal differences in bottom temperature
Temperature at depth	14.32 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	51.12 mg C m^{-2} d^{-1}	High productivity
Benthic position index	-36.704 m	Low seafloor unevenness
Turbidity	0.023 m^{-1}	High turbidity

54.5 Characterising species

Table 164: Species name, mean frequency occurrence and % contribution to group 54 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	39	51	*Pinnoctopus*	Octopus	0.38	62.81
				Nototodarus	Squid	0.31	28.32
	MMG	7	17	*Amphiura*	Brittle star	0.57	93.22
	SMG	20	28	*Dosinia*	Bivalve	0.25	39.49
				Neilo	Bivalve	0.25	21.75
				Magasella	Brachiopod	0.15	17.55
	SSG	25	16	*Natatolana*	Isopod	0.36	60.65
				Ampelisca	Amphipod	0.2	17.36
Demersal fish		123	66	*Parapercis colias*	Blue cod	0.72	76.08
Macroalgae		163	179	*Carpophyllum flexuosum*	Brown algae	0.13	28.12
				Macrocystis pyrifera	Giant kelp	0.09	14.21
				Carpophyllum maschalocarpum	Brown algae	0.13	12.7
				Grateloupia urvilleana	Red algae	0.06	6.33
				Undaria pinnatifida	Kelp	0.08	4.84
				Grateloupia turuturu	Red algae	0.04	4.11

Reef fish	45	49	*Notolabrus celidotus*	Wrasse	1	19.36
			Forsterygion lapillum	Triplefin	0.87	14.23
			Forsterygion varium	Triplefin	0.89	13.68
			Parapercis colias	Blue cod	0.84	12.29
			Forsterygion flavonigrum	Triplefin	0.58	5.28
			Notoclinops segmentatus	Triplefin	0.6	5.12
			Forsterygion malcolmi	Triplefin	0.58	4.64

54.6 Uncertainty ranges

Table 165: Mean uncertainty values for group 54 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.004	Low	0.717	High
Demersal fish	0.004	Low	0.703	High
Macroalgae	0.002	Moderate	0.996	High
Reef fish	0.005	Low	0.668	High
Combined	0.003	Moderate	0.714	High

55 Group 55

55.1 Geographic location

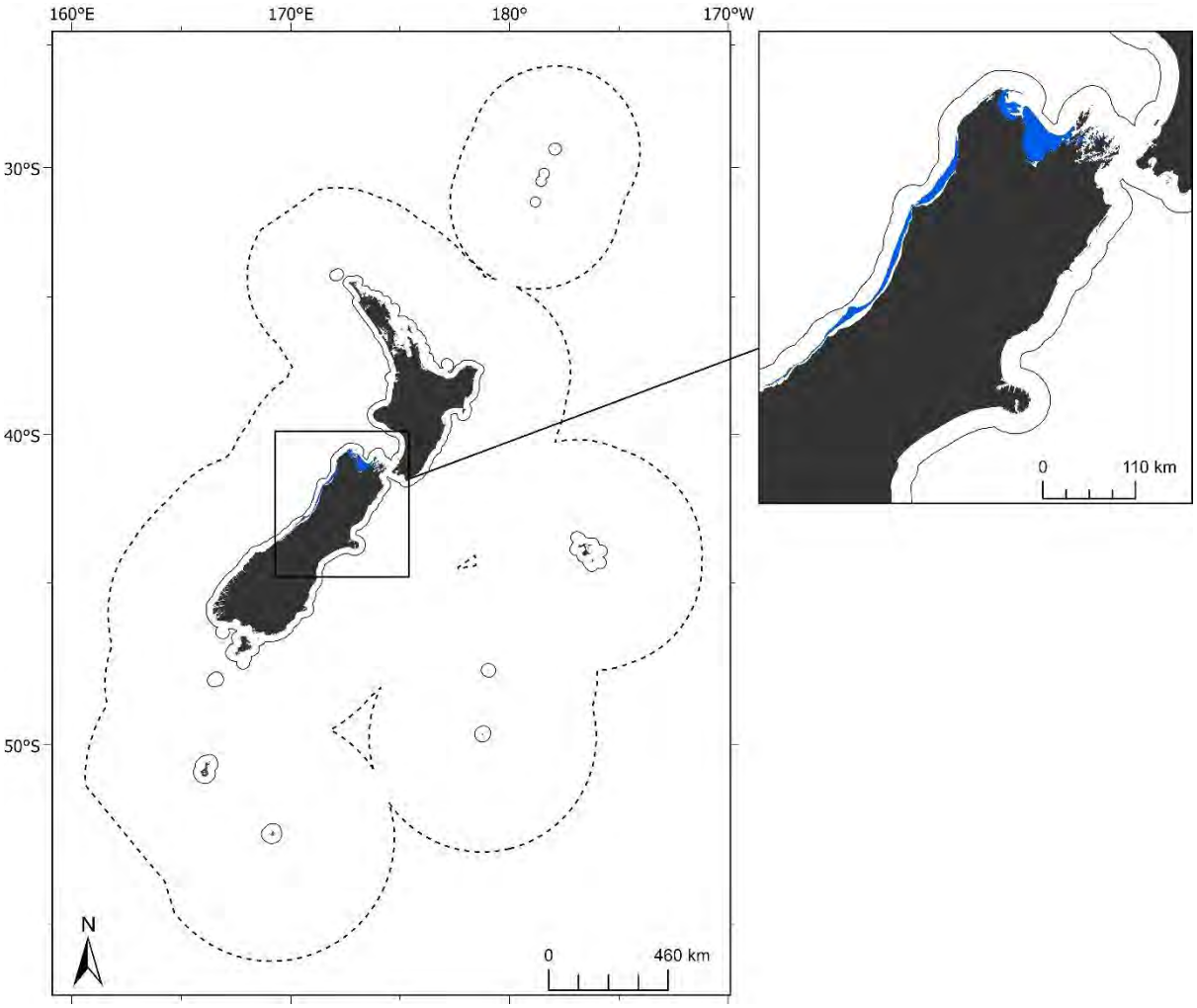

Figure 57: Geographic distribution of group 55 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

55.2 Group description

Group 55 occurs in the shallow coastal waters of Tasman and Golden bays and the west coast of the South Island (Figure 57). These high temperature waters have low concentrations of nitrate and silicate associated with elevated productivity and have large seasonal differences in bottom temperature and high seabed disturbance and moderate to high tidal currents (Table 166). Benthic invertebrate assemblages are characterised by high frequency occurrence *sea urchin*, hydrozoan and crab, with low frequency bivalve occurrence (Table 167). Demersal fish assemblages are characterised by high frequency occurrence of gurnard, barracouta and flounder and reef fish assemblages are characterised by high frequency occurrence of triplefin and wrasse (Table 167). Macroalgal assemblages are diverse and are characterised by several species of brown and red algae (Table 167). This group has a high number of samples for benthic invertebrates sampled using LLG.LMG gear types and demersal fish, a moderate number of samples for macroalgae and low number of samples for benthic invertebrates sampled using all other gear types and for reef fish (Table 167). Despite the variable number of samples across biotic groups, the overall confidence in

modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 168).

55.3 Similar groups

Loosely related to groups 53 – 54, and groups 56 – 57.

55.4 Characterising environmental conditions

Table 166: Group 55 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	25 m	Shallow coastal
Annual amplitude of sea floor temperature	4.31 °C	High seasonal differences in bottom temperature
Bottom silicate	3 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.78 mg L^{-1}	Moderate to High concentrations of oxygen at depth
Temperature at depth	14.56 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	64.62 mg C m^{-2} d^{-1}	High productivity
Benthic position index	-204.204 m	Low seafloor unevenness

55.5 Characterising species

Table 167: Species name, mean frequency occurrence and % contribution to group 55 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	232	60	*Nototodarus*	Squid	0.76	86.54
	MMG	4	25	*Amphisbetia*	Hydrozoan	0.5	50
				Nectocarcinus	Crab	0.5	50
	SMG	14	36	*Pratulum*	Bivalve	0.21	47.69
				Dosina	Bivalve	0.14	43.08
	SSG	14	14	*Echinocardium*	Sea urchin	0.79	86.89
Demersal fish		315	83	*Chelidonichthys kumu*	Red gurnard	0.91	11.89
				Thyrsites atun	Barracouta	0.83	9.77
				Rhombosolea plebeia	Sand flounder	0.8	8.89
				Pseudophycis bachus	Red cod	0.77	8.13
				Squalus acanthias	Spiny dogfish	0.69	6.2
				Seriolella brama	Blue warehou	0.67	5.87
				Pelotretis flavilatus	Flounder	0.6	4.54
				Notolabrus celidotus	Wrasse	0.58	4.51

Macroalgae	73	110	*Carpophyllum maschalocarpum*	Brown algae	0.23	41.84
			Carpophyllum flexuosum	Brown algae	0.19	27.4
			Agarophyton chilense	Red algae	0.1	7.51
Reef fish	19	41	*Notolabrus celidotus*	Wrasse	1	15.31
			Forsterygion varium	Triplefin	0.95	13.02
			Forsterygion malcolmi	Triplefin	0.84	9.48
			Parapercis colias	Blue cod	0.74	7.51
			Forsterygion flavonigrum	Triplefin	0.74	6.86
			Notolabrus fucicola	Wrasse	0.68	5.86
			Forsterygion lapillum	Triplefin	0.53	4.57

55.6 Uncertainty ranges

Table 168: Mean uncertainty values for group 55 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.779	High
Demersal fish	0.003	Moderate	0.794	High
Macroalgae	0.002	Moderate	0.992	High
Reef fish	0.005	Low	0.605	High
Combined	0.003	Moderate	0.782	High

56 Group 56

56.1 Geographic location

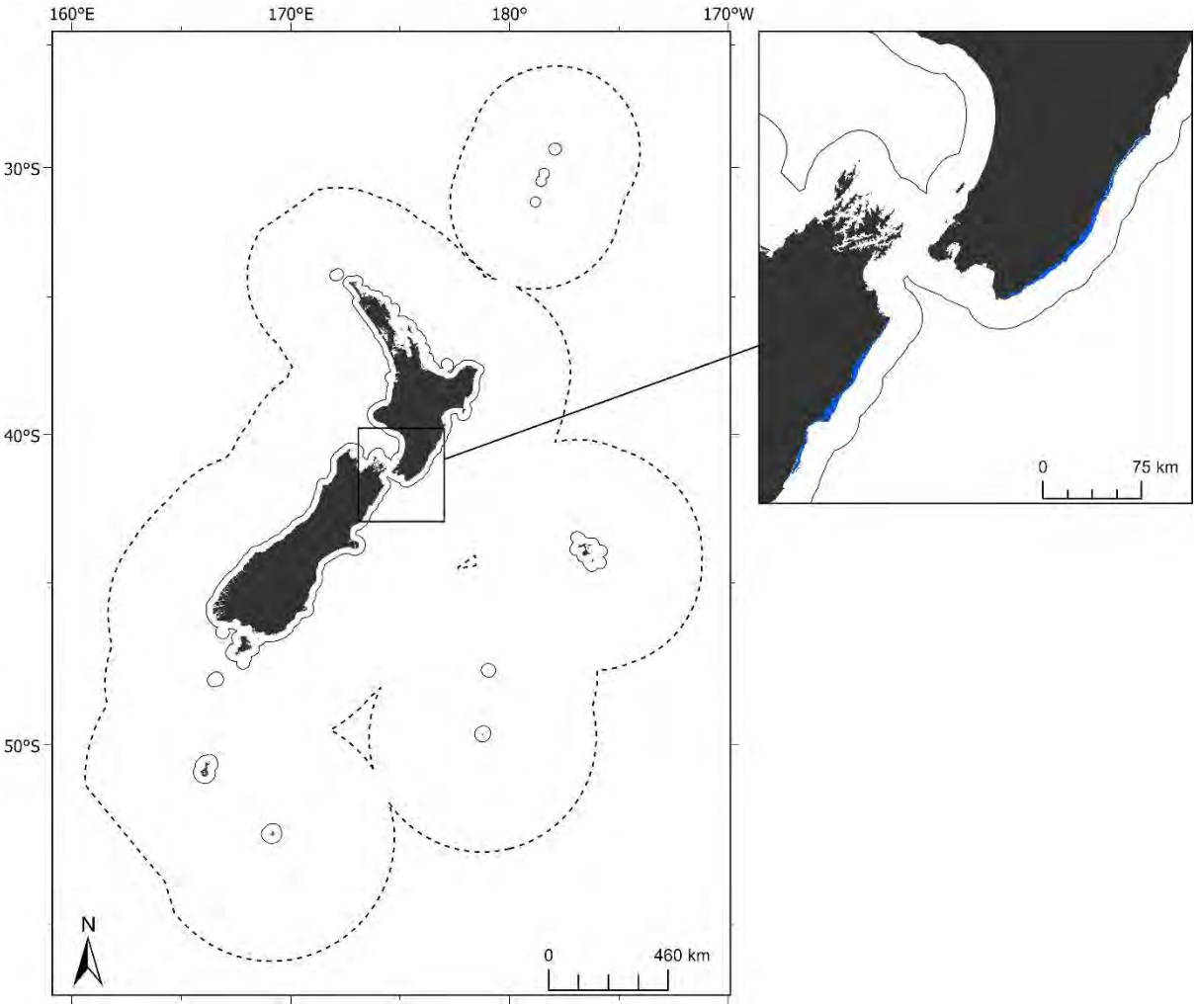

Figure 58: Geographic distribution of group 56 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

56.2 Group description

Group 56 occurs in the shallow coastal waters off north Canterbury and Wairarapa (Figure 58). These waters have large seasonal differences in bottom temperature, high annual temperature at depth, moderate to high oxygen concentration, and high detrital absorption (a proxy for water turbidity) (Table 169). There is a low number of benthic invertebrate samples resulting in assemblages characterised by a single octopus genus (Table 170). Demersal fish assemblages are characterised by high frequency occurrence of blue cod and low frequency occurrence of wrasse (Table 170). Reef fish assemblages are characterised by very high frequency triplefin, wrasse and blue cod (Table 170). Macroalgal assemblages are diverse and are characterised by multiple species of brown algae (Table 170). This group has a low number of samples for benthic invertebrates and reef fish, and a moderate number of samples for demersal fish and macroalgae (Table 170). Despite the variable number of samples across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for

model variability (SD), Table 171), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

56.3 Similar groups

Loosely related to groups 53 – 55, and group 57.

56.4 Characterising environmental conditions

Table 169: Group 56 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	15 m	Shallow coastal
Annual amplitude of sea floor temperature	4.31 °C	High. Large seasonal differences in bottom temperature
Bottom silicate	2.25 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.77 mg L^{-1}	Moderate to High concentrations of oxygen at depth
Temperature at depth	13.74 °C	High bottom water temperature
Detrital absorption	0.10 m^{-1}	High detrital absorption
Turbidity	0.021 m^{-1}	High turbidity

56.5 Characterising species

Table 170: Species name, mean frequency occurrence and % contribution to group 56 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	9	3	*Pinnoctopus*	Octopus	0.78	100
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG**	4	12	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		56	38	*Parapercis colias*	Blue cod	0.66	58.83
				Notolabrus celidotus	Wrasse	0.29	7.74
				Notolabrus fucicola	Wrasse	0.27	5.77
Macroalgae		81	174	*Carpophyllum flexuosum*	Brown algae	0.15	24.94
				Carpophyllum maschalocarpum	Brown algae	0.16	10.57
				Ecklonia radiata	Kelp	0.16	10.15
				Landsburgia quercifolia	Brown algae	0.16	8.57
				Lessonia sp B	Kelp	0.12	5.81
				Marginariella urvilliana	Brown algae	0.15	4.4
				Durvillaea antarctica	Kelp	0.1	4.24

Reef fish	18	44	*Forsterygion varium*	Triplefin	0.94	15.55
			Notolabrus celidotus	Wrasse	0.89	14.89
			Parapercis colias	Blue cod	0.78	10.49
			Notoclinops segmentatus	Triplefin	0.78	10.22
			Forsterygion malcolmi	Triplefin	0.78	9.53
			Forsterygion lapillum	Triplefin	0.67	9.01
			Notolabrus fucicola	Wrasse	0.61	5.63

**** No samples with species present, ** insufficient data to run SIMPER analysis***

56.6 Uncertainty ranges

Table 171: Mean uncertainty values for group 56 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.552	High
Demersal fish	0.003	Moderate	0.557	High
Macroalgae	0.002	Moderate	0.995	High
Reef fish	0.004	Low	0.382	Moderate
Combined	0.003	Moderate	0.541	High

57 Group 57

57.1 Geographic location

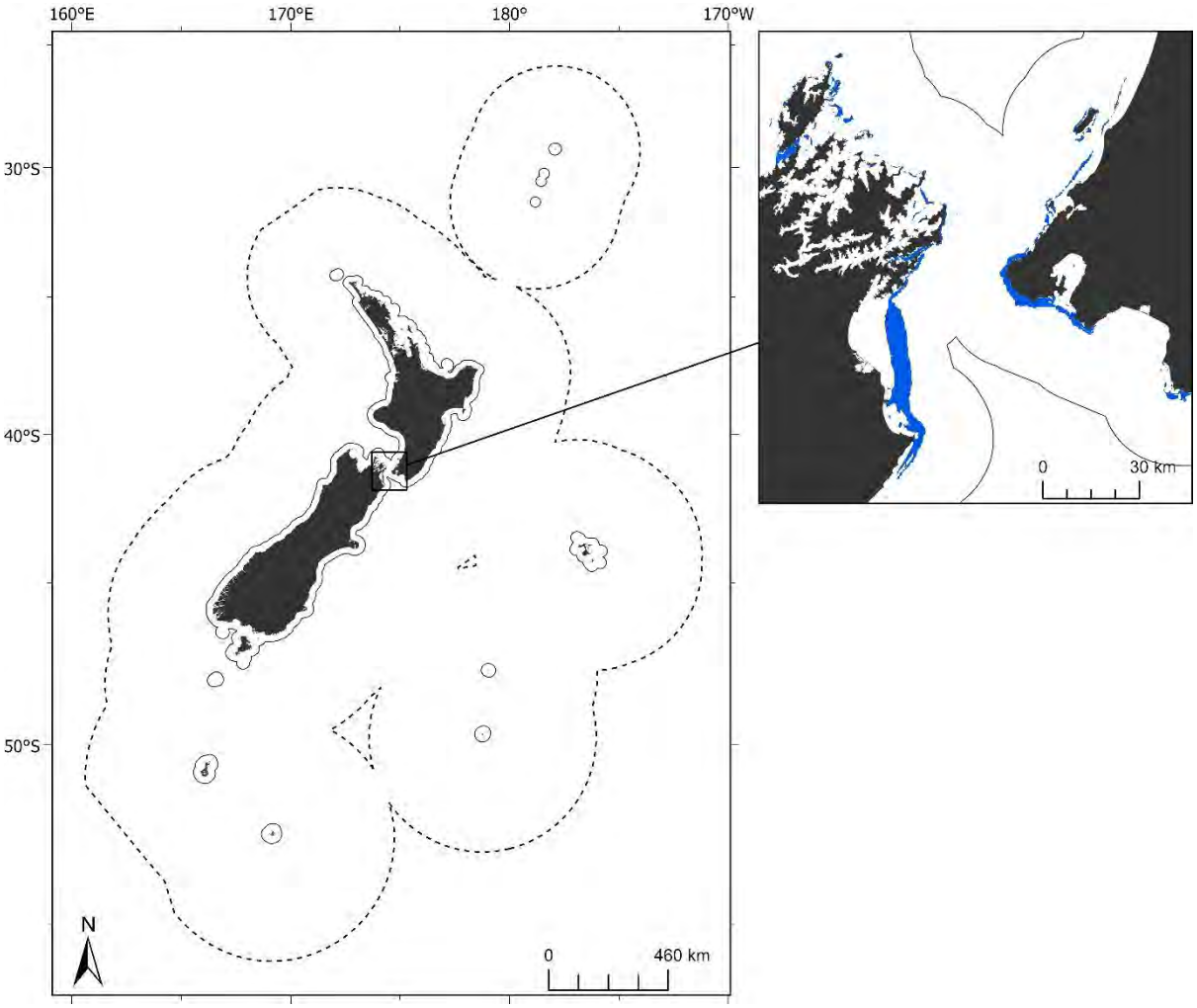

Figure 59: Geographic distribution of group 57 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

57.2 Group description

Group 57 occurs in the shallow coastal waters in and around the Cook Strait (Figure 59). These warm coastal waters are subject to strong tidal currents through the strait and are characterised by moderate oxygen concentration and low nitrate consistent with high rates of productivity (Table 172). Benthic invertebrate assemblages are characterised by very high frequency occurrence of sea cucumber, low frequencies of sea urchin, and several species of gastropod (Table 173). Demersal fish assemblages are characterised by high frequency occurrence of blue cod, and reef fish assemblages are characterised by high frequencies of triplefin, wrasse and blue cod (Table 173). Macroalgal assemblages are diverse and are characterised by several species of brown algae (Table 173). This group has a low number of samples for benthic invertebrates and reef fish and a moderate number of samples for demersal fish and macroalgae (Table 173). Despite the variable number of samples across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability

(SD), Table 174), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

57.3 Similar groups

Loosely related to groups 53 – 56.

57.4 Characterising environmental conditions

Table 172: Group 57 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	28 m	Shallow coastal
Tidal current	0.37 m s^{-1}	High tidal current
Bottom nitrate	1.21 µmol L^{-1}	Low concentrations of nitrate at depth
Dissolved oxygen at depth	5.73 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	13.64 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	48.77 mg C m^{-2} d^{-1}	High productivity

57.5 Characterising species

Table 173: Species name, mean frequency occurrence and % contribution to group 57 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	15	4	*Pinnoctopus*	Octopus	0.67	93.75
	MMG**	1	2	*na*	*na*	*na*	*na*
	SMG	9	20	*Penion*	Gastropod	0.22	27.78
				Echinocardium	Sea urchin	0.22	22.22
				Maurea	Gastropod	0.22	13.89
				Pelicaria	Gastropod	0.22	13.89
	SSG	2	5	*Paracaudina*	Sea cucumber	1	100
Demersal fish		56	32	*Parapercis colias*	Blue cod	0.88	77.21
Macroalgae		56	110	*Carpophyllum flexuosum*	Brown algae	0.32	35.61
				Ecklonia radiata	Kelp	0.32	30.49
				Carpophyllum maschalocarpum	Brown algae	0.18	5.07
Reef fish		23	45	*Notolabrus celidotus*	Wrasse	1	8.6
				Notolabrus fucicola	Wrasse	1	8.6
				Forsterygion varium	Triplefin	1	8.6
				Forsterygion malcolmi	Triplefin	0.91	7

	Parapercis colias	Blue cod	0.91	6.9
	Obliquichthys maryannae	Triplefin	0.87	6.3
	Pseudolabrus miles	Wrasse	0.87	6.02
	Odax pullus	Butterfish	0.83	5.75
	Ruanoho whero	Triplefin	0.78	4.96
	Parika scaber	Leatherjacket	0.74	4.48
	Latridopsis ciliaris	Moki	0.74	4.19

***** Insufficient data to run SIMPER analysis***

57.6 Uncertainty ranges

Table 174: Mean uncertainty values for group 57 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.004	Low	0.733	High
Demersal fish	0.004	Low	0.723	High
Macroalgae	0.002	Moderate	0.993	High
Reef fish	0.005	Low	0.548	High
Combined	0.003	Moderate	0.742	High

58 Group 58

58.1 Geographic location

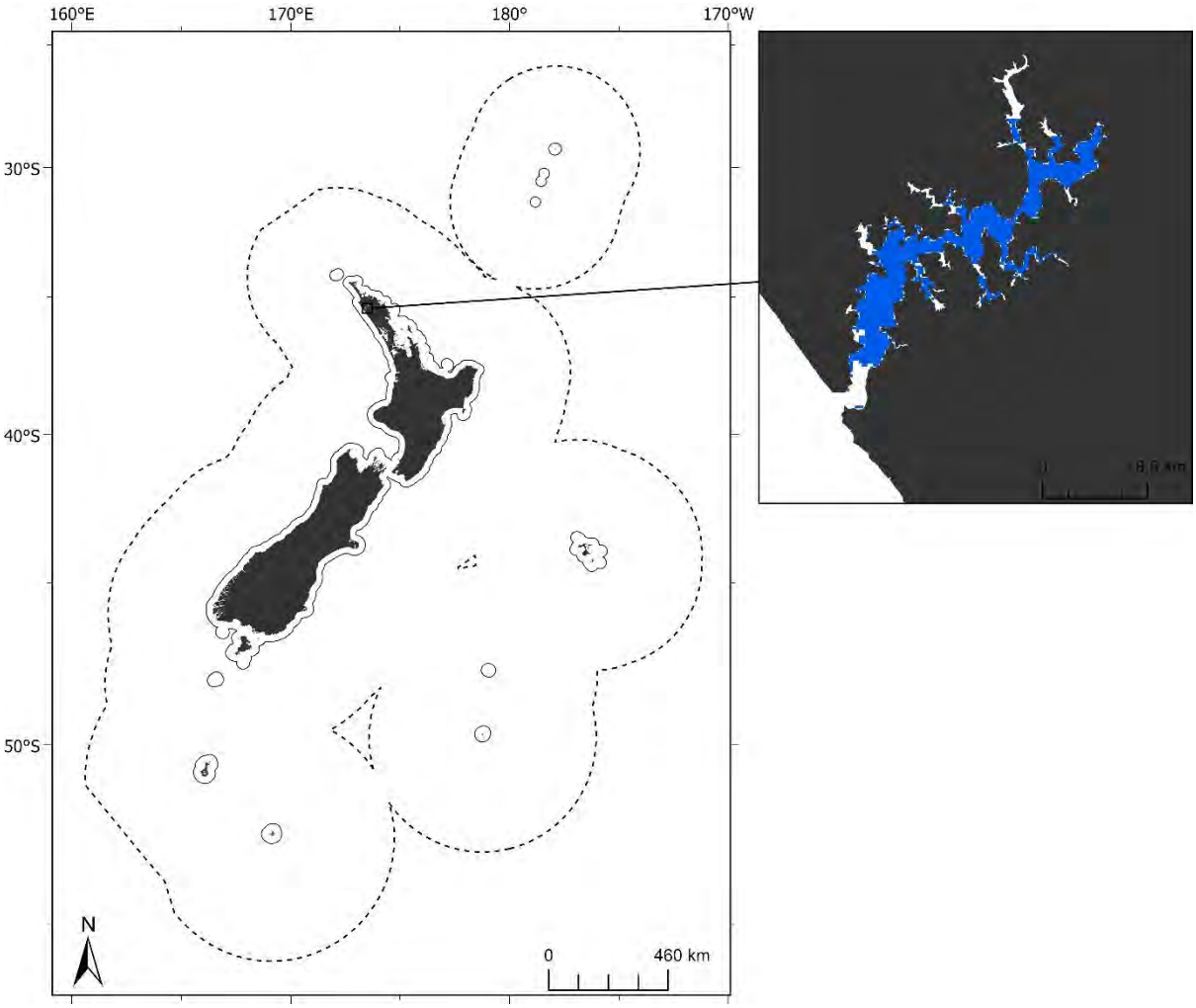

Figure 60: Geographic distribution of group 58 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

58.2 Group description

Group 58 occurs in the shallow coastal waters of the Hokianga Harbour (Figure 60). This harbour is subject to strong tidal currents and large seasonal differences in bottom temperature (Table 175). There were no benthic invertebrates, demersal- or reef fish samples within this group. Macroalgal assemblages are characterised by a single taxon of red algae (Table 176). Despite this, environmental coverage is high for benthic invertebrates, average for demersal fish, very high for macroalgae and low for reef fish suggesting some sampling in similar habitat has occurred for these taxa in other SCC groups (Table 177), however model uncertainty (SD) is high for all taxa bar macroalgae.

58.3 Similar groups

This group is distinct from all other groups.

58.4 Characterising environmental conditions

Table 175: Group 58 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	6 m	Shallow coastal
Annual amplitude of sea floor temperature	4.75 °C	High. Large seasonal differences in bottom temperature
Sea surface temperature gradient	0.97 °C	Moderate to high variability in sea surface temperature
Dissolved oxygen at depth	5.46 mg L^{-1}	Moderate concentrations of oxygen at depth
Temperature at depth	17.44 °C	High bottom water temperature
Tidal current	0.27 m s^{-1}	High tidal current
Chlorophyll *a* concentration spatial gradient	0.072 mg m^{-3} m^{-1}	High chlorophyll *a* gradient
Turbidity	0.021 m^{-1}	High turbidity

58.5 Characterising species

Table 176: Species name, mean frequency occurrence and % contribution to group 58 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	0	0	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG*	0	0	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae		6	6	*Gelidium johnstonii*	Red algae	0.5	100
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

58.6 Uncertainty ranges

Table 177: Mean uncertainty values for group 58 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.004	Low	0.826	High
Demersal fish	0.005	Low	0.664	High
Macroalgae	0.002	Moderate	0.998	High
Reef fish	0.006	Low	0.142	Moderate
Combined	0.004	Low	0.604	High

59 Group 59

59.1 Geographic location

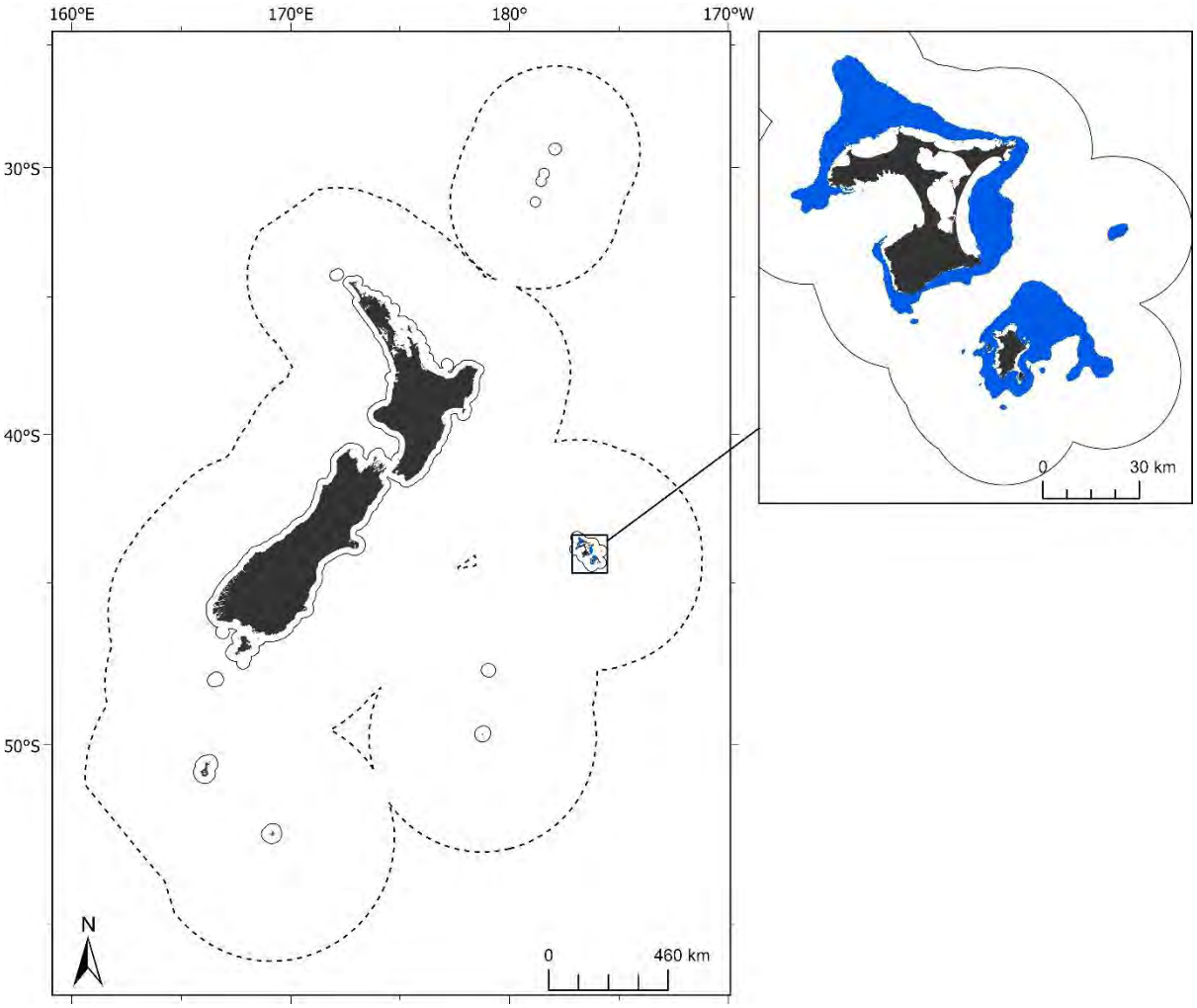

Figure 61: Geographic distribution of group 59 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

59.2 Group description

Group 59 is a localised group occurring in the shallow coastal waters surrounding the Chatham Islands (Figure 61). This group is characterised by low concentrations of silicate and nitrate at depth, moderate to high oxygen concentrations, and strong tidal currents (Table 178). There is insufficient benthic invertebrate, demersal and reef fish samples to define characterising taxa for these biotic groups. Macroalgal assemblages are characterised by several red algae species and the brown algae, *Homosira banksii* (note the low number of samples, Table 179). The overall confidence in modelled relationships is low to moderate (low confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 180).

59.3 Similar groups

Closely related to group 60; more loosely related to group 61.

59.4 Characterising environmental conditions

Table 178: Group 59 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	43 m	Shallow coastal
Slope	0.47 °	Low slope
Bottom silicate	1.56 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.96 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Tidal current	0.22 m s^{-1}	High tidal current
Bottom nitrate	3.62 µmol L^{-1}	Low concentrations of nitrate at depth
Turbidity	0.002 m^{-1}	Low turbidity

59.5 Characterising species

Table 179: Species name, mean frequency occurrence and % contribution to group 59 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	2	5	*na*	*na*	*na*	*na*
	MMG**	1	4	*na*	*na*	*na*	*na*
	SMG**	5	7	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish**		1	4	*na*	*na*	*na*	*na*
Macroalgae		14	64	*Hormosira banksii*	Brown algae	0.21	39.48
				Clymene coleana	Red algae	0.14	21.53
				Pyrophyllon cameronii	Red algae	0.21	5.54
				Pachymenia dichotoma	Red algae	0.21	5.11
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

59.6 Uncertainty ranges

Table 180: Mean uncertainty values for group 59 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.289	Moderate
Demersal fish	0.003	Moderate	0.126	Moderate
Macroalgae	0.002	Moderate	0.832	High
Reef fish	0.004	Low	0.05	Low
Combined	0.003	Moderate	0.09	Low

60 Group 60

60.1 Geographic location

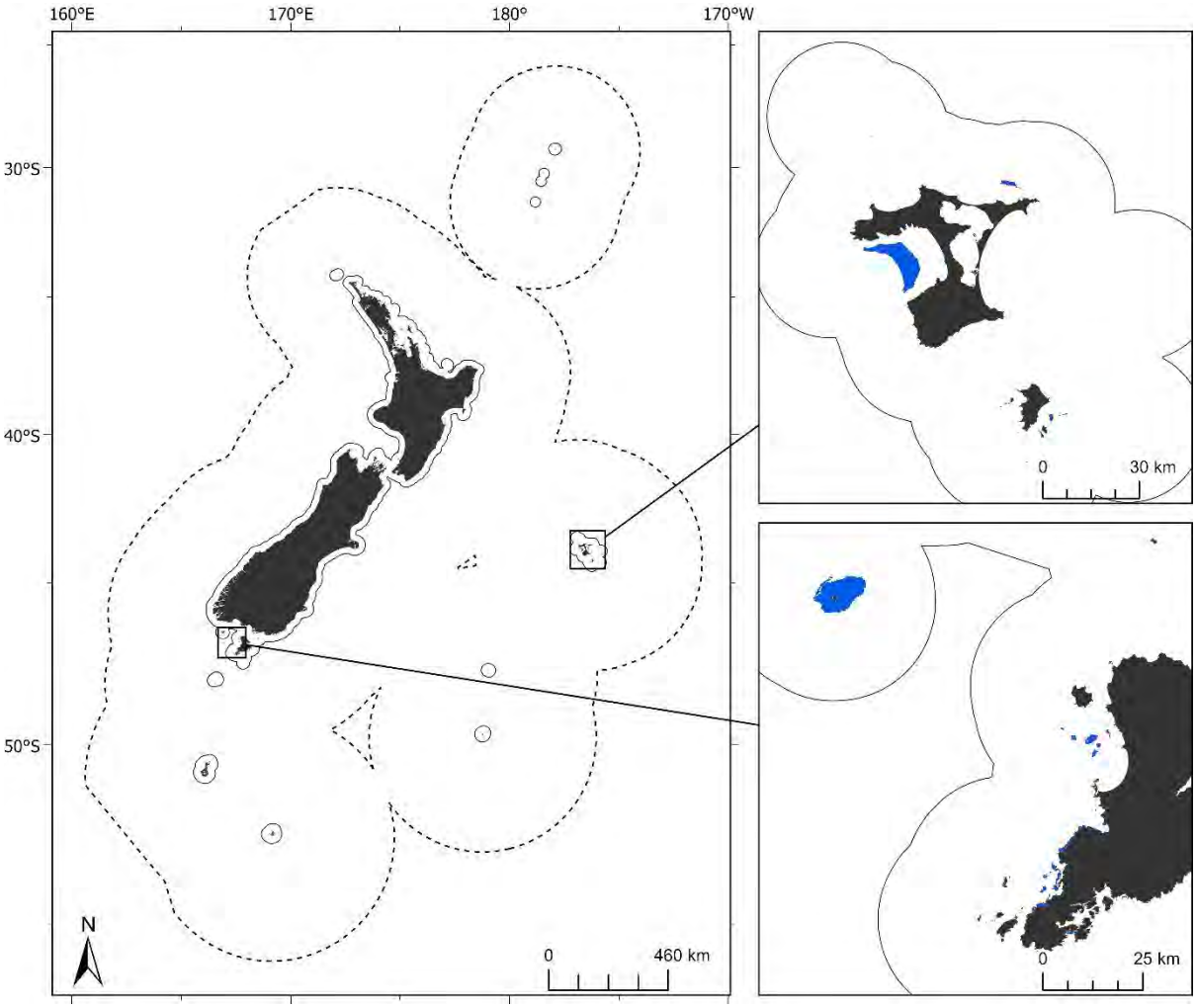

Figure 62: Geographic distribution of group 60 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

60.2 Group description

Group 60 is a small, localised group in the shallow coastal waters surrounding several southern offshore islands, including the Chatham Islands and Stewart Island (Figure 62). This group is characterised by low concentrations of silicate and nitrate, moderate to high levels of dissolved oxygen at depth, and large seasonal differences in bottom temperature, with moderate rates of productivity (Table 181). There are insufficient samples across any biotic group to define characterising taxa (Table 182). Despite the low number of samples across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 183) suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

60.3 Similar groups

Closely related to group 59; more loosely related to group 61.

60.4 Characterising environmental conditions

Table 181: Group 60 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	43 m	Shallow coastal
Annual amplitude of sea floor temperature	2.13 °C	High. Large seasonal differences in bottom temperature
Bottom silicate	2.63 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.90 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Temperature at depth	12.71 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	44.14 mg C m^{-2} d^{-1}	Moderate productivity
Tidal current	0.039 m s^{-1}	Low velocity tidal current

60.5 Characterising species

Table 182: Species name, mean frequency occurrence and % contribution to group 60 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	1	2	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	3	17	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		3	2	*na*	*na*	*na*	*na*
Macroalgae**		4	10	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

60.6 Uncertainty ranges

Table 183: Mean uncertainty values for group 60 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.65	High
Demersal fish	0.003	Moderate	0.584	High
Macroalgae	0.002	Moderate	0.956	High
Reef fish	0.004	Low	0.135	Moderate
Combined	0.003	Moderate	0.614	High

61 Group 61

61.1 Geographic location

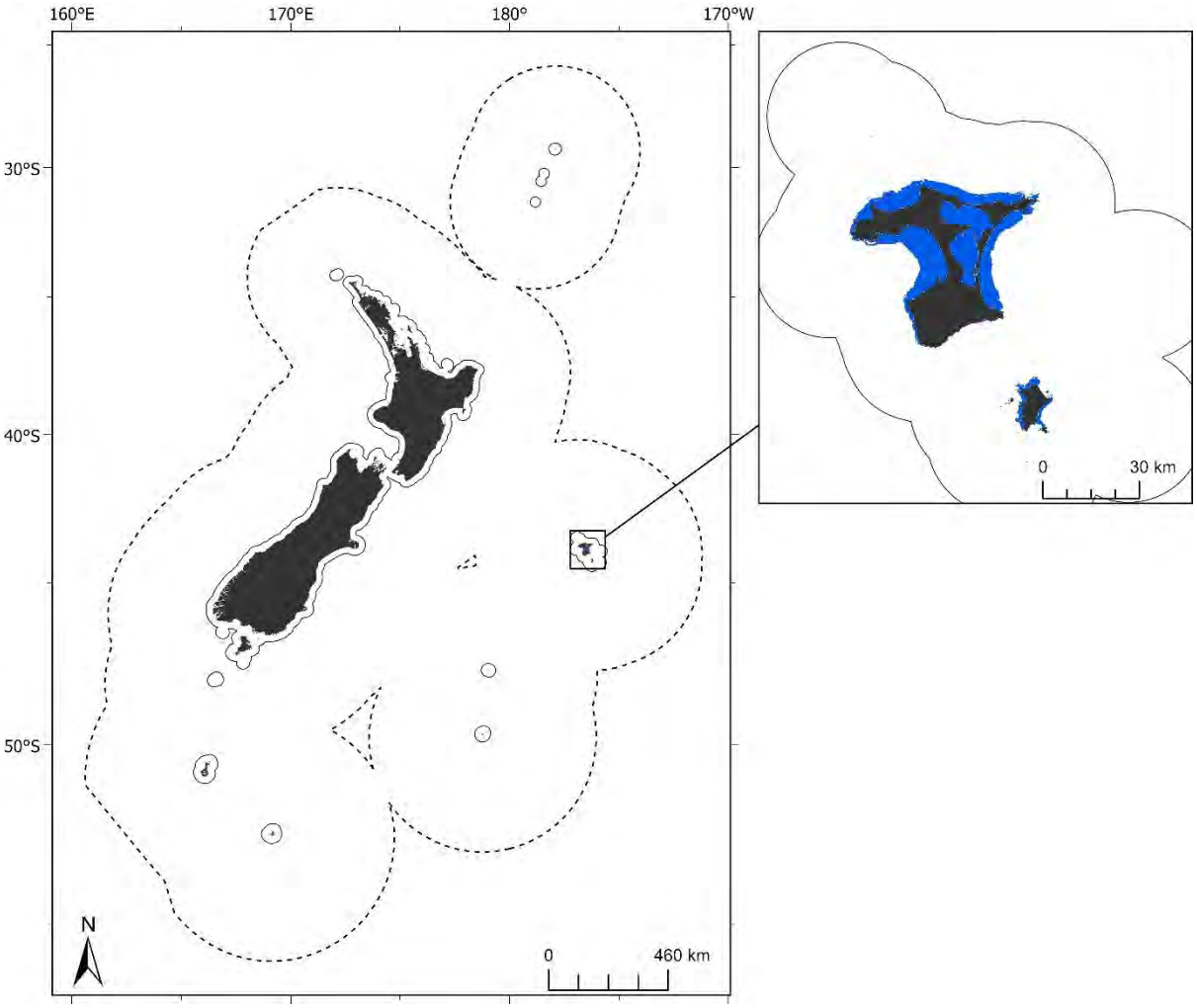

Figure 63: Geographic distribution of group 61 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

61.2 Group description

Group 61 is a small group occurring in the shallow coastal waters surrounding the Chatham Islands (Figure 63). This group is characterised by low concentrations of silicate and nitrate at depth, high productivity, and high rates of sediment disturbance (Table 184). Benthic invertebrate species assemblages are characterised by low frequency occurrence of bivalves, crustacea and a brittle star(Table 185). Macroalgal assemblages are diverse and are characterised by several species of red and brown algae(Table 185). This group has low samples for benthic invertebrates, a moderate number of samples for macroalgae, but no samples for demersal fish or reef fish. Despite the variable number of samples across biotic groups, the overall confidence in modelled relationships is low to moderate (low confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 186).

61.3 Similar groups

Loosely related to groups 59 and 60.

61.4 Characterising environmental conditions

Table 184: Group 61 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	3 m	Shallow coastal
Slope	0.25 °	Low slope
Bottom silicate	1.72 µmol L^{-1}	Low concentrations of silicate at depth
Bottom nitrate	2.09 µmol L^{-1}	Low concentrations of nitrate at depth
Benthic sediment disturbance	0.04 m s^{-1}	High rate of sediment disturbance
Downward vertical flux of particulate organic matter at the seabed	48.58 mg C m^{-2} d^{-1}	High productivity
Turbidity	0.002 m^{-1}	Low turbidity

61.5 Characterising species

Table 185: Species name, mean frequency occurrence and % contribution to group 61 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	0	0	*na*	*na*	*na*	*na*
	MMG**	1	6	*na*	*na*	*na*	*na*
	SMG	15	61	*Austrovenus*	Bivalve	0.13	20.03
				Amphiura	Brittle star	0.13	11.13
				Protophoxus	Amphipod	0.13	9.1
				Callianassa	Shrimp	0.13	8.34
				Paracentromedon	Amphipod	0.13	8.34
				Barbatia	Bivalve	0.13	7.15
				Lophopagurus	Crab	0.13	7.15
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae		53	155	*Cystophora scalaris*	Brown algae	0.26	23.61
				Carpophyllum maschalocarpum	Brown algae	0.17	10.73
				Plocamium microcladioides	Red algae	0.17	4.4
				Apophlaea lyallii	Red algae	0.17	4.02
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

61.6 Uncertainty ranges

Table 186: Mean uncertainty values for group 61 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.294	Moderate
Demersal fish	0.003	Moderate	0.079	Low
Macroalgae	0.002	Moderate	0.986	High
Reef fish	0.004	Low	0.042	Low
Combined	0.003	Moderate	0.073	Low

62 Group 62

62.1 Geographic location

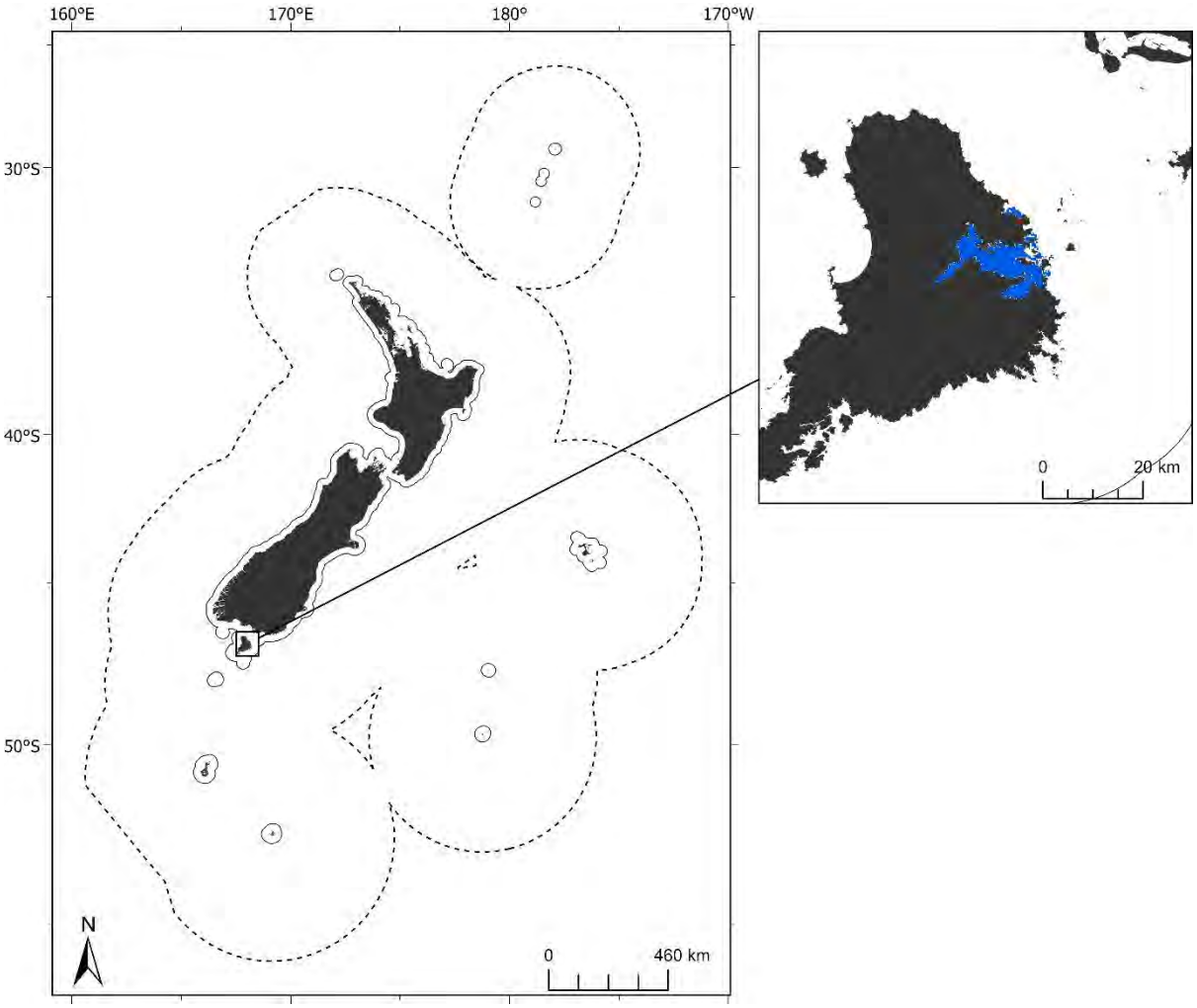

Figure 64: Geographic distribution of group 62 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

62.2 Group description

Group 62 is a small group in the shallow coastal waters of Paterson Inlet of Stewart Island (Figure 64). This group is characterised by high productivity and detrital absorption (high turbidity), a strong chlorophyll *a* concentration gradient, and high concentrations of oxygen at depth (Table 187). Benthic invertebrate species assemblages are characterised by high frequency occurrence of brachiopod and polychaete, with moderate frequency of sea urchins and bivalves (Table 188). Demersal fish assemblages are characterised by two species blue cod and spotty, while reef fish assemblages are more diverse and characterised by very high frequency of moki, blue cod, triplefin and several species of wrasse (Table 188). Macroalgal assemblages are characterised by brown and green algae in moderate to low frequencies (Table 188). This group has a low number of samples for benthic invertebrates and macroalgae, a moderate number of samples for demersal fish, and a low number of samples for reef fish. Despite the relatively low number of samples across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined'

biotic group environmental coverage and moderate for model variability (SD),Table 189), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

62.3 Similar groups

Loosely related to groups 63 – 65.

62.4 Characterising environmental conditions

Table 187: Group 62 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	15 m	Shallow coastal
Slope	2.55 °	Moderate slope
Chlorophyll *a* concentration spatial gradient	0.15 mg m^{-3} m^{-1}	Strong gradient in chlorophyll *a* concentration
Sea surface temperature gradient	0.18 °C	High variability in sea surface temperature
Dissolved oxygen at depth	6.15 mg L^{-1}	High concentrations of oxygen at depth
Detrital absorption	0.12 m^{-1}	High detrital absorption
Downward vertical flux of particulate organic matter at the seabed	53.95 mg C m^{-2} d^{-1}	High productivity

62.5 Characterising species

Table 188: Species name, mean frequency occurrence and % contribution to group 62 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	1	1	*na*	*na*	*na*	*na*
	MMG**	1	1	*na*	*na*	*na*	*na*
	SMG	10	21	*Talochlamys*	Bivalve	0.3	63.33
				Goniocidaris	Sea urchin	0.2	36.67
	SSG	6	16	*Neothyris*	Brachiopod	0.67	51.17
				Maldane	Polychaete	0.5	18.77
				Echinocardium	Sea urchin	0.33	6.9
Demersal fish		47	11	*Parapercis colias*	Blue cod	0.89	49.74
				Notolabrus celidotus	Wrasse	0.89	49.74
Macroalgae		24	63	*Macrocystis pyrifera*	Giant kelp	0.13	27.27
				Wittrockiella lyallii	Green algae	0.17	16.64
				Xiphophora gladiata	Brown algae	0.13	11.38
				Ulva rigida	Green algae	0.08	9.74
				Cystophora scalaris	Brown algae	0.08	7.79

Reef fish	2	13	*Latridopsis ciliaris*	Moki	1	12.5
			Notolabrus celidotus	Wrasse	1	12.5
			Notolabrus fucicola	Wrasse	1	12.5
			Pseudolabrus miles	Wrasse	1	12.5
			Parapercis colias	Blue cod	1	12.5
			Forsterygion flavonigrum	Triplefin	1	12.5

***** Insufficient data to run SIMPER analysis***

62.6 Uncertainty ranges

Table 189: Mean uncertainty values for group 62 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.004	Low	0.803	High
Demersal fish	0.004	Low	0.857	High
Macroalgae	0.002	Moderate	0.997	High
Reef fish	0.006	Low	0.621	High
Combined	0.003	Moderate	0.848	High

63 Group 63

63.1 Geographic location

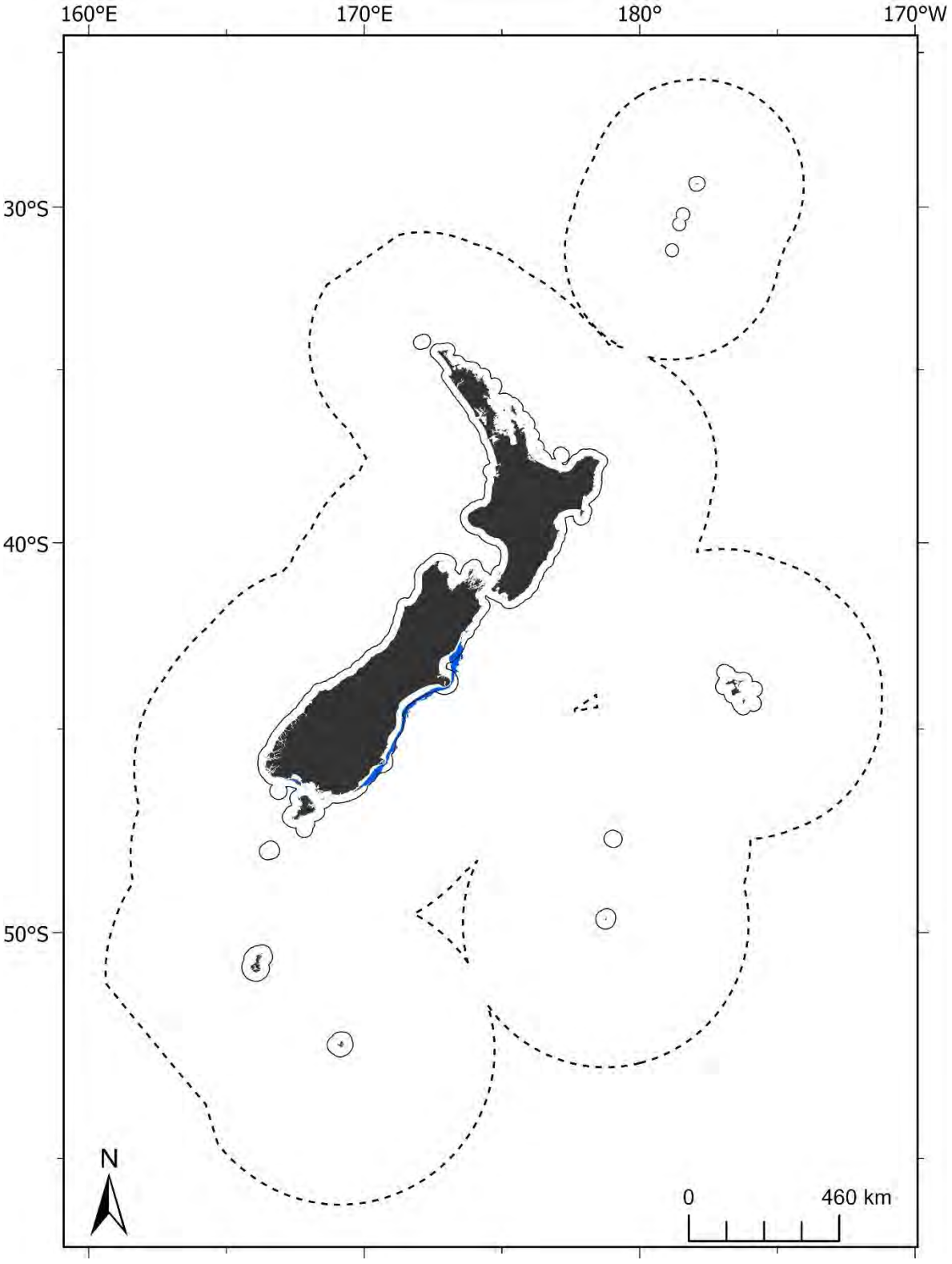

Figure 65: Geographic distribution of group 63 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

63.2 Group description

Group 63 is a narrow group covering the shallow continental shelf along the eastern coast of the South Island (Figure 65). This group is characterised by high oxygen concentrations at depth, and silicate concentrations at depth, moderate water temperatures, and high rates of productivity (Table 190). Benthic invertebrate assemblages are characterised by high frequency occurrence of crab, sea urchins, high to moderate frequency of sea star and hydrozoans and low frequency occurrence of gastropods and polychaetes (Table 191). Demersal fish populations are characterised by very high frequency occurrence of barracouta and dogfish, moderate-high frequency tarakihi and gurnard, and low-moderate frequency blue cod (Table 191). Macroalgal assemblages are characterised by several species of brown algae and one species of red algae (Table 191). This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish, a low number of samples for benthic invertebrates sampled with other gear types and macroalgae, and no samples for reef fish. Despite the variable number of samples across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 192), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

63.3 Similar groups

Closely related to group 64; more loosely relate to groups 62 and 65.

63.4 Characterising environmental conditions

Table 190: Group 63 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	54 m	Shelf depth
Slope	0.23 °	Low slope
Bottom silicate	3.09 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	6.08 mg L^{-1}	High concentrations of oxygen at depth
Temperature at depth	11.09 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	59 mg C m^{-2} d^{-1}	High productivity

63.5 Characterising species

Table 191: Species name, mean frequency occurrence and % contribution to group 63 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	419	112	*Nototodarus*	Squid	0.88	96.69
	MMG	6	29	*Leptomithrax*	Crab	0.67	16.42
				Pentagonaster	Sea star	0.67	14.37
				Sclerasterias	Sea star	0.67	14.37
				Odontaster	Sea star	0.5	7.6
				Symplectoscyphus	Hydrozoan	0.5	7.6

				Thacanophrys	Crab	0.5	7.6
				Goniocidaris	Sea urchin	0.5	6.18
	SMG	17	69	*Liracraea*	Gastropod	0.12	30.49
				Splendrillia	Gastropod	0.12	30.49
				Serpula	Polychaete	0.12	18.29
	SSG	4	9	*Echinocardium*	Sea urchin	0.75	100
Demersal fish		665	99	*Thyrsites atun*	Barracouta	0.73	12.52
				Squalus acanthias	Spiny dogfish	0.72	12.33
				Parapercis colias	Blue cod	0.33	9.79
				Nemadactylus macropterus	Tarakihi	0.57	8.22
				Chelidonichthys kumu	Red gurnard	0.58	7.36
				Callorhinchus milii	Elephantfish	0.53	6.47
				Pseudophycis bachus	Red cod	0.51	5.47
				Arnoglossus scapha	Witch	0.46	4.12
Macroalgae		38	118	*Stauromenia australis*	Red algae	0.13	22.84
				Xiphophora gladiata	Brown algae	0.18	10.68
				Scytothamnus fasciculatus	Brown algae	0.11	6.17
				Landsburgia quercifolia	Brown algae	0.11	4.95
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

63.6 Uncertainty ranges

Table 192: Mean uncertainty values for group 63 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.8	High
Demersal fish	0.003	Moderate	0.865	High
Macroalgae	0.002	Moderate	0.971	High
Reef fish	0.005	Low	0.201	Moderate
Combined	0.003	Moderate	0.86	High

64 Group 64

64.1 Geographic location

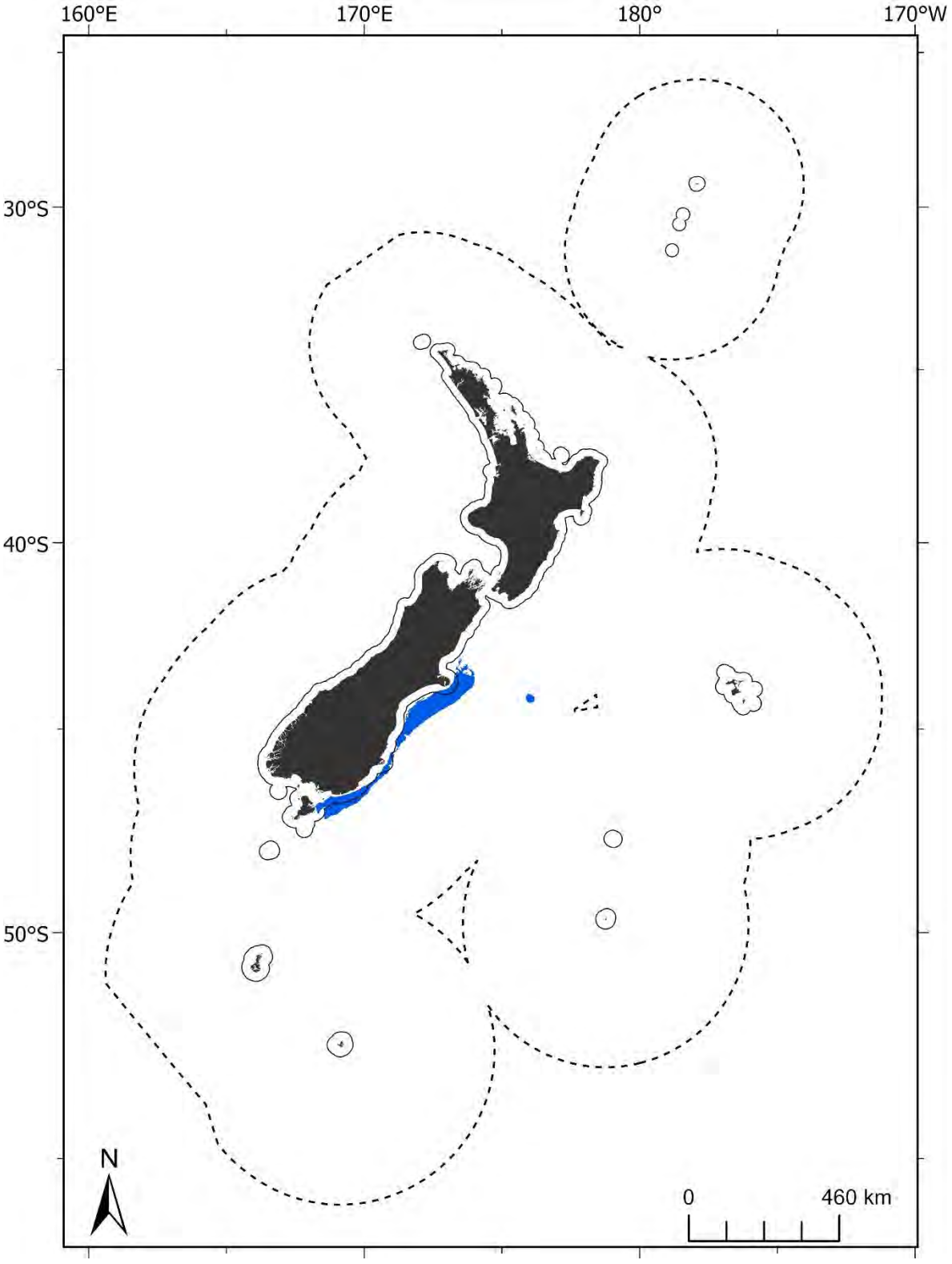

Figure 66: Geographic distribution of group 64 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

64.2 Group description

Group 64 is a large group covering the continental shelf along the eastern coast of the South Island, and part of the Veryan Bank on the Chatham Rise (Figure 66). This group is characterised by moderate temperatures at depth, high oxygen concentrations and productivity (Table 193). Other environmental variables are generally moderate, e.g., salinity at depth and dissolved solute concentrations (e.g. nitrate)) (Table 193). Benthic invertebrate assemblages are characterised by high frequency occurrence of several species of crab, sea star and brachiopod, with moderate tolow occurrence of squat lobster and bivalves (Table 194). Demersal fish assemblages are characterised by very high frequency occurrence of barracouta, stargazer and dogfish (Table 194). This group has a high number of samples for benthic invertebrates sampled with LLG.LMG gear types and demersal fish, but a low number of samples for benthic invertebrates sampled with other gear types and for macroalgae, and no samples for reef fish (Table 194). Despite the variable number of samples across biotic groups, the overall confidence in modelled relationships is moderate – high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 195), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

64.3 Similar groups

Closely related to group 63; more loosely relate to groups 62 and 65.

64.4 Characterising environmental conditions

Table 193: Group 64 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	93 m	Shelf depth
Salinity at depth	34.63 psu	Moderate salinity at depth
Bottom nitrate	12.18 µmol L^{-1}	Moderate concentrations of nitrate at depth
Dissolved oxygen at depth	6.09 mg L^{-1}	High concentrations of oxygen at depth
Temperature at depth	10.44 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	51.78 mg C m^{-2} d^{-1}	High productivity
Slope	0.249 m s^{-1}	Low slope

64.5 Characterising species

Table 194: Species name, mean frequency occurrence and % contribution to group 64 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	1300	151	*Nototodarus*	Squid	0.94	98.59
	MMG	16	100	*Nectocarcinus*	Crab	0.63	18.49
				Sclerasterias	Sea star	0.63	16.55
				Leptomithrax	Crab	0.56	15.84

				Odontaster	Sea star	0.56	12.5
				Munida	Squat lobster	0.38	6.89
	SMG	39	100	*Neothyris*	Brachiopod	0.33	55.2
				Pratulum	Bivalve	0.15	8.8
				Lophopagurus	Crab	0.13	4.59
				Mesopeplum	Bivalve	0.13	4.34
	SSG	14	9	*Neothyris*	Brachiopod	0.57	52.16
				Lophopagurus	Crab	0.5	42.88
Demersal fish		1567	108	*Squalus acanthias*	Spiny dogfish	0.88	16.17
				Thyrsites atun	Barracouta	0.85	14.99
				Kathetostoma giganteum	Giant stargazer	0.72	10.13
				Nemadactylus macropterus	Tarakihi	0.59	6.53
				Arnoglossus scapha	Witch	0.56	5.3
				Cephaloscyllium isabellum	Carpet shark	0.54	5.08
				Polyprion oxygeneios	Hāpuku	0.5	5.04
				Pseudophycis bachus	Red cod	0.53	4.98
Macroalgae**		2	2	*na*	*na*	*na*	*na*
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

64.6 Uncertainty ranges

Table 195: Mean uncertainty values for group 64 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.78	High
Demersal fish	0.003	Moderate	0.851	High
Macroalgae	0.002	Moderate	0.911	High
Reef fish	0.005	Low	0.092	Low
Combined	0.003	Moderate	0.848	High

65 Group 65

65.1 Geographic location

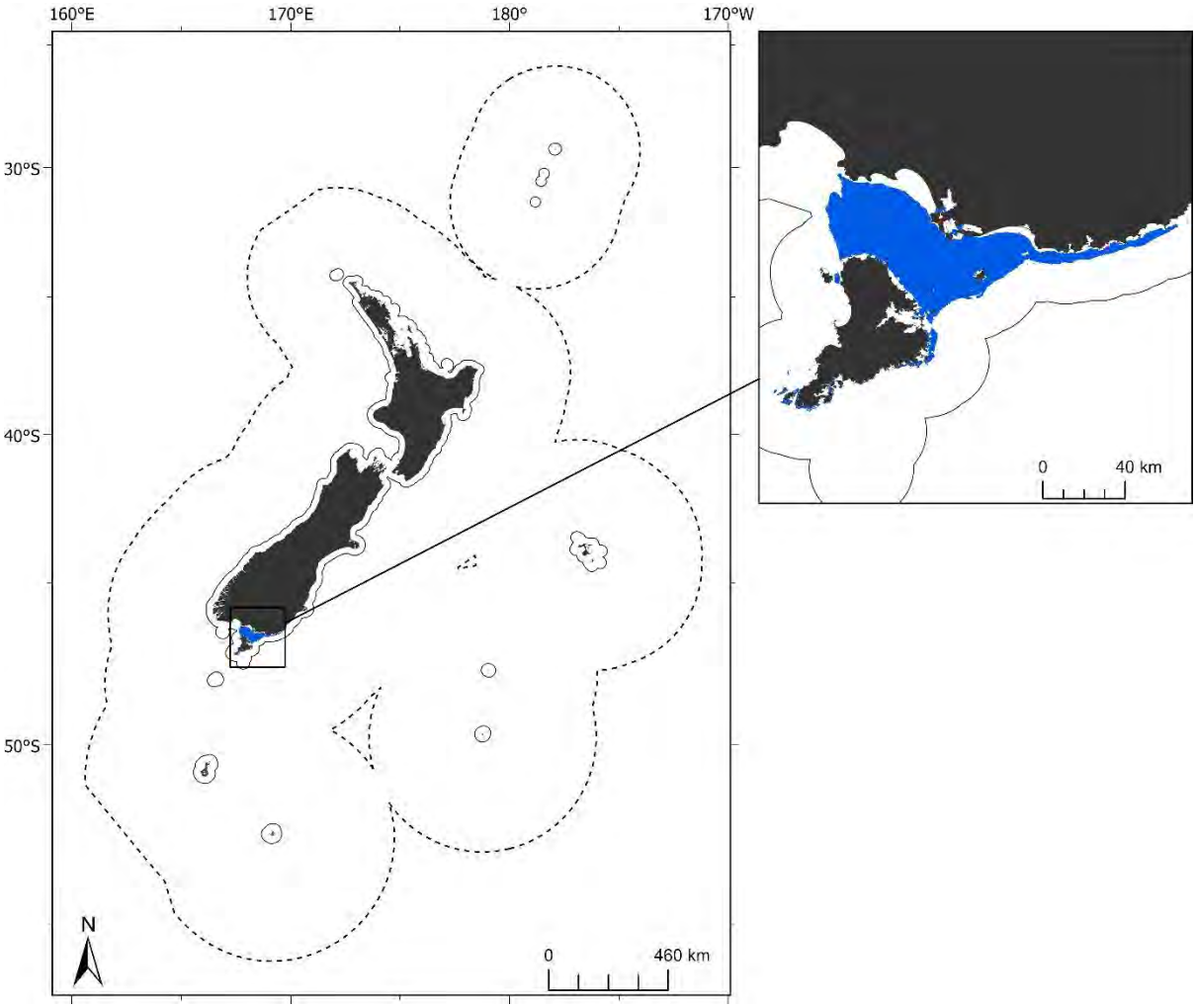

Figure 67: Geographic distribution of group 65 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

65.2 Group description

Group 65 is a localised shallower water group occurring in the Foveaux Strait (Figure 67). This group is characterised by strong tidal currents and high sediment disturbance by wave action, as well as moderate temperatures at depth, high oxygen concentrations and high productivity (Table 196). Benthic invertebrate assemblages are diverse and are characterised by high frequency occurrence of hydrozoans, bryozoans, crabs and brittle stars, with moderate occurrence of octopus and brachiopods (Table 197). Demersal fish assemblages are characterised by a single very high frequency occurrence of blue cod (despite a high number of samples). Reef fish assemblages are diverse and characterised by several species of wrasse and triplefin (Table 197). Macroalgal communities are also diverse (close to 150 unique taxa) and are characterised by seven species of brown algae (Table 197). This group has a high number of demersal fish samples, a low – moderate number of samples for benthic invertebrates and macroalgae and a low number of reef fish samples (Table 197). Despite the variable number of samples across biotic groups, the overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group

environmental coverage and moderate for model variability (SD), Table 198), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

65.3 Similar groups

Loosely related to groups 62 – 64.

65.4 Characterising environmental conditions

Table 196: Group 65 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	31 m	Shallow coastal
Benthic sediment disturbance	0.02 m s^{-1}	High rate of sediment disturbance
Tidal current	0.37 m s^{-1}	High tidal current speed
Dissolved oxygen at depth	6.11 mg L^{-1}	High concentrations of oxygen at depth
Temperature at depth	12.35 °C	Moderate bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	61.99 mg C m^{-2} d^{-1}	High productivity

65.5 Characterising species

Table 197: Species name, mean frequency occurrence and % contribution to group 65 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	22	4	*Pinnoctopus*	Octopus	0.59	84.48
	MMG	4	72	*Symplectoscyphus*	Hydrozoan	0.75	11.52
				Amphisbetia	Hydrozoan	0.75	10.5
				Disporella	Bryozoan	0.75	8.53
				Ophiopsammus	Brittle star	0.75	8.53
				Schizosmittina	Bryozoan	0.75	8.53
				Thacanophrys	Crab	0.5	6.6
				Beania	Bryozoan	0.5	4.13
				Celleporina	Bryozoan	0.5	4.13
	SMG	50	113	*Octopus*	Octopus	0.2	34.77
				Pyura	Tunicate	0.1	16.16
				Calloria	Brachiopod	0.2	9.35
				Pentagonaster	Sea star	0.18	8.55
				Neothyris	Brachiopod	0.18	5.25
	SSG	20	10	*Lophopagurus*	Crab	0.65	45.13
				Ophiopsammus	Brittle star	0.55	28.15
Demersal fish		195	41	*Parapercis colias*	Blue cod	0.92	70.42
Macroalgae		50	149	*Macrocystis pyrifera*	Giant kelp	0.2	17.44
				Xiphophora gladiata	Brown algae	0.2	9.97
				Ecklonia radiata	Kelp	0.16	6.2

			Cystophora scalaris	Brown algae	0.16	5.88
			Durvillaea antarctica	Kelp	0.16	5.22
			Cystophora platylobium	Brown algae	0.14	5.01
			Cystophora retroflexa	Brown algae	0.14	4.6
Reef fish	7	18	*Latridopsis ciliaris*	Moki	1	9.95
			Latris lineata	Trumpeter	1	9.95
			Notolabrus celidotus	Wrasse	1	9.95
			Notolabrus fucicola	Wrasse	1	9.95
			Odax pullus	Butterfish	1	9.95
			Parapercis colias	Blue cod	1	9.95
			Forsterygion varium	Triplefin	1	9.95
			Obliquichthys maryannae	Triplefin	1	9.95

65.6 Uncertainty ranges

Table 198: Mean uncertainty values for group 65 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.659	High
Demersal fish	0.003	Moderate	0.765	High
Macroalgae	0.002	Moderate	0.978	High
Reef fish	0.005	Low	0.116	Moderate
Combined	0.003	Moderate	0.768	High

66 Group 66

66.1 Geographic location

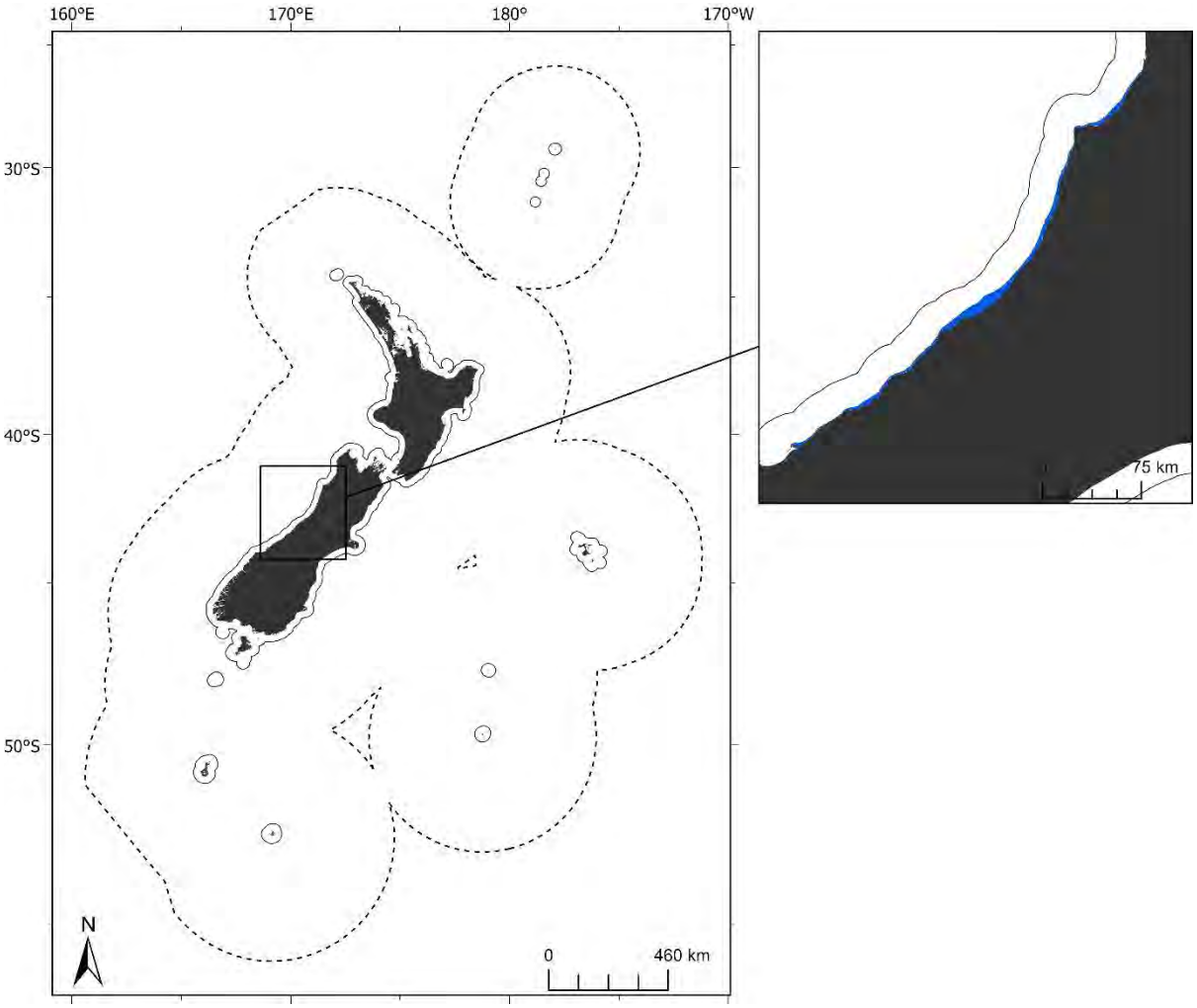

Figure 68: Geographic distribution of group 66 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

66.2 Group description

Group 66 is a small group occurring in the shallow, nearshore west coast waters of the South Island (Figure 68). This group is characterised by high temperatures at depth and large seasonal differences in bottom temperature, as well as high sediment disturbance by wave action (Table 199); it has moderate to high oxygen concentrations, and low dissolved solute concentrations (e.g. silicate). There is insufficient benthic invertebrate, demersal and reef fish samples to define characterising taxa for these biotic groups. Macroalgal assemblages are characterised predominantly by several species of red algae (Table 200). This group has a low number of samples for macroalgae, very low numbers of samples for demersal fish and reef fish, and no benthic invertebrate samples. The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 201).

66.3 Similar groups

Loosely related to groups 67 – 70.

66.4 Characterising environmental conditions

Table 199: Group 66 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	9 m	Shallow coastal
Annual amplitude of sea floor temperature	4.90 °C	High. Large seasonal differences in bottom temperature
Bottom silicate	3.26 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	5.89 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Temperature at depth	14.77 °C	High bottom water temperature
Benthic sediment disturbance	0.05 m s^{-1}	High rate of sediment disturbance
Detrital absorption	0.125 m^{-1}	High detrital absorption
Benthic position index	-254.130 m	Low seafloor unevenness

66.5 Characterising species

Table 200: Species name, mean frequency occurrence and % contribution to group 66 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	0	0	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG*	0	0	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish**		1	9	*na*	*na*	*na*	*na*
Macroalgae		31	60	*Sarcothalia lanceata*	Red algae	0.19	14.51
				Green algae	Green algae	0.13	12.71
				Gymnogongrus furcatus	Red algae	0.23	11.12
				Petalonia binghamiae	Brown algae	0.16	9.66
				Gigartina clavifera	Red algae	0.16	9.54
				Pyropia plicata	Red algae	0.13	8.29
				Ulva compressa	Green algae	0.1	4.62
Reef fish**		1	4	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

66.6 Uncertainty ranges

Table 201: Mean uncertainty values for group 66 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.353	Moderate
Demersal fish	0.004	Low	0.343	Moderate
Macroalgae	0.002	Moderate	0.996	High
Reef fish	0.005	Low	0.395	Moderate
Combined	0.003	Moderate	0.307	Moderate

67 Group 67

67.1 Geographic location

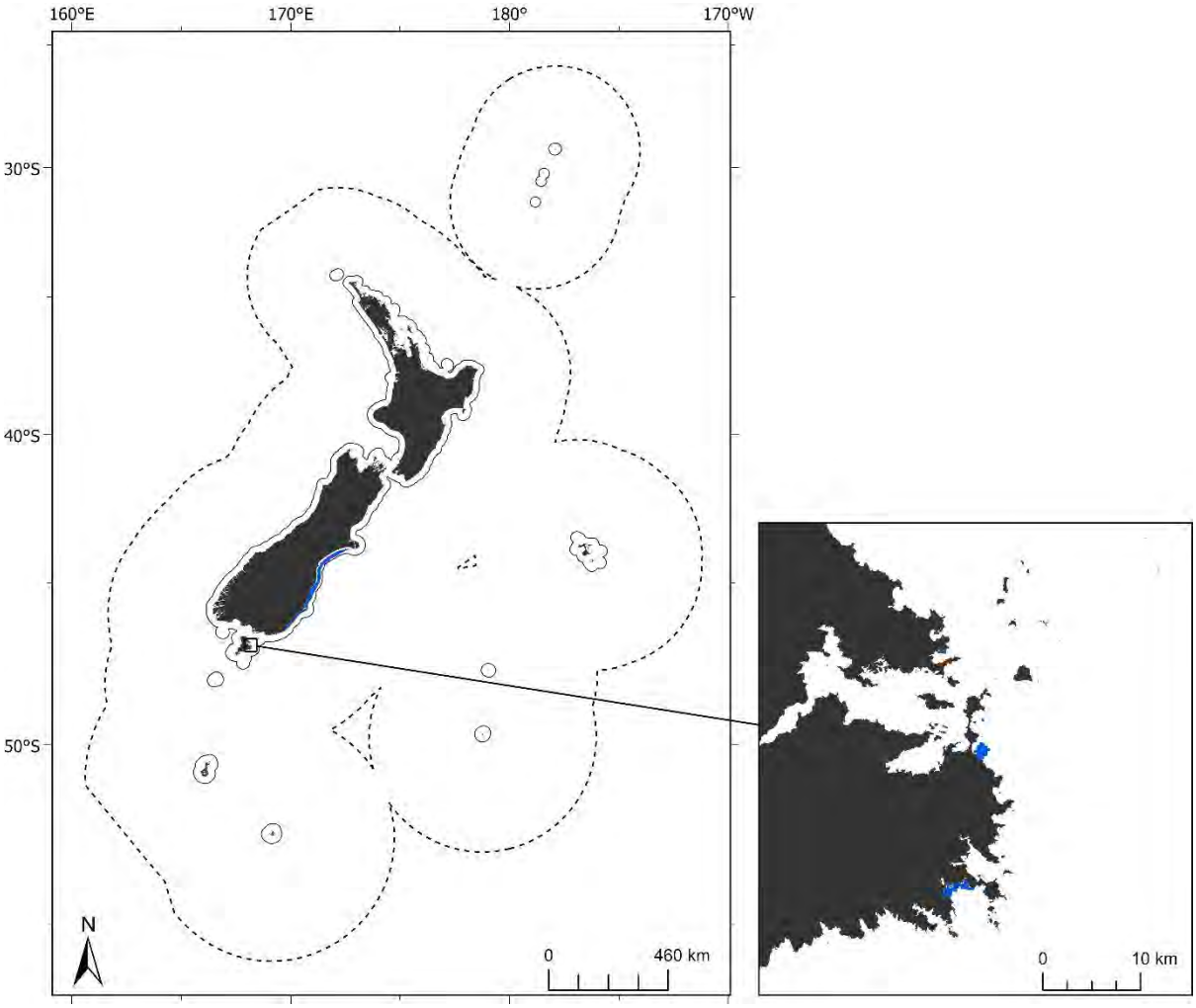

Figure 69: Geographic distribution of group 67 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

67.2 Group description

Group 67 is a small group occurring in nearshore, shallow waters of the southeast coast of the South Island, and Stewart Island (Figure 69). This group is characterised by high productivity, high oxygen concentration, low salinity at depth, as well as moderate temperature at depth but large seasonal differences in bottom temperature (Table 202). Benthic invertebrate assemblages are characterised by squid , crab and a gastropod (Table 203). Demersal fish assemblages are characterised by moderate-high frequency occurrence of several species including blue cod, gurnard and barracouta (Table 203). Reef fish assemblages are characterised by very high frequency occurrence of six species, including wrasse and triplefin (Table 203). Macroalgal assemblages are diverse and characterised by very low frequency occurrence of kelp, green algae and several red algae species (Table 203). This group has a high number of samples for demersal fish and benthic invertebrates sampled using LLG.LMG gear types, a moderate number of samples for macroalgae, and a low number of samples for reef fish, and for benthic invertebrates sampled with other gear types . Despite the variable number of samples across biotic groups, the overall confidence in modelled

relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 204), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

67.3 Similar groups

Closely related to group 68; more loosely related to group 66 and groups 69 – 70.

67.4 Characterising environmental conditions

Table 202: Group 67 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	53 m	Shelf depth
Slope	0.34 °	Low slope
Annual amplitude of sea floor temperature	4.01 °C	High. Large seasonal differences in bottom temperature
Temperature at depth	11.39 °C	Moderate temperature at depth
Salinity at depth	34.43 psu	Low salinity at depth
Dissolved oxygen at depth	6.27 mg L^{-1}	High concentrations of oxygen at depth
Downward vertical flux of particulate organic matter at the seabed	59.17 mg C m^{-2} d^{-1}	High productivity
Tidal current	0.033 m s^{-1}	Low tidal current velocity

67.5 Characterising species

Table 203: Species name, mean frequency occurrence and % contribution to group 67 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	179	31	*Nototodarus*	Squid	0.69	91.09
	MMG	3	32	*Nectocarcinus*	Crab	0.67	100
	SMG	10	15	*Buccinulum*	Gastropod	0.2	100
	SSG**	1	1	*na*	*na*	*na*	*na*
Demersal fish		414	77	*Parapercis colias*	Blue cod	0.45	25.39
				Meuschenia scaber	Leatherjacket	0.49	10.11
				Squalus acanthias	Spiny dogfish	0.56	9.22
				Thyrsites atun	Barracouta	0.52	7.7
				Callorhinchus milii	Elephantfish	0.48	6.31
				Chelidonichthys kumu	Red gurnard	0.47	6.16
Macroalgae		100	158	*Ulva australis*	Green algae	0.07	7.7
				Blastophyllis hombroniana	Red algae	0.1	7.07

			Corallina aff ferreyrae	Red algae	0.07	5.36
			Lessonia sp C	Kelp	0.05	5.23
			Pachymenia dichotoma	Red algae	0.08	4.42
Reef fish	5	18	*Latridopsis ciliaris*	Moki	1	15.23
			Notolabrus celidotus	Wrasse	1	15.23
			Notolabrus fucicola	Wrasse	1	15.23
			Forsterygion varium	Triplefin	1	15.23
			Odax pullus	Butterfish	0.8	8.12
			Notoclinops segmentatus	Triplefin	0.8	8.12

***** Insufficient data to run SIMPER analysis***

67.6 Uncertainty ranges

Table 204: Mean uncertainty values for group 67 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.749	High
Demersal fish	0.003	Moderate	0.858	High
Macroalgae	0.002	Moderate	0.993	High
Reef fish	0.005	Low	0.171	Moderate
Combined	0.003	Moderate	0.859	High

68 Group 68

68.1 Geographic location

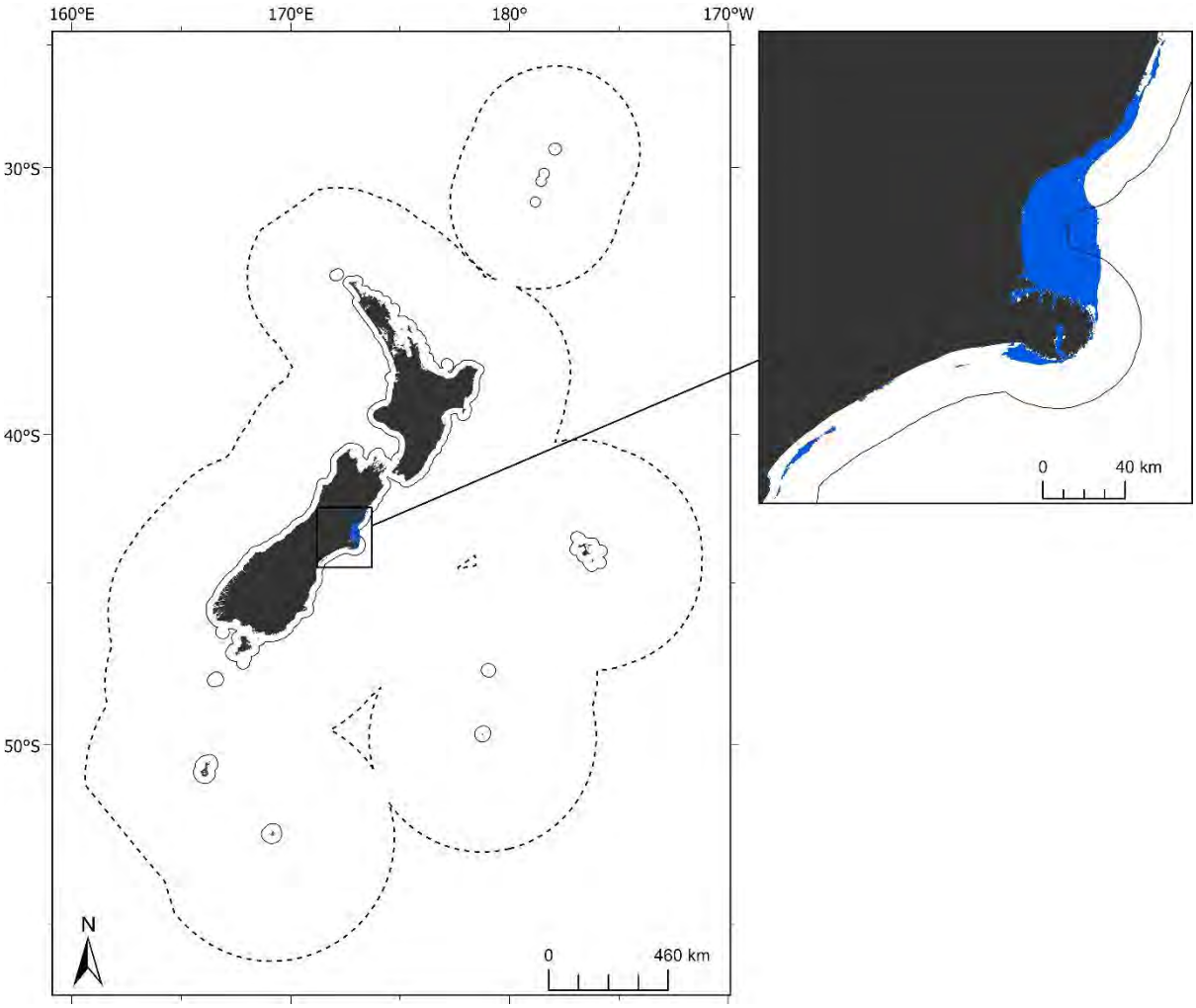

Figure 70: Geographic distribution of group 68 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

68.2 Group description

Group 68 is a small group occurring in the shallow, nearshore waters of the Canterbury coast, including around Banks Peninsula (Figure 70). This group is characterised by, large seasonal differences in bottom temperature, high oxygen concentrations and low dissolved solutes (e.g. silicate) (Table 205). Benthic invertebrate assemblages are characterised by the squid *Nototodarus* and the crab *Ovalipes* (Table 206). Demersal fish populations are characterised by moderate-high frequency occurrence of dogfish, flounder and warehou (Table 206). Macroalgal assemblages are characterised by very low frequency occurrence of several species of red, brown and green algae (Table 206). This group has a high number of samples for demersal fish, a moderate number of samples for benthic invertebrates sampled by LLG.LMG gear types, and a low sample number for macroalgae, reef fish, and benthic invertebrates sampled using other gear types. The overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 207).

68.3 Similar groups

Closely related to group 67; more loosely related to group 66 and groups 69 – 70.

68.4 Characterising environmental conditions

Table 205: Group 68 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	25 m	Shallow coastal
Slope	0.26 °	Low slope
Bottom silicate	2.51 µmol L^{-1}	Low concentrations of silicate at depth
Dissolved oxygen at depth	6.12 mg L^{-1}	High concentrations of oxygen at depth
Annual amplitude of sea floor temperature	4.6 °C	High seasonal differences in bottom temperature
Downward vertical flux of particulate organic matter at the seabed	70.14 mg C m^{-2} d^{-1}	High productivity
Turbidity	0.017 m^{-1}	High turbidity

68.5 Characterising species

Table 206: Species name, mean frequency occurrence and % contribution to group 68 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	101	23	*Nototodarus*	Squid	0.48	53.45
				Ovalipes	Crab	0.37	39.07
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG*	0	0	*na*	*na*	*na*	*na*
	SSG**	3	3	*na*	*na*	*na*	*na*
Demersal fish		291	77	*Parapercis colias*	Blue cod	0.34	17.04
				Squalus acanthias	Spiny dogfish	0.51	7.47
				Peltorhamphus novaezeelandiae	New Zealand sole	0.49	6.93
				Seriolella brama	Blue warehou	0.49	6.84
				Callorhinchus milii	Elephantfish	0.47	6.64
				Chelidonichthys kumu	Red gurnard	0.47	6.24
				Thyrsites atun	Barracouta	0.46	6.08
				Pseudophycis bachus	Red cod	0.44	5.83
				Galeorhinus galeus	School shark	0.42	4.88
				Mustelus lenticulatus	Rig	0.4	4.56
Macroalgae		32	91	*Macrocystis pyrifera*	Giant kelp	0.19	37.14

			Ulva australis	Green algae	0.09	10.55
			Pyropia rakiura	Red algae	0.09	9.85
			Carpophyllum maschalocarpum	Brown algae	0.13	8.77
Reef fish**	1	6	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

68.6 Uncertainty ranges

Table 207: Mean uncertainty values for group 68 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.696	High
Demersal fish	0.003	Moderate	0.877	High
Macroalgae	0.002	Moderate	0.992	High
Reef fish	0.005	Low	0.203	Moderate
Combined	0.003	Moderate	0.869	High

69 Group 69

69.1 Geographic location

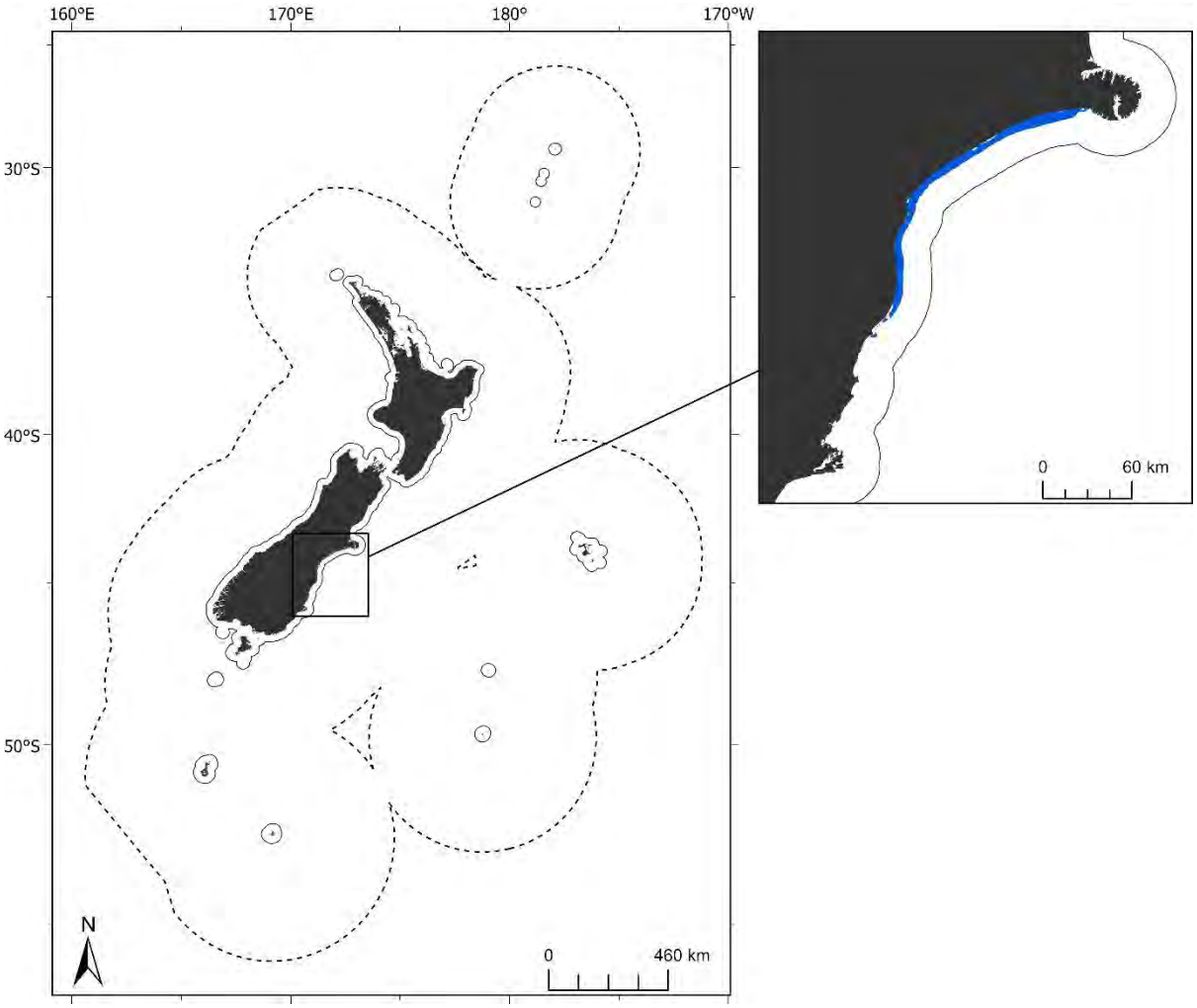

Figure 71: Geographic distribution of group 69 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

69.2 Group description

Group 69 is a small group occurring in the shallow, nearshore waters of the Canterbury Bight to the south of Banks Peninsula (Figure 71). This group is characterised by moderate temperature and large seasonal differences in bottom temperature, high productivity, high oxygen concentrations and low slope (Table 208). Benthic invertebrate assemblages are characterised by the high frequency occurrence of sea urchin and crab (Table 209). Demersal fish populations are characterised by moderate-high frequency occurrence of several species, including elephantfish, New Zealand sole and the pufferfish *Contusus richei* (Table 209). Macroalgal assemblages are characterised by moderate frequency of multiple species of red algae (Table 209). This group has a moderate number of samples for benthic invertebrates sampled using LLG.LMG gear types and for demersal fish, a low number of samples for macroalgae and for benthic invertebrates sampled using other gear types, and no reef fish samples. The overall confidence in modelled relationships is moderate to high (high confidence for 'combined' biotic group environmental coverage and moderate for model variability (SD), Table 210).

69.3 Similar groups

Loosely related to groups 66 – 68, and group 70.

69.4 Characterising environmental conditions

Table 208: Group 69 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	7 m	Shallow coastal
Slope	0.31 °	Low slope
Salinity at depth	34.22 psu	Low salinity at depth
Dissolved oxygen at depth	6.23 mg L^{-1}	High concentrations of oxygen at depth
Annual amplitude of sea floor temperature	4.72 °C	High. Large seasonal differences in bottom temperature
Downward vertical flux of particulate organic matter at the seabed	69.01 mg C m^{-2} d^{-1}	High productivity
Benthic sediment disturbance	0.027 m s^{-1}	High seafloor disturbance
Turbidity	0.048 m^{-1}	High turbidity

69.5 Characterising species

Table 209: Species name, mean frequency occurrence and % contribution to group 69 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	42	12	*Ovalipes*	Crab	0.83	97.59
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	4	3	*Fellaster*	Sea urchin	0.75	100
	SSG**	1	4	*na*	*na*	*na*	*na*
Demersal fish		83	58	*Callorhinchus milii*	Elephantfish	0.88	11.16
				Squalus acanthias	Spiny dogfish	0.86	10.41
				Galeorhinus galeus	School shark	0.78	8.69
				Peltorhamphus novaezeelandiae	New Zealand sole	0.72	7.45
				Zearaja nasuta	Skate	0.71	7.01
				Contusus richei	Pufferfish	0.71	6.82
				Pseudophycis bachus	Red cod	0.69	6.42
				Sprattus antipodum	Sprat	0.66	5.78
				Seriolella brama	Blue warehou	0.65	5.45
				Mustelus lenticulatus	Rig	0.63	5.27

Macroalgae	18	71	*Schizoseris griffithsia*	Red algae	0.33	17.75
			Ulva sp B	Green algae	0.22	12.49
			Gigartina clavifera	Red algae	0.22	7.94
			Rhodophyllis membranacea	Red algae	0.22	7.94
			Undaria pinnatifida	Kelp	0.17	7.54
			Adamsiella chauvinii	Red algae	0.22	5.88
			Melanothamnus strictissimus	Red algae	0.22	5.88
			Polysiphonia decipiens	Red algae	0.22	5.88
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

69.6 Uncertainty ranges

Table 210: Mean uncertainty values for group 69 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.702	High
Demersal fish	0.004	Low	0.753	High
Macroalgae	0.002	Moderate	0.996	High
Reef fish	0.005	Low	0.188	Moderate
Combined	0.003	Moderate	0.7	High

70 Group 70

70.1 Geographic location

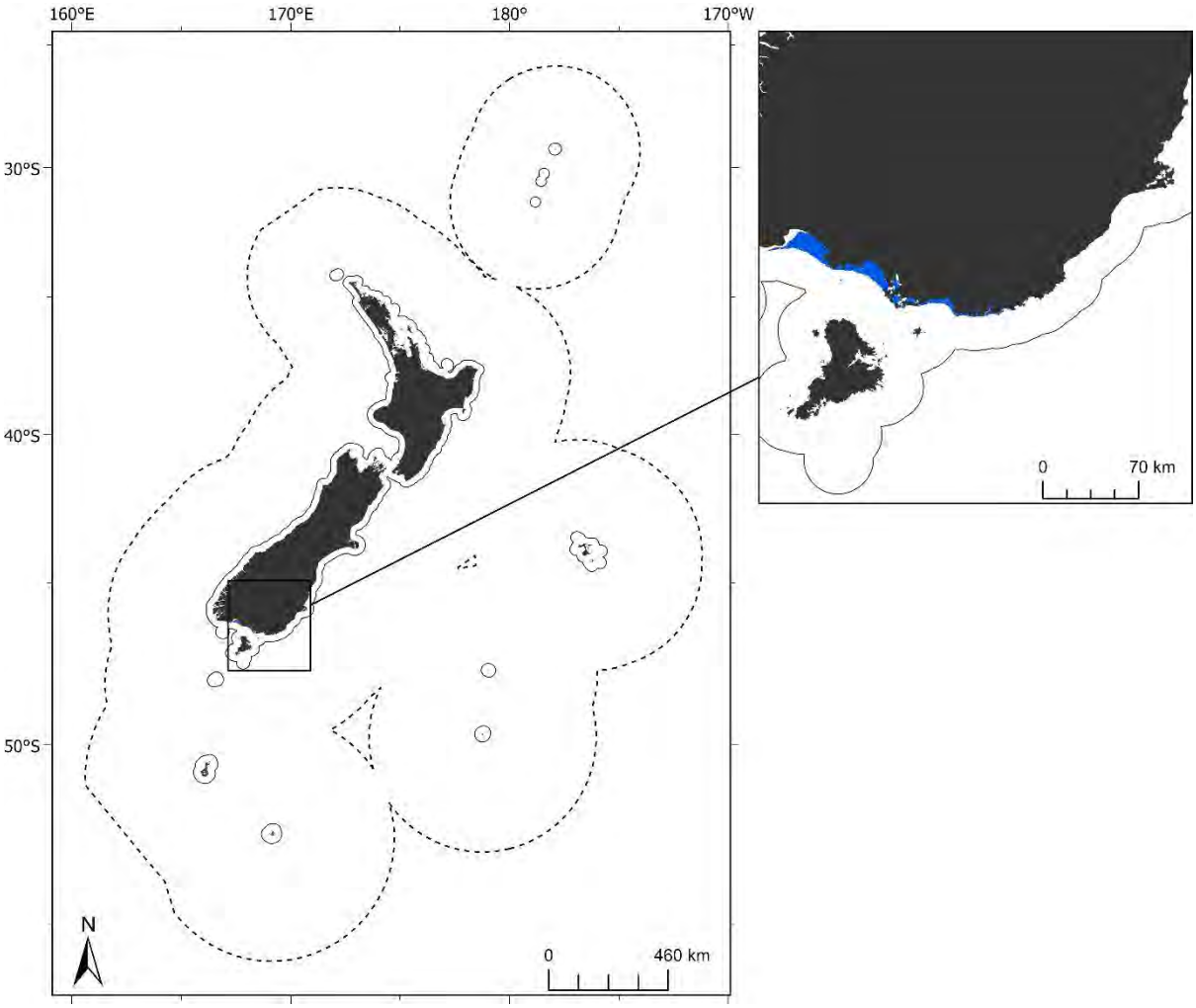

Figure 72: Geographic distribution of group 70 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

70.2 Group description

Group 70 is a small group occurring in the shallow, southernmost coast of the South Island (Figure 72). This group is characterised by high productivity, high oxygen concentrations and low concentrations of nitrate (Table 211). There is insufficient benthic invertebrate and reef fish samples to define characterising taxa for these biotic groups. Demersal fish assemblages are characterised by moderate to high frequency occurrence of blue cod, moki and wrasse (Table 212). Macroalgal assemblages are characterised by moderate frequency of predominantly red algae (Table 212). This group has a low number of samples for benthic invertebrates and for demersal fish, a low number of samples for macroalgae, and no reef fish samples. The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 213).

70.3 Similar groups

Loosely related to groups 66 – 69.

70.4 Characterising environmental conditions

Table 211: Group 70 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	11 m	Shallow coastal
Detrital absorption	0.16 m^{-1}	High detrital absorption
Bottom nitrate	5.62 µmol L^{-1}	Low concentrations of nitrate at depth
Dissolved oxygen at depth	6.11 mg L^{-1}	High concentrations of oxygen at depth
Tidal current	0.13 m s^{-1}	Moderate tidal current speed
Downward vertical flux of particulate organic matter at the seabed	65.77 mg C m^{-2} d^{-1}	High productivity
Benthic sediment disturbance	0.036 m s^{-1}	High seafloor disturbance
Turbidity	0.023 m^{-1}	High turbidity

70.5 Characterising species

Table 212: Species name, mean frequency occurrence and % contribution to group 70 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	2	5	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG*	0	0	*na*	*na*	*na*	*na*
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		9	27	*Parapercis colias*	Blue cod	0.56	31.39
				Latridopsis ciliaris	Moki	0.44	14.32
				Notolabrus celidotus	Wrasse	0.44	10.91
				Chelidonichthys kumu	Red gurnard	0.44	9.04
				Pseudolabrus miles	Wrasse	0.33	6.44
Macroalgae		29	84	*Agarophyton chilense*	Red algae	0.17	18.06
				Vertebrata australis	Red algae	0.14	13.49
				Hapalidiales sp 5	Red algae	0.1	10.65
				Hapalidiales sp 1	Red algae	0.07	9.83
				Adamsiella chauvinii	Red algae	0.14	7.47
				Corallina aff ferreyrae	Red algae	0.1	6.65
				Cystophora platylobium	Brown algae	0.07	4.92
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis.***

70.6 Uncertainty ranges

Table 213: Mean uncertainty values for group 70 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.48	Moderate
Demersal fish	0.004	Low	0.634	High
Macroalgae	0.002	Moderate	0.994	High
Reef fish	0.005	Low	0.213	Moderate
Combined	0.003	Moderate	0.428	Moderate

71 Group 71

71.1 Geographic location

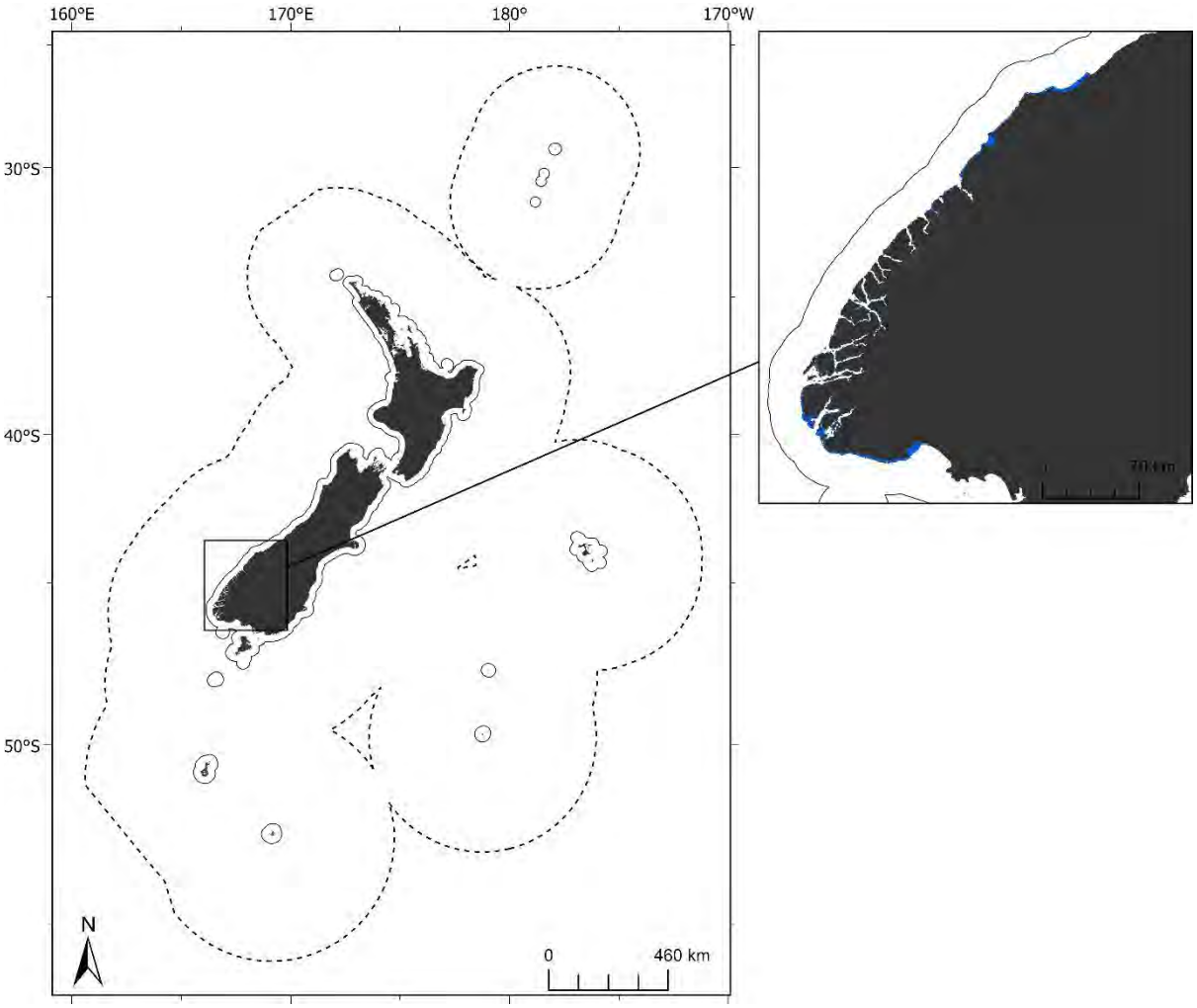

Figure 73: Geographic distribution of group 71 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

71.2 Group description

Group 71 is a small group occurring on the southwestern coast of the South Island (Figure 73) in waters with low salinity at depth, high rates of sediment disturbance by wave action, moderate to high oxygen concentration, and areas of high slope (Table 214). Demersal fish assemblages are characterised by high frequency occurrence of blue cod and wrasse. Reef fish assemblages are characterised by high frequency occurrence of wrasse, triplefin and marblefish (Table 215). Macroalgal assemblages are characterised by moderate frequency of several species of both red and brown algae (Table 215). This group has a low number of samples for all biotic groups (Table 215). Despite the low sample number across biotic groups, the overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 216), suggesting sampling in similar environmental conditions has occurred for these taxa in other SCC groups.

71.3 Similar groups

This group is distinct from all other groups.

71.4 Characterising environmental conditions

Table 214: Group 71 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	24 m	Shallow coastal
Slope	5.05 °	High slope
Salinity at depth	33.63 psu	Low salinity at depth
Dissolved oxygen at depth	5.97 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Benthic sediment disturbance	0.03 m s^{-1}	High rate of sediment disturbance
Bottom nitrate	3.79 µmol L^{-1}	Low concentrations of nitrate at depth
Benthic sediment disturbance	0.032 m s^{-1}	High benthic sediment disturbance by wave action

71.5 Characterising species

Table 215: Species name, mean frequency occurrence and % contribution to group 71 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG**	1	1	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG**	1	2	*na*	*na*	*na*	*na*
	SSG**	1	1	*na*	*na*	*na*	*na*
Demersal fish		12	7	*Parapercis colias*	Blue cod	0.92	61.03
				Pseudolabrus miles	Wrasse	0.75	33.24
Macroalgae		31	59	*Sargassum sinclairii*	Brown algae	0.16	22.19
				Landsburgia quercifolia	Brown algae	0.13	12.56
				Corallina aff ferreyrae	Red algae	0.16	11.6
				Carpomitra costata	Brown algae	0.13	7.9
				Hapalidiales sp 2	Red algae	0.1	5.65
				Plocamium microcladioides	Red algae	0.1	5.15
				Euptilota formosissima	Red algae	0.13	4.85
				Plocamium angustum	Red algae	0.13	4.85
Reef fish		3	12	*Aplodactylus arctidens*	Marblefish	1	17.92

	Notolabrus fucicola	Wrasse	1	17.92
	Pseudolabrus miles	Wrasse	1	17.92
	Forsterygion varium	Triplefin	1	17.92

**** No samples with species present, ** insufficient data to run SIMPER analysis***

71.6 Uncertainty ranges

Table 216: Mean uncertainty values for group 71 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.003	Moderate	0.403	Moderate
Demersal fish	0.003	Moderate	0.347	Moderate
Macroalgae	0.002	Moderate	0.991	High
Reef fish	0.005	Low	0.254	Moderate
Combined	0.003	Moderate	0.373	Moderate

72 Group 72

72.1 Geographic location

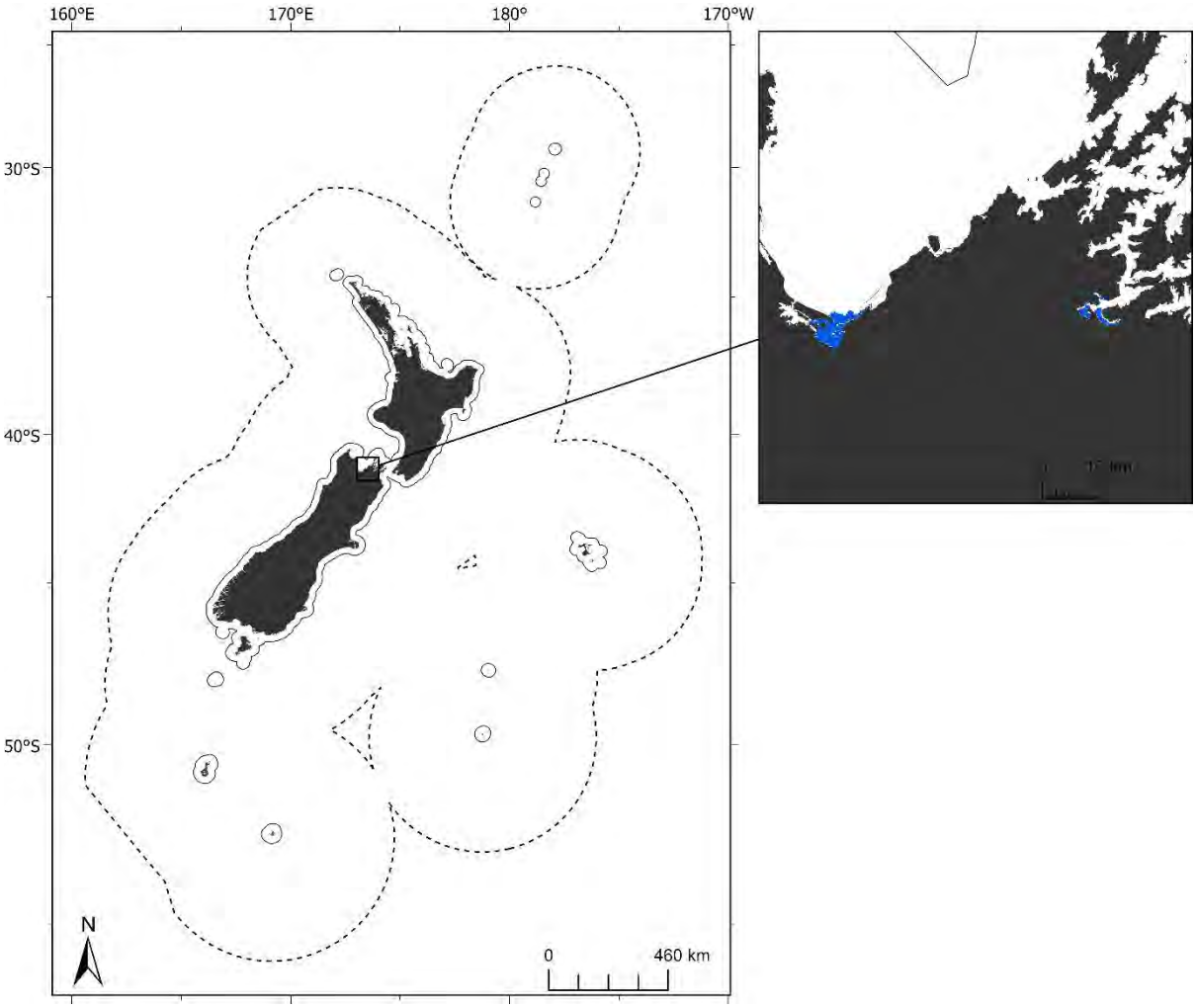

Figure 74: Geographic distribution of group 72 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

72.2 Group description

Group 72 is a small group occurring in the shallow harbours and estuaries of the northern South Island (Waimea Inlet and Pelorus Sound) (Figure 74). The waters are characterised by high detrital absorption, high productivity, strong gradients in chlorophyll *a* concentration, with high temperatures and moderate to high oxygen concentration at depth (Table 217). There is insufficient demersal and reef fish samples to define characterising taxa for these biotic groups. Benthic invertebrate assemblages are characterised by high frequency occurrence of the bivalves *Arthritica* and *Neolepton,* and the gastropod *Neoguraleus* (Table 218). Macroalgal assemblages are characterised by moderate frequency of a red and green algae (Table 218). This group has a very low number of samples for benthic invertebrates and macroalgae and no samples for demersal fish or reef fish. The overall confidence in modelled relationships is moderate (moderate confidence for 'combined' biotic group environmental coverage and for model variability (SD), Table 219).

72.3 Similar groups

This group is not closely related to any other groups.

72.4 Characterising environmental conditions

Table 217: Group 72 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	1 m	Shallow coastal
Detrital absorption	0.32 m^{-1}	High detrital absorption
Chlorophyll *a* concentration spatial gradient	0.18 mg m^{-3} m^{-1}	Strong gradient in chlorophyll *a* concentration
Dissolved oxygen at depth	5.98 mg L^{-1}	Moderate to high concentrations of oxygen at depth
Temperature at depth	13.54 °C	High bottom water temperature
Sea surface temperature gradient	0.33 °C	High variability in sea surface temperature
Downward vertical flux of particulate organic matter at the seabed	67.35 mg C m^{-2} d^{-1}	High productivity
Benthic position index	-212.638 m	Low seafloor unevenness
Turbidity	0.062 m^{-1}	High turbidity

72.5 Characterising species

Table 218: Species name, mean frequency occurrence and % contribution to group 72 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	0	0	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	4	34	*Neolepton*	Bivalve	0.75	42.39
				Neoguraleus	Gastropod	0.5	23.29
				Arthritica	Bivalve	0.5	8.58
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish*		0	0	*na*	*na*	*na*	*na*
Macroalgae		9	29	*Erythroglossum undulatissimum*	Red algae	0.22	62.76
				Bryopsis vestita	Green algae	0.22	19.31
Reef fish*		0	0	*na*	*na*	*na*	*na*

**** No samples with species present***

72.6 Uncertainty ranges

Table 219: Mean uncertainty values for group 72 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)

Benthic invertebrates	0.004	Low	0.499	Moderate
Demersal fish	0.005	Low	0.209	Moderate
Macroalgae	0.002	Moderate	0.997	High
Reef fish	0.006	Low	0.311	Moderate
Combined	0.003	Moderate	0.166	Moderate

73 Group 73

73.1 Geographic location

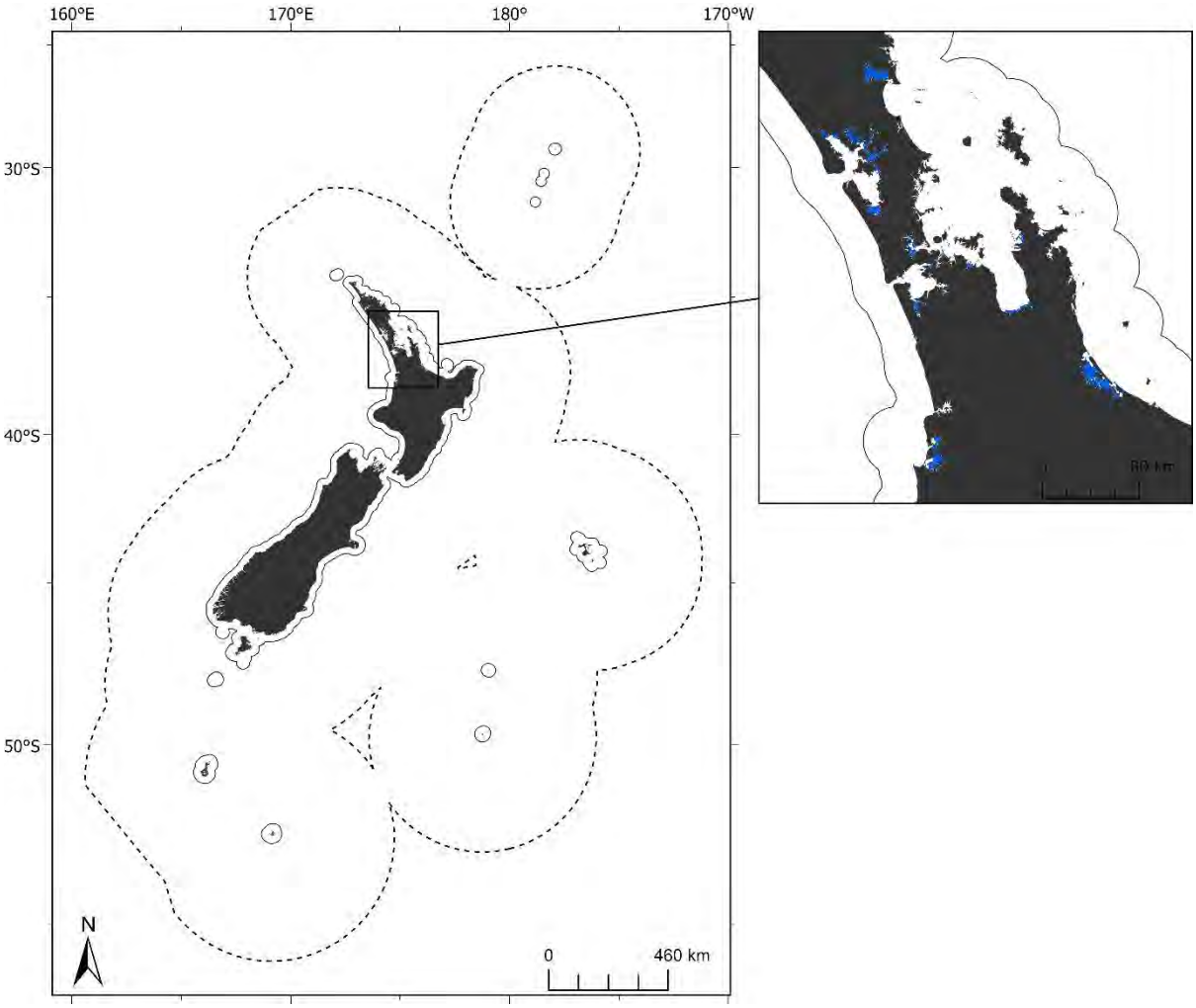

Figure 75: Geographic distribution of group 73 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

73.2 Group description

Group 73 is a small group occurring in the upper reaches of harbours and estuaries of the northern North Island (Whangarei, Kaipara, Waitemata, Manukau, Coromandel, Kawhia, and Tauranga harbours) (Figure 75). This group is characterised by high detrital absorption, productivity and water temperature, large seasonal differences in bottom temperature and chlorophyll *a* concentration spatial gradient (Table 220). There is insufficient demersal and reef fish samples to define characterising taxa for these biotic groups. Benthic invertebrate species assemblages are characterised by low frequency occurrence of amphipods, crustacea and a sea cucumber (Table 221). Macroalgal assemblages are characterised predominantly by low frequency occurrence of multiple species of red algae, with several green algae taxa (Table 221). This group has a low number of samples for benthic invertebrates, macroalgae and demersal fish and no samples for reef fish. The overall confidence in modelled relationships is low to moderate (moderate confidence for 'combined' biotic group environmental coverage and low for model variability (SD), Table 222).

73.3 Similar groups

Loosely related to groups 74 and 75.

73.4 Characterising environmental conditions

Table 220: Group 73 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	2 m	Shallow coastal
Chlorophyll *a* concentration spatial gradient	0.33 mg m^{-3} m^{-1}	High Strong gradient in chlorophyll *a* concentration
Detrital Absorption	0.43 m^{-1}	High detrital absorption
Annual amplitude of sea floor temperature	5.32 °C	Large seasonal differences in bottom temperature
Temperature at depth	17.44 °C	High bottom water temperature
Sea surface temperature gradient	0.3 °C	High variability in sea surface temperature
Downward vertical flux of particulate organic matter at the seabed	56.32 mg C m^{-2} d^{-1}	High productivity
Turbidity	0.066 m^{-1}	High turbidity

73.5 Characterising species

Table 221: Species name, mean frequency occurrence and % contribution to group 73 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG*	2	1	*na*	*na*	*na*	*na*
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	37	89	*Proharpinia*	Amphipod	0.22	25.37
				Ampelisca	Amphipod	0.16	10.45
				Taeniogyrus	Sea cucumber	0.08	9.26
				Halicarcinus	Crab	0.14	7.95
				Pagurus	Crab	0.11	7.26
				Natatolana	Isopod	0.14	6.93
				Neogouraleus	Gastropod	0.11	6.82
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish**		1	12	*na*	*na*	*na*	*na*
Macroalgae		65	148	*Ulva sp B*	Green algae	0.11	20.99
				Codium fragile	Green algae	0.09	11.77
				Hormosira banksii	Brown algae	0.09	8.07
				Agarophyton chilense	Red algae	0.11	7.25
				Catenella nipae	Red algae	0.08	6.95
				Plocamium cirrhosum	Red algae	0.12	5.11

			Spyridia filamentosa	Red algae	0.08	5.07
			Crassiphycus proliferus	Red algae	0.11	4.2
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

73.6 Uncertainty ranges

Table 222: Mean uncertainty values for group 73 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.005	Low	0.488	Moderate
Demersal fish	0.005	Low	0.254	Moderate
Macroalgae	0.002	Moderate	0.998	High
Reef fish	0.006	Low	0.15	Moderate
Combined	0.004	Low	0.17	Moderate

74 Group 74

74.1 Geographic location

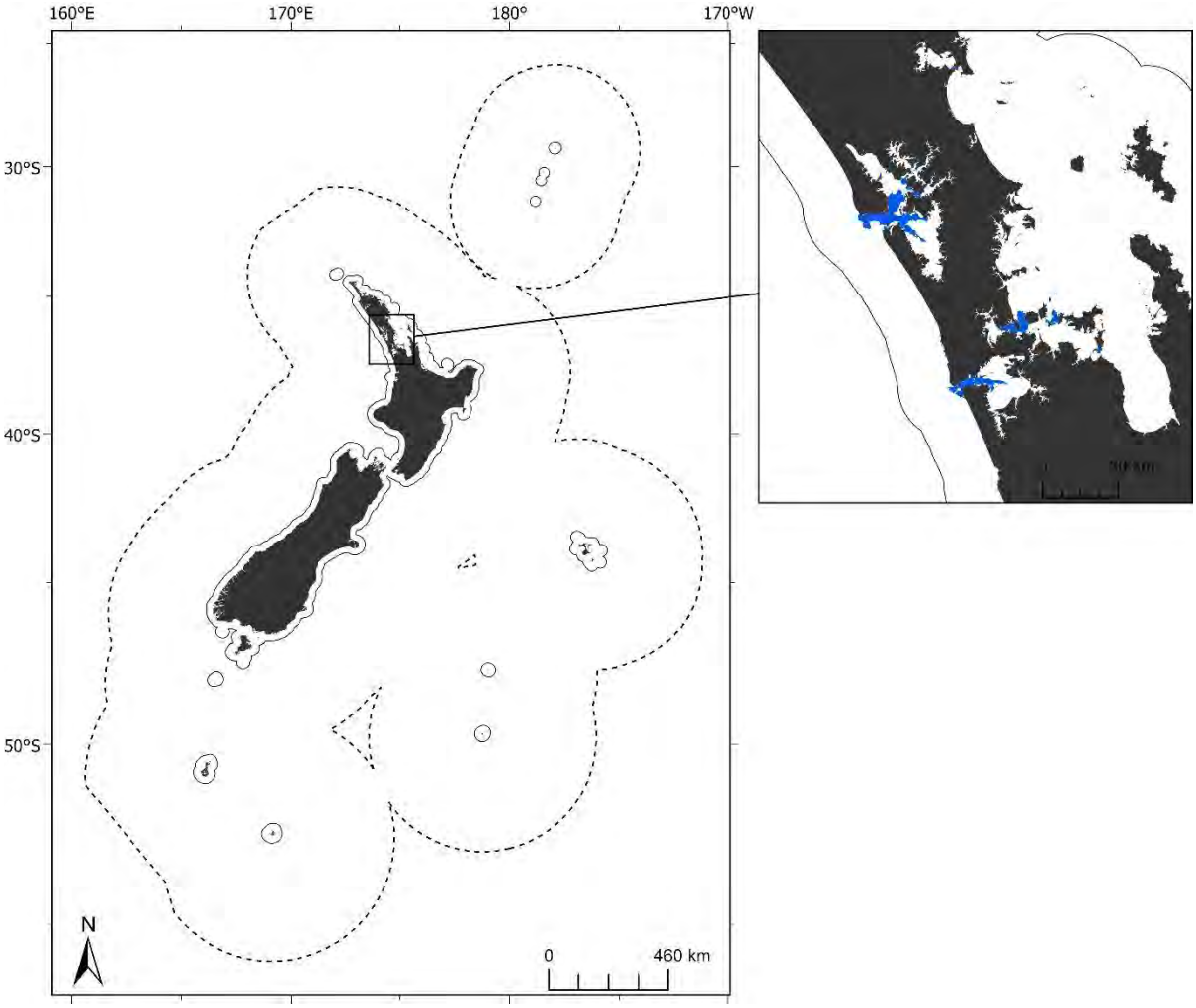

Figure 76: Geographic distribution of group 74 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

74.2 Group description

Group 74 is a small group occurring in the main channels of harbours and estuaries of the northern North Island (Whangarei, Kaipara, Waitemata and Manukau harbours) (Figure 76). These waters are subject to strong tidal currents and sediment disturbance by wave action (Table 223) and are characterised by high detrital absorption, productivity and temperature, as well as high annual variation in temperature. Benthic invertebrate species assemblages are characterised by moderate frequency occurrence of isopods, amphipods, crabs and sea cucumber (Table 224). Demersal fish assemblages are characterised by very high frequency occurrence of snapper, wrasse and john dory (Table 224). Macroalgal assemblages are characterised predominantly by low frequency occurrence of red, brown and green algae (Table 224). This group has a low number of samples for benthic invertebrates, demersal and reef fish and a moderate number of macroalgae samples. The overall confidence in modelled relationships is low to moderate (moderate confidence for 'combined' biotic group environmental coverage and low for model variability (SD), Table 225).

74.3 Similar groups

Closely related to group 75; more loosely related to group 73.

74.4 Characterising environmental conditions

Table 223: Group 74 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	9 m	Shallow coastal
Annual amplitude of sea floor temperature	5.84 °C	High. Large seasonal differences in bottom temperature
Tidal Current	0.57 m s^{-1}	High tidal current
Benthic sediment disturbance	0.039 m s^{-1}	High rate of sediment disturbance
Detrital absorption	0.26 m^{-1}	High detrital absorption
Temperature at depth	17.29 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	72.94 mg C m^{-2} d^{-1}	High productivity
Turbidity	0.046 m^{-1}	High turbidity

74.5 Characterising species

Table 224: Species name, mean frequency occurrence and % contribution to group 74 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	4	4	*Sepioteuthis*	Squid	0.75	100
	MMG*	0	0	*na*	*na*	*na*	*na*
	SMG	35	164	*Natatolana*	Isopod	0.4	8.6
				Paranthura	Isopod	0.34	6.45
				Taeniogyrus	Sea cucumber	0.34	6.36
				Petrolisthes	Crab	0.26	5.64
				Notomithrax	Crab	0.26	4.92
				Austromaera	Amphipod	0.29	4.06
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		4	18	*Chrysophrys auratus*	Snapper	1	22.05
				Notolabrus celidotus	Wrasse	1	22.05
				Zeus faber	John Dory	1	22.05
				Mustelus lenticulatus	Rig	0.75	9.74
Macroalgae		92	105	*Gelidium caulacantheum*	Red algae	0.16	15.14
				Hormosira banksii	Brown algae	0.11	11.2
				Codium fragile	Green algae	0.11	6.87
				Microdictyon mutabile	Green algae	0.08	4.52

			Aeodes nitidissima	Red algae	0.07	4.31
			Cladostephus spongiosum	Brown algae	0.07	4.29
			Petalonia binghamiae	Brown algae	0.08	4.15
			Scytosiphon lomentaria	Brown algae	0.1	4.12
Reef fish**	1	5	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

74.6 Uncertainty ranges

Table 225: Mean uncertainty values for group 74 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.004	Low	0.683	High
Demersal fish	0.005	Low	0.605	High
Macroalgae	0.002	Moderate	0.997	High
Reef fish	0.006	Low	0.184	Moderate
Combined	0.004	Low	0.435	Moderate

75 Group 75

75.1 Geographic location

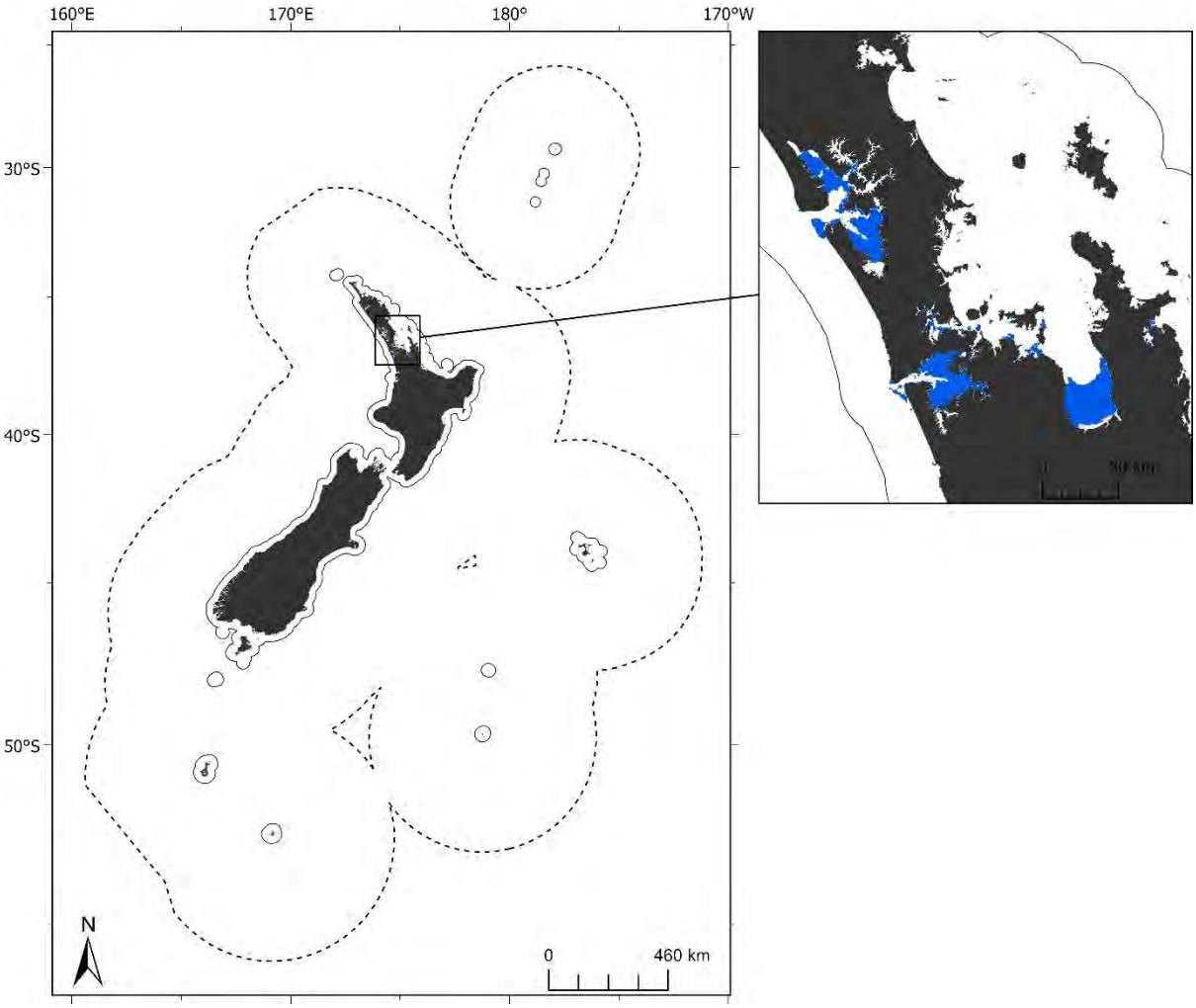

Figure 77: Geographic distribution of group 75 from a 75-group seafloor community classification (SCC) in the New Zealand marine environment (EEZ shown as dashed line).

75.2 Group description

Group 75 is a small group occurring in the mid-reaches of harbours and estuaries of the northern North Island (Kaipara, Waitemata and Manukau Harbours and the Firth of Thames) (Figure 77). These waters are subject to strong tidal currents, and are characterised by high detrital absorption, productivity and temperature, as well as large seasonal differences in bottom temperature (Table 226). Benthic invertebrate assemblages are characterised by high frequency occurrence of mussel, and moderate occurrence of amphipods, isopods and ostracods (Table 227). Demersal fish assemblages are characterised by very high frequency occurrence of snapper, and a high frequency of eagle rays and mackerel (Table 227). Macroalgal assemblages are characterised by four species of red algae (Table 227). This group has a low number of samples for benthic invertebrates and demersal fish, a moderate number of macroalgae samples, and no samples for reef fish. The overall confidence in modelled relationships is low to moderate (moderate confidence for 'combined' biotic group environmental coverage and low for model variability (SD), Table 228).

75.3 Similar groups

Closely related to group 74; more loosely related to group 73.

75.4 Characterising environmental conditions

Table 226: Group 75 characterising environmental conditions

Environmental variable	Mean value	Qualitative description
Bathymetry	3 m	Shallow coastal
Annual amplitude of sea floor temperature	5.74 °C	High. Large seasonal differences in bottom temperature
Detrital absorption	0.39 m^{-1}	High detrital absorption
Tidal Current	0.22 m s^{-1}	High tidal current
Temperature at depth	17.36 °C	High bottom water temperature
Downward vertical flux of particulate organic matter at the seabed	68.82 mg C m^{-2} d^{-1}	High productivity
Turbidity	0.073 m^{-1}	High turbidity
Benthic position index	-2.334 m	Moderate seafloor unevenness

75.5 Characterising species

Table 227: Species name, mean frequency occurrence and % contribution to group 75 similarity for those species contributing to a total of 70% of the group similarity or > 4 % to the group similarity. Groups with no species present or where data was insufficient to run analyses are reported as na.

Taxa type	Sampling gear	n samples	Unique taxa	Scientific name	Common name/broad descriptor	Mean frequency occurrence	% contribution to similarity
Benthic invertebrates	LLG.LMG	6	0	*Perna*	Bivalve	0.5	70
	MMG**	1	1	*na*	*na*	*na*	*na*
	SMG	22	86	*Proharpinia*	Amphipod	0.27	34.75
				Natatolana	Isopod	0.27	13.31
				Paranthura	Isopod	0.27	11.31
				Diasterope	Ostracod	0.23	7.65
				Torridoharpinia	Amphipod	0.18	5.42
	SSG*	0	0	*na*	*na*	*na*	*na*
Demersal fish		25	31	*Chrysophrys auratus*	Snapper	0.92	17.87
				Myliobatis tenuicaudatus	Eagle ray	0.76	11.46
				Trachurus novaezelandiae	Yellowtail Jack mackerel	0.68	9.14
				Mustelus lenticulatus	Rig	0.68	8.55
				Arripis trutta	Kahawai	0.68	8.27
				Chelidonichthys kumu	Red gurnard	0.6	5.92
				Pseudocaranx dentex	Trevally	0.56	5.44
				Notolabrus celidotus	Wrasse	0.56	5.2
Macroalgae		93	61	*Agarophyton chilense*	Red algae	0.23	53.25

			Capreolia implexa	Red algae	0.12	9.93
			Lophothamnion hirtum	Red algae	0.09	4.67
			Gelidium caulacantheum	Red algae	0.08	4.1
Reef fish*	0	0	*na*	*na*	*na*	*na*

**** No samples with species present, ** insufficient data to run SIMPER analysis***

75.6 Uncertainty ranges

Table 228: Mean uncertainty values for group 75 by biotic group and 'combined'.

Taxa	Mean SD	Confidence (SD)	Mean Env. Cov	Confidence (Env. Cov)
Benthic invertebrates	0.004	Low	0.472	Moderate
Demersal fish	0.005	Low	0.356	Moderate
Macroalgae	0.002	Moderate	0.997	High
Reef fish	0.006	Low	0.175	Moderate
Combined	0.004	Low	0.318	Moderate

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