Survey of the Southland recreational blue cod fishery during the 2009–2010 fishing year

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EXECUTIVE SUMMARY

Davey, N.K.; Hartill, B. (2011). Survey of the Southland recreational blue cod fishery during the 2009–2010 fishing year.

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This survey provides a characterisation of the present state of the blue cod recreational fishery in Southland. It documents identified sub-fisheries, areas fished, species caught and harvest rates which will be able to be compared with any future surveys to monitor trends in this part of the BCO 5 recreational fishery.

The recreational fishery for blue cod in Southland was surveyed over 12 months from October 2009 to September 2010. The objective of this survey was to characterise the fishery. Data were collected for each sub-fishery describing areas fished, species caught and harvest per unit effort (HPUE). The methods used to investigate the sub-fisheries included a creel survey at selected boat ramps (Bluff, Riverton/Colac and Halfmoon Bay) and a logbook survey for charter and recreational vessels.

Creel survey interviews were conducted with 1486 fishers on 361 boats at the selected ramps over the 12 month period. For the trailer boat sub-fishery, the areas where most fishing occurred were between Stewart Island and the mainland, with Ruapuke Island (RIS) having the highest frequency of trips and greatest effort (hours fished). Colac Bay/Riverton (CRS) and Bluff Harbour (BHS) also had high frequency of trips and a high number of hours spent fishing (effort), which is likely to be driven by proximity to the boat ramps. The majority of fishing effort from trailer boats (hook and line) was targeted towards blue cod. The dominant species caught by fishers from trailer boats was blue cod and this species was caught ten times more frequently than any other fish species. Fishers did not appear to be restricted by bag limits however, as only a small percentage of the trailer boat fishers interviewed took the limit of 30 fish (or above). Harvest rates for fishers targeting blue cod from trailer boats (line and hook) averaged four fish per hour compared to diving with a harvest rate of eight fish per hour.

The charter and recreational vessel sub-fisheries were investigated using a logbook survey. Six charter operators took part in the survey and returned 316 trip logs amounting to 1910 fisher days. The majority of their fishing effort (2706 hours) was for blue cod in Halfmoon Bay (HMB). Almost 90% of the total fishing effort undertaken by these fishers was directed towards blue cod. All charter vessels used baited line and/or bait and jigging. The overall HPUE for fishers targeting blue cod onboard charter vessels by hook and line was 2.1 fish per hour. We also calculated HPUE for each area for this sub-fishery and these values ranged from 0.7 fish per hour at Paterson Inlet (PI) to 10 fish per hour at Bluff Outer (BOS).

Ten private recreational vessels (who do not access fishery by boat ramp or charter vessel) also took part in the logbook survey and returned 158 trip logs amounting to 467 fisher days. Baited line was the most popular method but potting was commonly undertaken from two vessels. Halfmoon Bay (HMB) and Colac Bay/Riverton (CRS) were the most frequently fished areas, and had the greatest effort. This component of the fishery accounted for more fishing effort in Paterson Inlet (PI) than any other surveyed sector of the fishery. The majority of fishing effort (75–100%) in all areas was for blue cod. Harvest rates for these fishers were calculated for two fishing methods. For method boat (line and hook), the HPUE was 1.7 fish per hour and for method potting it was 5.1 fish per hour. The reported level of effort associated with potting appears high because of the 'deployment' time required for the pots. Blue cod was again the most frequently targeted and harvested species.

1. INTRODUCTION

Blue cod (BCO 5) is the most important commercial inshore finfish fishery in Southland (Ministry of Fisheries 2010). The BCO 5 Quota Management Area (QMA) begins at Slope Point (Catlins), includes Foveaux Strait, Stewart Island and extends past Fiordland to Awarua Point (West Coast) (Figure 1). The significant majority of blue cod fishing is thought to occur in Statistical Areas 025 and 030, being Foveaux Strait and northern Stewart Island and the south coast.

Previous recreational harvest estimation surveys suggest that the harvest of blue cod in BCO 5 is in the order of 150 to 300 t (Boyd & Reilly 2005, Bradford 1998). The commercial fishery in the 2008/09 fishing year landed 1391 t of blue

cod from a 1500 t TACC (Ministry of Fisheries 2010). While the estimated recreational harvest for blue cod is not large compared to the commercial landings, there is anecdotal information that recreational fishing for blue cod is increasing. It is also anecdotally indicative from fishers for blue cod in BCO 3, 5 and 7 (Ministry of Fisheries 2010) that blue cod can be subject to localised depletion, with subsequent impacts on catch rates for recreational fishers.

Recreational fishing in the Fiordland region (Awarua Point to western Te Waewae Bay) has been previously characterised in terms of areas fished, species targeted and caught, and methods used (Davey and Hartill 2010). The Fiordland survey collected baseline information on the nature and extent of recreational fishing by looking at four components of the fishery (charter vessels, private/syndicate vessels, trailer boats and commercial vessels fishing under section 111 approvals), provided general characterisation, and some harvest rates (HPUE) for the blue cod recreational fishery.

Recreational fishing in Southland is also a significant activity for locals and visitors. National marine recreational fishing diary surveys found that blue cod is the most frequently landed species in the lower South Island (Boyd & Reilly 2005). Results of a survey of recreational fishing at Stewart Island from October 2002 to September 2003 showed that this fishery is dominated by blue cod, with all bottom lining fishing trips and almost all potting trips targeting this species (James et al. 2004). Blue cod accounted for 86% of the total catch taken by bottom line and 76% of the catch taken by potting with almost 60% of this catch being retained (James et al. 2004). Blue cod catch per unit effort (CPUE) was also quantified in the James et al. 2004 survey.

This research provides a characterisation of the present state of the blue cod recreational fishery in Southland, along with information on harvest rates that can be compared with future surveys to monitor trends in the BCO 5 recreational fishery. The results of this survey are discussed alongside those of the recent Fiordland survey to provide an overall picture of the BCO5 recreational fishery.

As with all recreational fisheries, there are several sub-fisheries within the Southland fishery that must be considered separately, as there is no unified way of monitoring them collectively. We have attempted to characterise all sub-fisheries of the Southland fishery for the period 1 October 2009 to 30 September 2010. The survey focused on the following sub-fisheries:

1. Trailer boat fishery (creel survey at boat ramps)
2. Charter and larger private recreational (amateur) boat fishery including:
    a. Fishers who leave Stewart Island via the main departure points (ferry and airline) (exit survey)
    b. Operators who charter hunting parties to and from Stewart Island (logbook)
3. Commercial fishers who land a recreational take from their commercial vessel (Ministry of Fisheries data)

The survey area definitions used in all aspects of this work (Figure 1) matched those used in a previous survey of the recreational fishery (James et al. 2004) and of a recent standardised potting survey (Carbines & Beentjes in prep) so that comparisons could be made through time. Some comparisons are made with results derived from the previous survey where past data, or estimates, are available in a suitable form that allows for valid comparisons.

The main objective of this project is to characterise the present state of the recreational fishery for blue cod in the Southland region. The specific objectives involved undertaking a survey of all identified sub-fisheries using various methods (boat ramp surveys and logbooks) where recreational fishers were surveyed to determine areas fished, species caught and catch rates.

2. METHODS

2.1 Creel survey of recreational fishers at selected boat ramps

We undertook a creel survey at selected boat ramps in Southland in order to determine areas fished, species caught and harvest rates. Boat ramp-based fishers are a key component of this fishery. There are a limited number of access points for recreational trailer boats in Southland, and surveying took place primarily at Bluff, Riverton and Colac Bay, with a secondary focus on Stewart Island's Halfmoon Bay boat ramps (Figure 1).

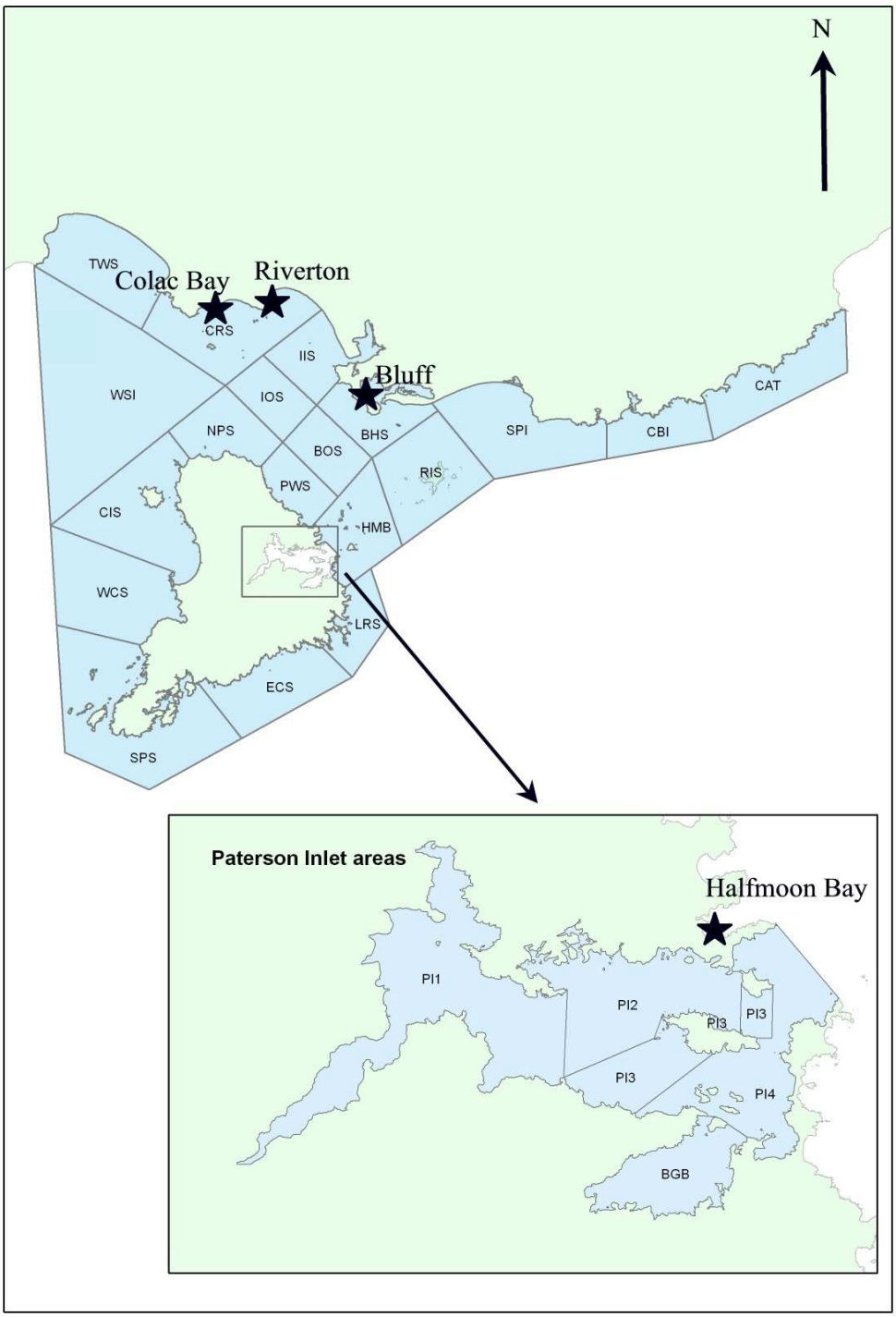


Figure 1: Map showing the Southland survey areas and area codes with positions of the boat ramp survey points. This area is all within BCO 5. The area codes are TWS=Te Waewae, CRS=Colac Bay/Riverton, WSI=West of Stewart Island, IIS=Invercargill Inner Southland, BHS=Bluff Harbour, Southland, IOS=Invercargill Outer, Southland, BOS=Bluff Outer, Southland, RIS=Ruapuke Island, Southland, SPI=Slope Point Inner, CBI=Curio Bay Inner, ECS=East Coast, Stewart Island, WCS=West Coast, Stewart Island, CAT=Catlins, Southland, HMB=Halfmoon Bay, Stewart Island, PIS=Paterson Inlet, Stewart Island, BGB=Big Glory Bay, Stewart Island, PWS=Port William, Stewart Island, CIS=Codfish Island, Stewart Island, NPS=Northern Point, Stewart Island, SPS=Southern Point, Stewart Island, LRS=Lords River, Stewart Island.

Fishers returning to ramps were interviewed on a random stratified selection of survey days (Table 1). As this project was a characterisation of the recreational fishery, and not attempting to estimate total harvest (requiring all fishers to be intercepted) we did not work the ramps on a dawn to dusk scenario. On survey days, interviews at Bluff, Riverton, Colac Bay and Stewart Island (Halfmoon Bay) were conducted over an eight hour period ending at dusk. Workers were asked to work an 8 hour shift, preferably for 8 hours leading up to dusk. However if the weather forecast was for deteriorating conditions during the day, they could work an earlier 8 hour period.

Table 1: Sample design for a boat ramp survey at Bluff, Riverton, Colac Bay and Halfmoon Bay

Ramp	Season	Day type	Number of days available	No. Days sampled (planned)	No. days sampled (end Sept 2010)	No. days sampled (end Nov 2010)*
Bluff	Summer	Weekend/PH	69	12	13	15
		Weekday	142	12	9	12
	Winter	Weekend/PH	45	6	4	4
		Weekday	108	6	6	6
		Total Bluff	364	36	32	37
Riverton/Colac Bay	Summer	Weekend/PH	69	12	13	18
		Weekday	142	12	10	14
	Winter	Weekend/PH	45	6	4	4
		Weekday	108	6	5	5
		Total Riverton/Colac	364	36	32	41
Halfmoon Bay	Summer	Weekend/Public Holiday	69	12	12	12
	Winter	Weekend/Public Holiday	45	6	6	6
		Total Halfmoon Bay	114	18	18	18

*Note: two extra months were surveyed to complete the contracted days. These results are not included in the general analysis as they are outside the fishing year.

Survey days were initially randomly pre-selected, both to ensure that the data were temporally representative, and for logistical reasons. As there is no recent quantitative data that we could use to determine optimal sampling levels, we sought the opinions of local fishers to determine the extent to which weather patterns can influence levels of fishing effort in this region. Effort was expected to be low on some days, due to prevailing weather conditions, and this was taken into account when determining the number of survey days in each seasonal/day type stratum. Local knowledge of the Southland boat ramps indicated that Halfmoon Bay was a low use ramp hence we attempted to focus on high use days (weekends and public holidays).

All interviews followed the standard format developed by NIWA and used in previous surveys (Hartill et al. 2006, Davey et al. 2008, Davey & Hartill 2010). This format allowed us to gather information on areas fished, harvest and effort by fishers, fishing method and boat numbers (see Appendix 1 for survey sheet). As each fisher was asked to indicate where their fishing took place, it was possible to calculate zone-specific descriptors of fishing effort for those zones where sufficient information was available.

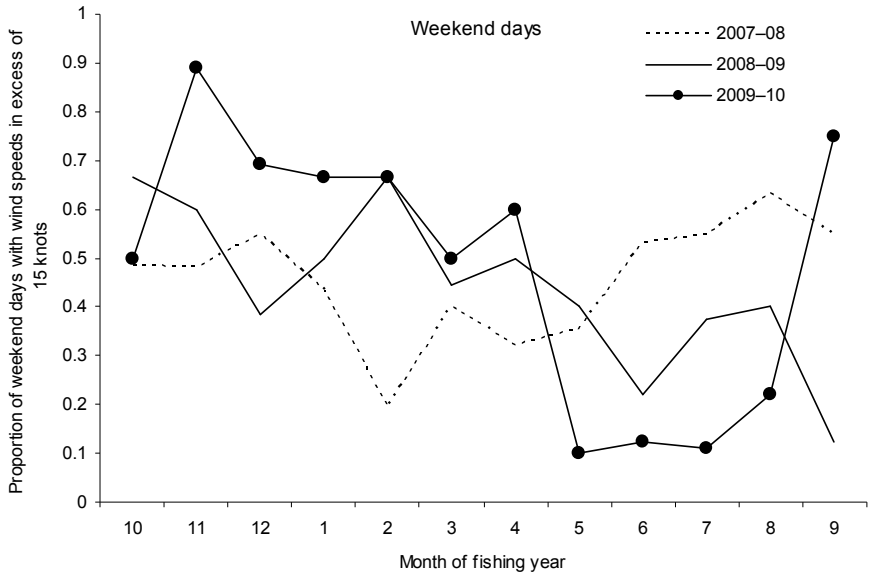
Some fishers refused to take part in the survey. When such refusals were encountered, the interviewer attempted to determine whether fishing had occurred, and recorded their impressions of the level of fishing activity accordingly. When fishing had clearly occurred, the harvest rates and harvests of these parties were treated as typical of those parties who consented to be interviewed. Parties who refuse to be interviewed, and whose activity remains undetermined were regarded as if they were not interviewed with the probability of their having fished being determined by the proportion of interviewed parties who had fished.

Initially we planned to cancel a ramp day if the weather was clearly going to prevent any fishing activity. We would then schedule an alternate sampling day in the following week, provided it was in the same stratum (midweek days versus weekend/public holidays). This gave the boat ramp workers prior knowledge of days they were required to work and maintained temporal consistency. After discussions with local recreational and commercial fishers, we set 15 knots (in various directions–depending on ramp aspect) as our minimum wind speed threshold for cancelling a survey day. However, the local weather quickly dictated that this method was unsatisfactory. After two months we

had cancelled all days except one. Over the entire survey period 95% of scheduled days were cancelled. We decided in late November 2009 to encourage the boat ramp workers to work any fishable day (in the required strata) that they could. It still proved difficult to meet our required number of survey days (see Table 1) and at the end of September 2010 we were still short of planned survey days. The original sampling design was adhered to at Stewart Island, however the original random dates were altered. The sampling design at Bluff, Riverton/Colac Bay was close to the stratified design but the dates were not the same as the original ones picked. More summer days (October) were added at the end of the survey to complete the number of days surveyed and to attempt to increase the number of fishers encountered throughout the year. The additional data collected will not be presented in this report as it is outside the contracted fishing year; however the data will be loaded and available on the Ministry of Fisheries database (rec_data).

The wind speed data was plotted to provide a summary of the number of days where the wind strength was above 15 knots and hence considered 'unfishable' and the survey cancelled (Figure 2a and b). Our data is taken from the Invercargill Aero Club at 3 pm daily. This dataset does not include other weather conditions such as overhead conditions and swell heights, and hence is indicative but not conclusive to cancel a survey day. The two years prior to the survey are graphed for comparison to our survey year. Over 50% of the weekend days during the summer were above 15 knots which was high compared to the previous two years' data. The winter season however saw only 10% of the weekend days over 15 knots. The midweek days also had a high proportion (over 50% for most summer days) over 15 knots wind. Overall this data indicates our summer weather was not in a good year for surveying as many days were unfishable. The winter midweek days were more settled with fewer days having wind strengths above 15 knots than previous years whereas weekend days were similar to previous years at around 30% of days reaching greater than 15 knots. According to this data the winter was a much better time for surveying. However there is little fishing in winter, so it was in summer that more survey days were required.

a.



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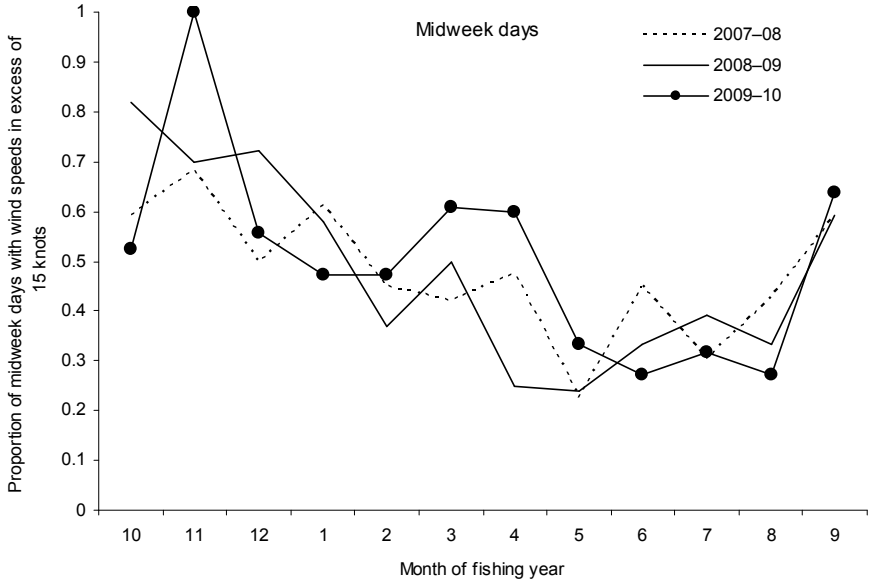


Figure 2: Proportion of weekend days (a) and midweek days (b) that experienced wind strengths over 15 knots in the Southland region during the survey year (2009–10), and two complete previous years' data (2007–08, 2008–09). Data taken from Invercargill aeroclub automatic weather station (agent 11104). 15 knots was the minimum strength to cancel a survey day.

The harvest rate calculated for trailer boat fishers was harvest per unit effort (HPUE) and this was calculated in terms of numbers of fish caught and kept (harvested) per hour fished. This was calculated for blue cod only and for all fishing methods that we had data available.

The secondary ramp (Halfmoon Bay) was only surveyed on weekends and public holidays, when relatively high levels of effort were expected.

2.2 Logbook survey of recreational fishers using charter or larger recreational vessels

2.2.1 Charter vessel logbook survey

A proportion of recreational fishing in Southland occurred from charter vessels. Of these vessels, approximately half operated from Bluff and conducted charters around Stewart Island or Southland while the remaining vessels operated from Stewart Island. There were also 11 charter vessels operating in Fiordland (Stat areas 031 and 032 in BCO 5), however this fishing activity was not resurveyed due to a recent recreational survey in this region (Davey & Hartill 2011).

A logbook survey was used to sample the fishing activity from these charter vessels. We approached as many of these operators as possible before 1 October 2009 and attempted to solicit their cooperation with a logbook scheme. The logbooks followed the same design as the previous surveys in Fiordland and the Chatham Islands (Davey & Hartill 2010, Davey et al. 2010). This format was therefore well tested and we were confident that they were easy to complete.

Each logbook consisted of the following: a map delineating areas within Southland (which was the same map used for the boat ramp survey and the exit questionnaire), a list of species and method codes, and a daily activity sheet, which was used to characterise both fishing and non-fishing activity (Appendix 2). A GPS position (degrees and minutes) of the fishing location within the area was also requested which was additional to previous logbook surveys. When fishing occurred, the operator was asked to record how many people fished, to estimate how long they fished (effort), and how many of each fish species they caught (harvested and released). While the emphasis of this survey was on blue cod fishing we attempted to gather information about other species, as this involved no additional effort or cost. We only asked the operator to record these data at the group level, in the interests of brevity, as requests for too much data invariably reduces co-operation. Any harvest rate estimates that we derived therefore were averaged across all fishers within a party. This is unlikely to introduce significant bias, however, as many of the factors which influence harvest rates are common to all fishers within that party (such as location, method and time of day). We also asked operators to measure the length (TL) of the first ten blue cod caught each day. Experience from past surveys in Fiordland suggests that some operators will not comply with requests to measure fish (Davey & Hartill 2011), however, an attempt to gather these data was made.

Skippers were contacted every three months. An initial letter was sent asking for the previous three months data to be sent, or for them to leave a message to report ‘no fishing’. If no data were returned within a month, a series of phone calls were made until we either contacted the person or received the data.

Stewart Island hunting parties who also fished accessed the fishery in two ways, either via a commercial operation (ferry or aircraft) or via private means (charter boat). Those fishers using charter vessels were approached in the same way as the other charter boat parties. Those who accessed the fishery via ferry or aircraft were sampled as below (see exit questionnaire). Skippers/pilots who dropped off the hunting parties were contacted every three months and encouraged to return the logbook pages. The information was recorded so that it could be used to identify when data had potentially been collected more than once from the same party, so that there was no double counting.

The characteristics of these two charter (general charter and hunting charter) groups were considered together, as all fishers were paying clients.

2.2.2 Private recreational vessel logbook survey

Early in the survey we were made aware that many fishers in this region (particularly Stewart Island) did not predominantly use a boat ramp, but instead used moorings or berths and larger recreational vessels. As the objectives were to characterise and provide a harvest rate for this region we extended our logbook surveys to include as many independent recreational fishers as possible. These fishers are private recreational fishers who do not use a boat ramp or a charter vessel. An additional 20 logbooks were handed out to these private recreational (not charter vessel) fishers, and ten of these fishers returned data. These data were considered separately to the data from the charter operators as fishery characteristics may be quite different for this group compared to the paying clientele onboard charter vessels.

The harvest rate calculated for charter vessel fishers and private recreational vessel fishers was harvest per unit effort (HPUE) and this was calculated in terms of numbers of fish landed per hour fished. We also calculated the HPUE in each of the areas for this component.

2.2.3 Exit questionnaires

We also set up an exit questionnaire to sample fishers who departed Stewart Island via the two main departure points (ferry and airline terminals). The same format was adopted as that used in the Stewart Island 2004 survey and the present Chatham Island survey (Davey et al. 2011, James et al. 2004) (see Appendix 3). Fishers were asked to select a fishing platform from options of charter vessel, private vessel or shore fishing. They were also asked to indicate the area fished using the same general area codes and boundaries as the sub-fisheries surveyed. Also, we requested that methods used, fish species caught (harvested and released) and number of each species be recorded.

2.2.4 Analysis of recreational take from commercial Catch and Effort Landing Returns

Another sector where recreational fishing potentially occurs is when commercial fishers operating in the Southland region land a recreational catch. To do this they are required to obtain a general (for one year) or particular (where the vessel is de-registered for a specified period of time) approval to land this fish under Section 111 of the Fisheries Act. This catch must be landed and recorded with the appropriate statistical area where the fishing occurred. It was not possible to get specific fishing locations to a fine scale from these data.

The Ministry of Fisheries was asked to provide NIWA with a list of all vessels that are holders of a general approval for the survey region, and we requested a data extract for these vessels for trips which included fishing events in the areas of interest. The data requested was:

1. Vessel id codes (actual vessel names remained confidential)
2. The number (or weight) and species of fish harvested (blue cod in this case)
3. The general statistical area where the fish was caught

From this information we selected the statistical areas that were relevant and included in the survey area. The statistical areas within the FMA 5 management area we selected were 025, 027, 029, 030, 923 and 924.

For operators applying for particular approval, a fax system was set up with the cooperation of the Ministry of Fisheries in Invercargill encouraging fishers to record their landings and fax them to NIWA. This relied on the co-operation of the commercial fishers. The same format of the cover letter and fax as that used for the Fiordland Survey (Davey & Hartill 2010) was produced. The Ministry of Fisheries did not notify us of any vessels applying for particular approval during the survey period. We checked with the Ministry of Fisheries to confirm that no particular approvals were issued during the survey period in the area of interest. All results presented for this section therefore were for fishers with general approval.

3. RESULTS

3.1 Creel survey of recreational fishers at selected boat ramps

3.1.1 General characterisation

A total of 82 sessions were completed at the four boat ramps over the survey period (Table 2). Riverton/Colac Bay was treated as a single ramp destination (fishers tend to use the ramp that was most accessible on the day), however if tidal conditions allowed, both ramps were worked simultaneously. As Halfmoon Bay was only worked on expected high use days (weekends or public holidays) the total number of sessions was only 18 days.

Table 2: Number of sessions completed at each boat ramp in the Southland region. All sessions were 8 hours except 4 sessions which worked 8.25–9.00 hours.

	Boat ramp				
Day type	Bluff	Colac Bay	Riverton	Halfmoon Bay	Total
1 (weekend/PH)	16	5	15	18	54
2 (weekday)	16	1	11	–	28
Total	32	6	26	18	82

Most of the fishing parties that we encountered were from boats returning to Bluff, with 1052 fishers interviewed from 229 boats intercepted (Table 3).

Table 3: The number of boats encountered with fishers onboard and the total number of fishers interviewed at each boat ramp in the Southland region.

		Interviewed	
	No. sessions	No. boats	No. fishers
Ramp			
Bluff	32	229	1 052
Riverton	26	87	271
Colac Bay	6	21	78
Halfmoon Bay	18	24	85
Total	82	361	1 486

The scheduling of the 82 sessions undertaken was non-random, because of a large number of cancellations due to adverse weather. Only two survey sessions were carried out in October and none in November (Table 4). Of the 82 sessions undertaken, 31 took place during the months December and January when fishing effort peaked.

Table 4: Temporal spread of the sessions at each ramp in the Southland region.

						Summer months						Winter months	
Ramp	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Bluff	1	–	5	6	3	3	4	1	1	2	3	3	32
Colac Bay	–	–	2	2	–	1	–	–	–	–	–	1	6
Halfmoon Bay	–	–	1	5	2	2	2	1	2	2	–	1	18
Riverton	1	–	5	5	2	2	3	–	1	3	2	2	26
Total	2	–	13	18	7	8	9	2	4	7	5	7	82

Each vessel that used the boat ramp was categorised by interview outcome and vessel type (Table 5). A total of 507 vessels were encountered on the boat ramps during the survey period. The majority of the fishing parties encountered used trailer boats (492) of which 352 were interviewed. Another 113 vessels were encountered which were not used for fishing. They included picnickers, water-skiers and people testing boats. The ‘not interviewed’ events occurred if the boat ramp interviewer was engaged in an interview and unable to intercept subsequent vessels on the ramp, but this only occurred in 28 instances. Only two refusals were encountered during the survey.

Table 5: The interview outcome and vessel type encountered at the four boat ramps over the survey period.

	Vessel type					
Interview outcome	Charter	Launch	Maori permit	Trailer boat	Yacht	Total
Interviewed	2	3	2	352	2	361
Interviewed (not fishing)	–	5	–	108	–	113
Not Interviewed	–	–	–	27	1	28
Fishing (not interviewed)	–	–	–	3	–	3
Refused	–	–	–	2	–	2
Total	2	8	2	492	3	507

3.1.2 Demographics of the fishers interviewed

Each fisher interviewed was asked four demographic questions (fishing avidity, origin, gender and age). Fishers re-encountered on subsequent days were not asked these questions again. This avoided biasing the demographics to the avid fishers. The number of repeat encounters of fishers was 422 (Table 6). Most fishers encountered in the Southland region claimed to fish 0–10 days per year, with 11–20 days per year the next most frequent. Only 10 fishers claimed to fish more than 50 days per year.

Table 6: Avidity of fishers interviewed on the Southland boat ramps during the survey period.

Avidity	Frequency
0–10 days	786
11–20 days	190
21–30 days	54
31–40 days	15
41–50 days	9
>51 days	10
Re-encounters	422
Total	1486

Over 800 of the fishers interviewed originated (home) from the adjacent Southland or Stewart Island areas (Figure 3). Just over 100 fishers originated from the greater South Island and few fishers were from the greater New Zealand region or from overseas.

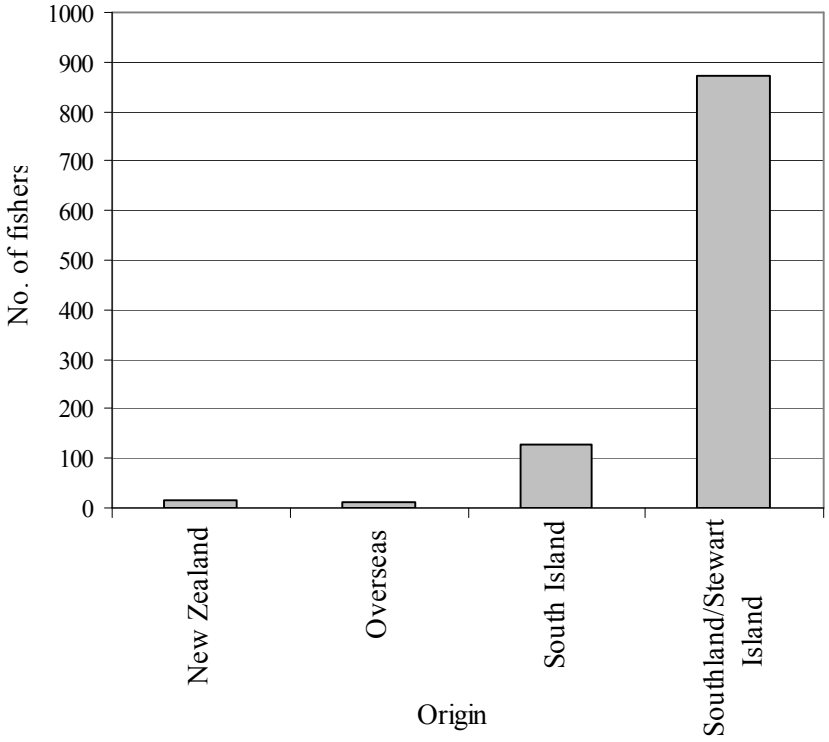


Figure 3: The origins (homes) of the fishers interviewed at the boat ramp during survey sessions in Southland. Note that an additional 456 interviews were re-encounters, or chose not to answer this question.

The genders of the fishers interviewed included 832 males and 103 females (Figure 4).

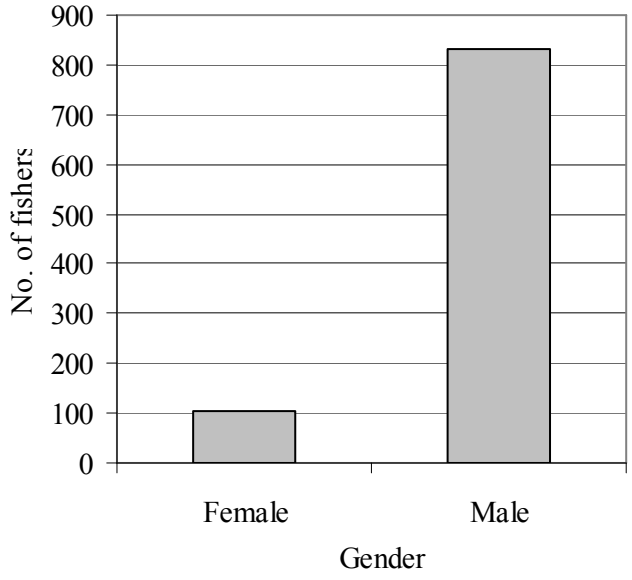


Figure 4: Gender ratio of the 935 fishers who were interviewed at the boat ramps. Note that in addition to 422 re-encounters there were also 129 fishers where this information was not recorded.

The final demographic question was age category (Figure 5). The highest numbers of fishers interviewed were in the age category 40–49 years old. Over 150 fishers were also in the age categories either side of 40–49 years old.

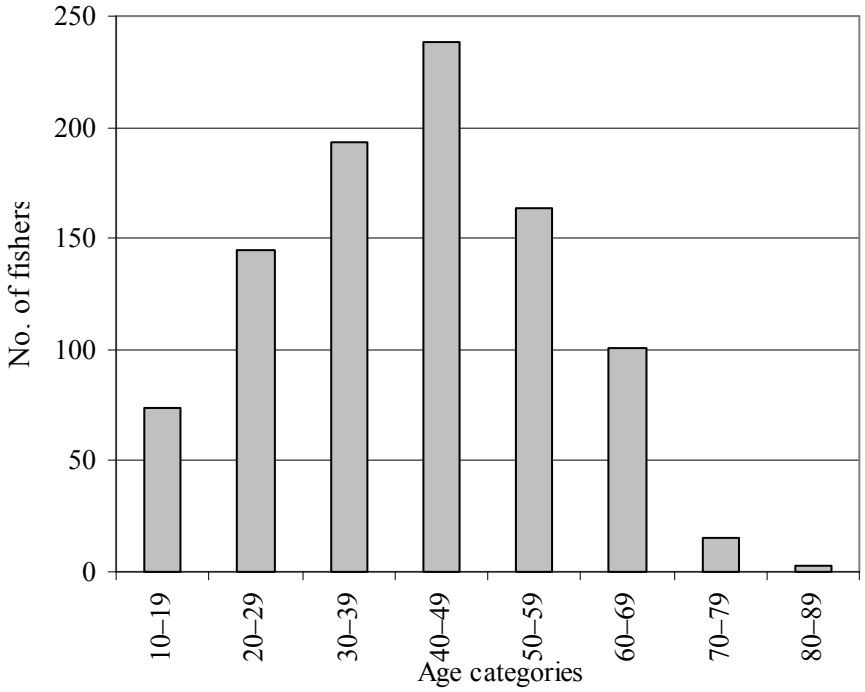


Figure 5: Age group categories of the 933 fishers who were interviewed at the boat ramps. Note that in addition to the 422 re-encounters there were also 131 who did not answer this question.

3.1.3 Spatial characterisation

The majority of fishing trips and associated effort (hours spent fishing) were conducted in the Ruapuke Island area (RIS), Colac/Riverton (CRS) and Bluff Harbour, Southland (BHS) (Figure 6). The northern coast accounted for most trips around Stewart Island, with the southern areas not fished by trailer vessels.

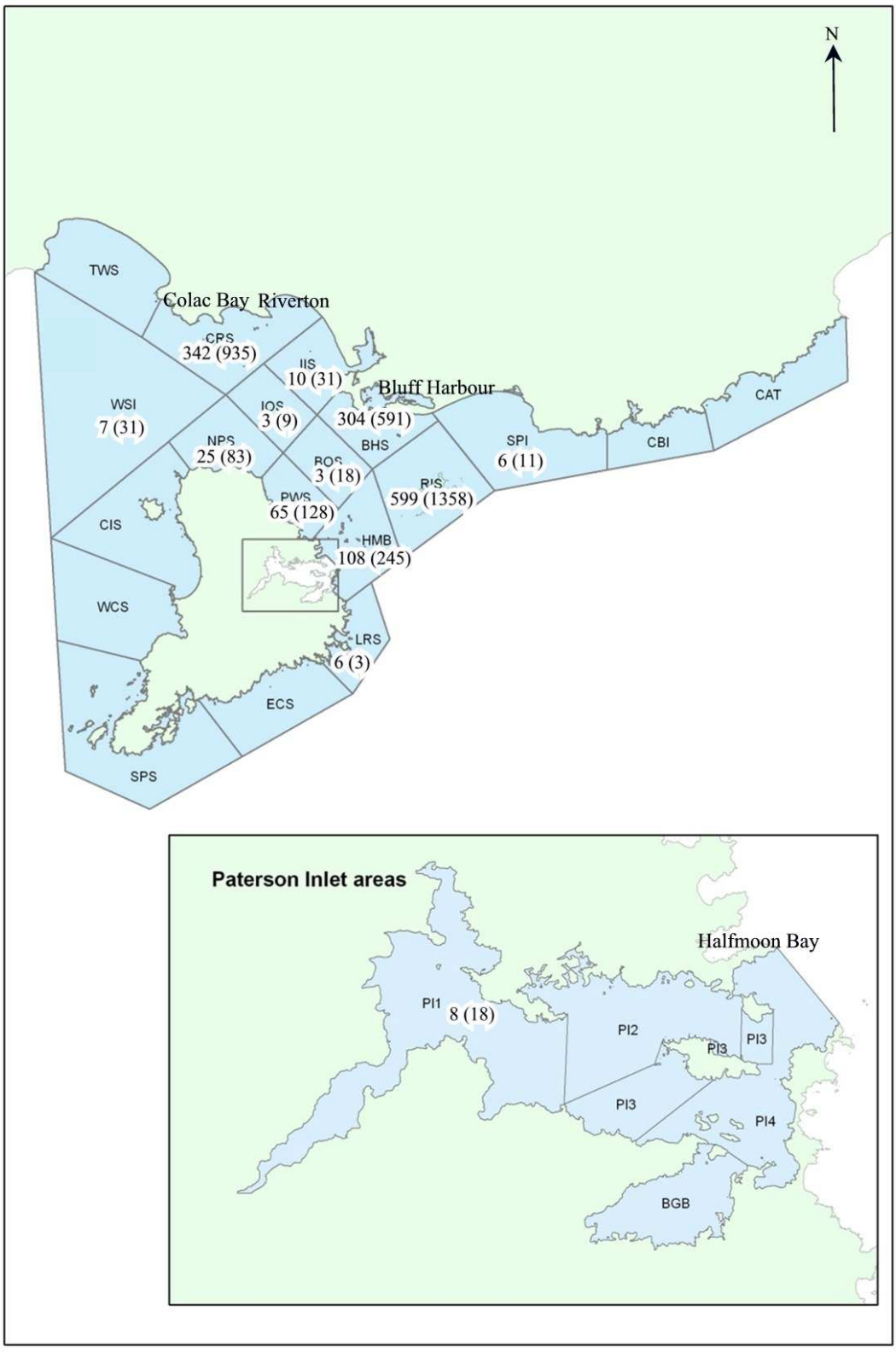


Figure 6: Map showing frequency of trips and fishing effort (hours spent fishing) in each area by vessels using the four surveyed boat ramps in the Southland region.

The number of hours spent targeting blue cod reflected the general frequency and effort patterns with Ruapuke Island (RIS), Colac/Riverton (CRS) and Bluff Harbour, Southland (BHS) being the most popular areas (Figure 7). Halfmoon Bay (HMB) accounted for the majority of hours targeting blue cod off Stewart Island.

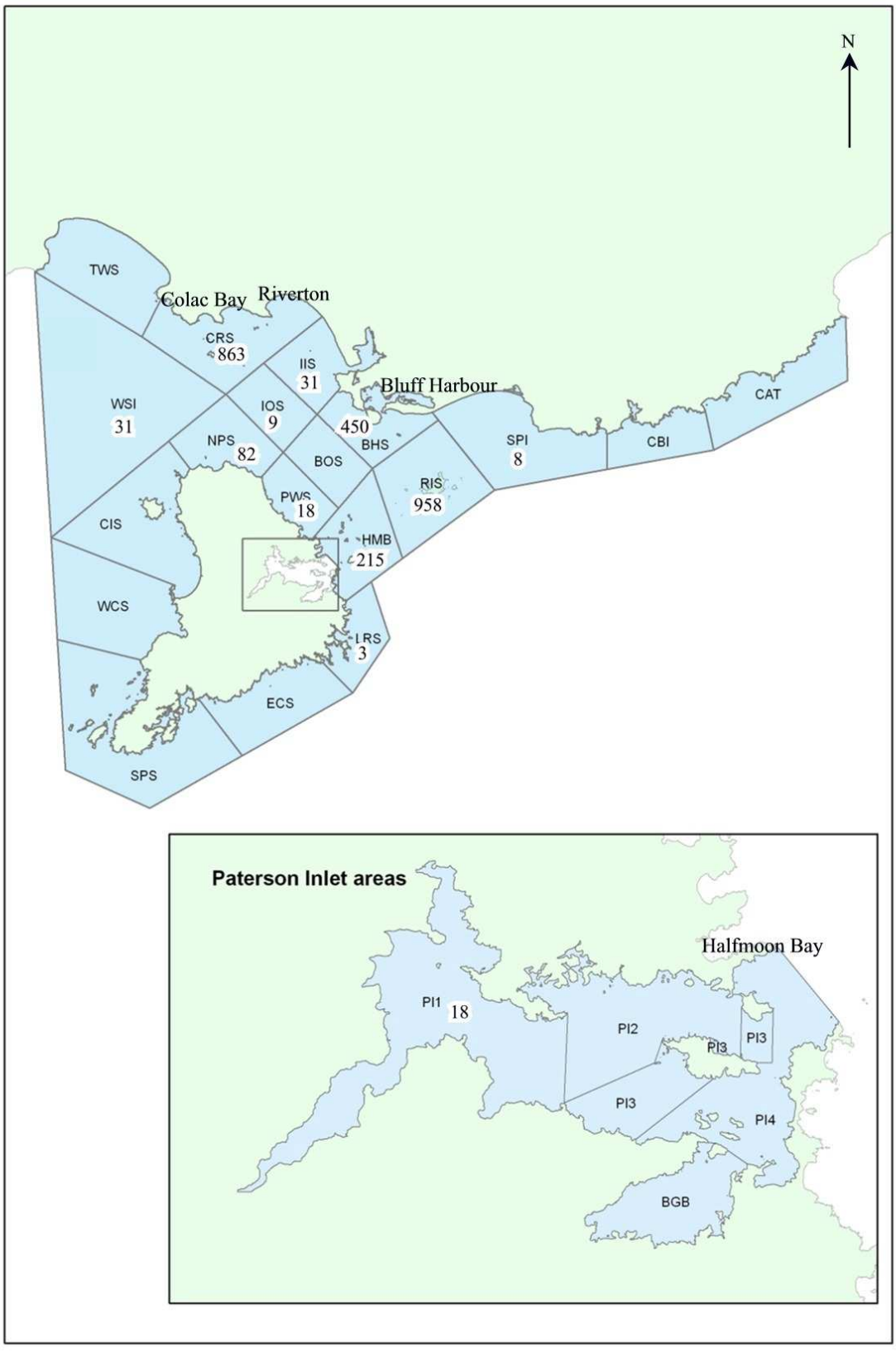


Figure 7: Map showing number of hours (effort) spent targeting blue cod in each area by vessels using the four surveyed boat ramps in the Southland region.

Approximately 40% of the trailer vessel fishing trips were in the Ruapuke Island area (RIS) and the most common methods used were baited line, dredging (oysters) and snorkelling (Table 7). The other two areas that had a high number of fishing trips were Colac/Riverton (CRS) and Bluff Harbour (BHS). The majority of all trips in these areas used the baited line method.

Table 7: Frequency of trips using each method in each area by vessels using the boat ramps in the Southland region.

	Southland							Stewart Island						
	Bluff Harbour	Bluff Outer	Colac, Riverton	Invercargill Inner	Invercargill Outer	Ruapuke Island	Slope Point Inner	Lords River	Northern Point	Port William	West of Stewart Island	Halfmoon Bay	Paterson Inlet_1	Total
Area codes	BHS	BOS	CRS	IIS	IOS	RIS	SPI	LRS	NPS	PWS	WSI	HMB	PI1	
Baited line	171	–	300	10	3	246	5	6	23	17	7	80	8	876
Baited line and jig	31	–	–	–	–	87	1	–	–	–	–	9	–	128
Drag netting	3	–	–	–	–	–	–	–	–	–	–	–	–	3
Dredging	21	3	3	–	–	114	–	–	–	25	–	3	–	169
Drop/dahn line	–	–	3	–	–	–	–	–	–	5	–	–	–	8
Hand gathering	–	–	–	–	–	11	–	–	–	–	–	1	–	12
Jigging	2	–	–	–	–	–	–	–	–	–	–	–	–	2
Potting (ie. for crayfish)	–	–	6	–	–	7	–	–	–	–	–	–	–	13
SCUBA diving	14	–	6	–	–	18	–	–	–	18	–	3	–	59
Set netting	2	–	5	–	–	11	–	–	–	–	–	2	–	20
Snorkel diving	58	–	19	–	–	105	–	–	2	–	–	10	–	194
Trolling with lure	2	–	–	–	–	–	–	–	–	–	–	–	–	2
Total	304	3	342	10	3	599	6	6	25	65	7	108	8	1 486

3.1.4 Species composition, size frequency and bag frequency

The species most commonly caught and kept (harvested) by vessel based fishers using boat ramps in the Southland region was blue cod (Table 8). The total number of blue cod harvested was 9773 and this far exceeded the next most common finfish species harvested, wrasse (generic for scarlet, banded and girdled) with 586 harvested. Trumpeter was the next most popular finfish harvested with 370 fish. Oyster, paua and kina were the most common shellfish harvested in Southland.

Table 8: Composition of fish and shellfish species and number harvested in the Southland region by vessels using the boat ramp during the survey year. Only fish species harvested in numbers greater than 10 have been included. NOTE: not all of these fish were measured.

Species	number caught
Blue cod	9 773
Oyster	9 288
Paua	1 938
Kina	1 026
Wrasse	586
Trumpeter	370
Spiny dog	229
Rock lobster	187
Barracouta	135
Scallop	90
Moki	48
Hapuku	47
Mussels-all species	47
Butterfish (greenbone)	28
Leatherjacket	25
Flounder	24
Shark-undefined species	24
Sea perch	22
Red Cod	21
Greenshell mussels	15
Tarakihi	14
Octopus	11
Spotty	10

When harvested fish were available they were measured by the boat ramp workers. Blue cod was the only species for which enough measurements were available to produce a meaningful length frequency histogram (Figure 8). The majority of blue cod measured were between 30 and 53 cm with modal peaks at 33 cm and 38 cm. The mean length of blue cod harvested by trailer boat fishers was 38 cm. The minimum legal size of blue cod is 33 cm and over 80% of the harvested fish measured are longer than this.

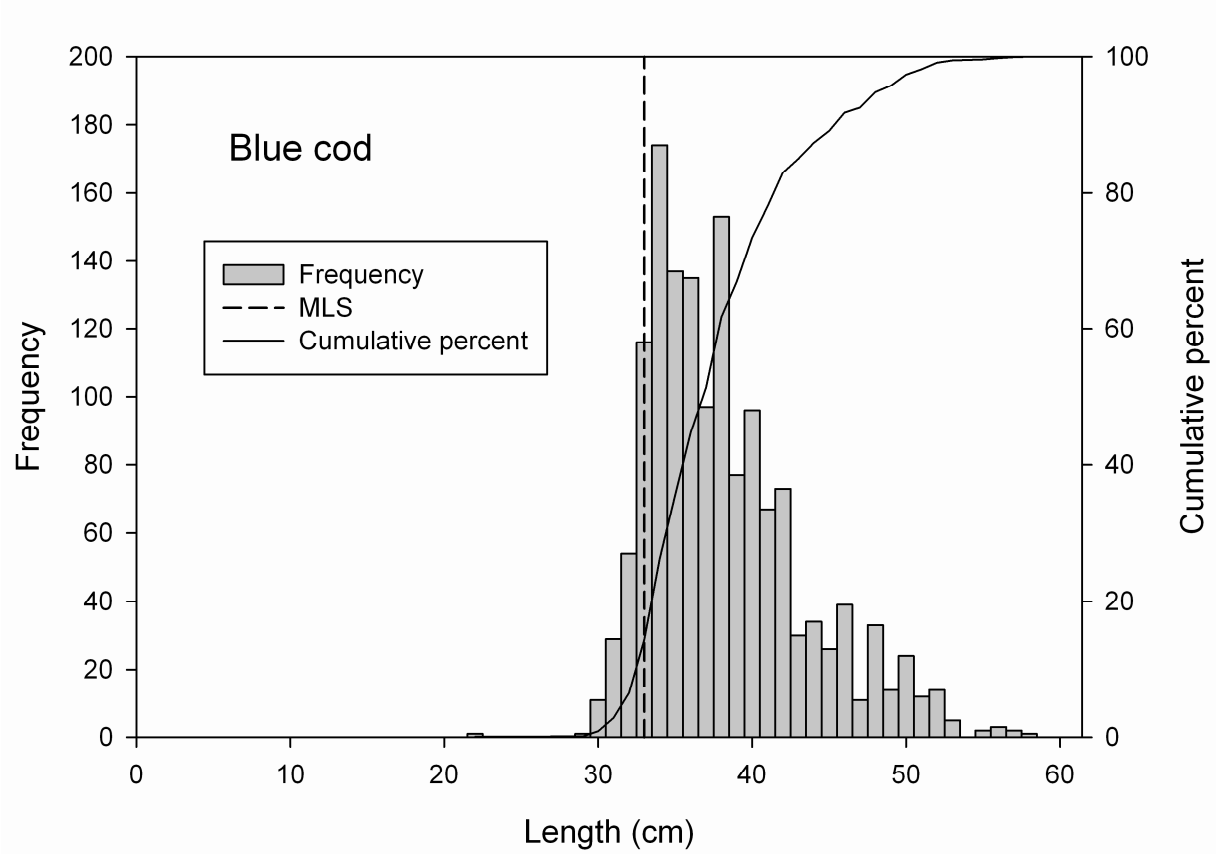


Figure 8: Size-frequency and cumulative percentage of blue cod caught and harvested onboard vessels using the boat ramps in the Southland region. The minimum legal size (MLS) is indicated as a dashed line.

The bag frequency distribution for this sub-fishery displays the number of blue cod individual trailer boat fishers landed (harvested) during a trip (Figure 9). The bag limit for this species in this region is 30 blue cod and only 50 individuals took this amount or more during the fishing season. These reports do not necessarily indicate illegal activity, as the way the data was collected does not preclude the occasional large catch being associated with a single fisher.

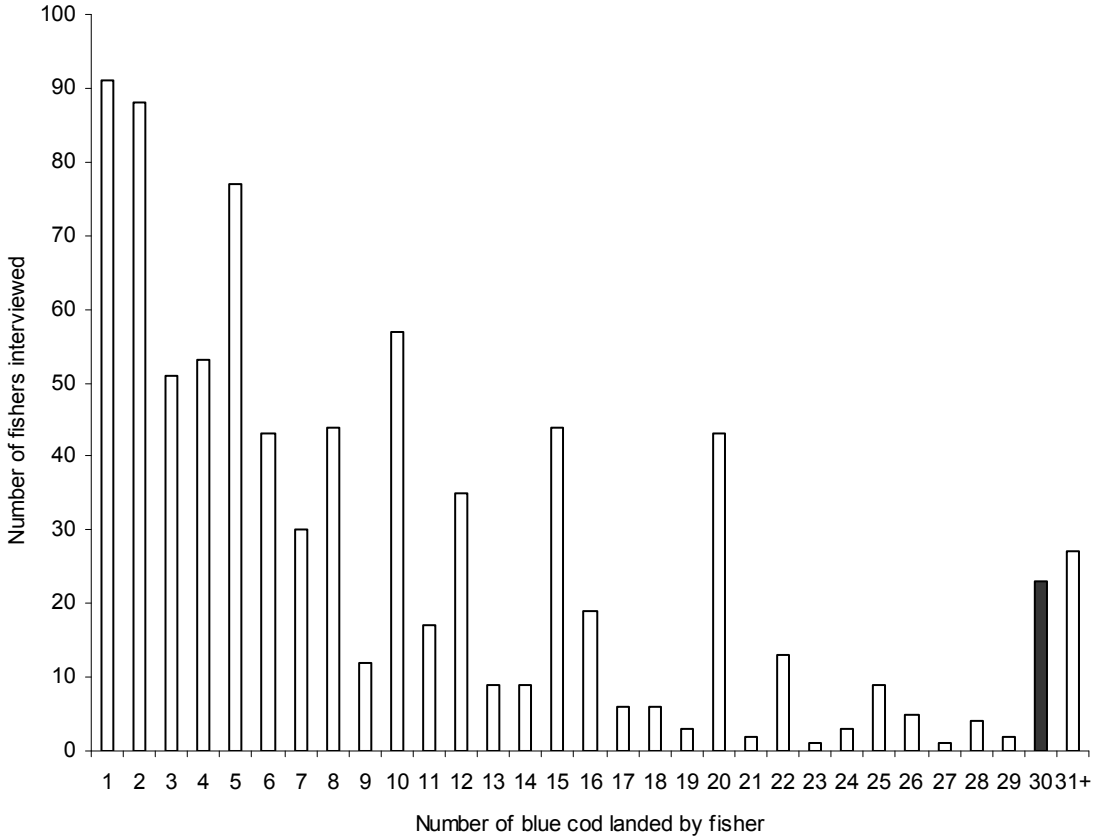


Figure 9: Number of blue cod harvested by fishers using trailer boat ramps in Southland during the surveyed fishing year. The black bar indicates maximum daily bag limit of 30 blue cod.

3.1.5 Harvest per unit effort (HPUE)

The raw harvest per unit effort (HPUE), which shows the number of fish caught and kept (harvested) per hour, was calculated for blue cod. Trailer vessel fishers in Southland harvested blue cod using three methods: boat (line and hook), diving, and potting. Harvest rates were calculated for each of these methods (Table 9). Harvest rates were highest for divers, at 8 fish per hour, but this estimate is based on the reported harvest and effort of the only two interviewed fishers who used this method to target blue cod. The most commonly used method for fishing for blue cod was by line and hook from boats, which includes jigging and bait fishing. Harvest rates for these fishers averaged 4 fish per hour.

Table 9: HPUE for blue cod targeted and harvested per hour by three methods (Boat (line and hook), diving and potting).

Method used	Fish harvested	Hours fished	HPUE
Boat (line and hook)	9733	2398	4.0
Diving	21	3	8.0
Potting	19	20	1.0

The distribution of the HPUE for all fishers interviewed who used the method boat (line and hook) when targeting blue cod indicate that while 4 fish per hour is the mean HPUE, the HPUE values ranged over the data set from 0 fish per hour to over 15 fish per hour (Figure 10). Harvest rates of between 0.5 to 2.5 fish per hour were the most common.

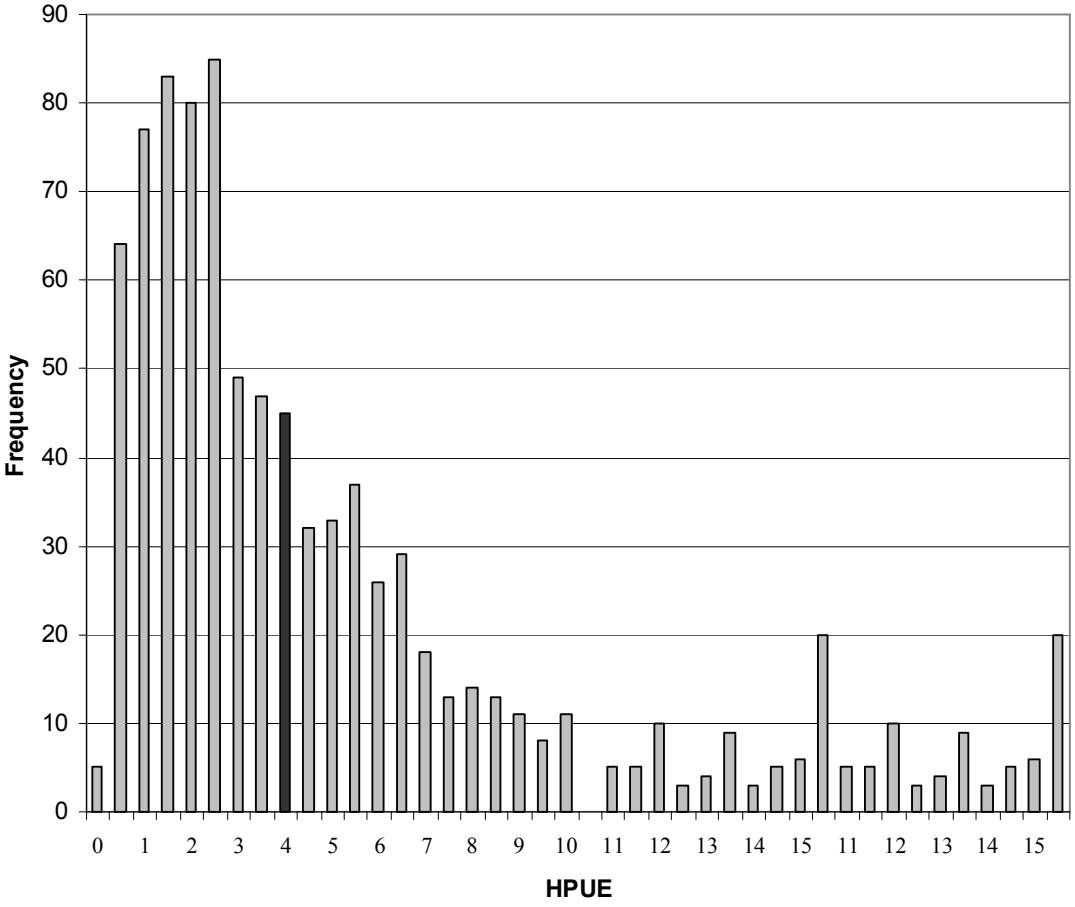


Figure 10: Distribution of the HPUE for all individual fishers where the method used to harvest blue cod was Boat (line and hook). The black bar shows the mean HPUE.

The HPUE was also calculated for each of the areas (Table 10). The highest HPUE was at Port William (PWS) with 9.3 fish harvested per hour. This HPUE is over double the overall average (4) using method boat (line and hook).

Table 10: HPUE for blue cod targeted and caught (harvested) per hour by method Boat (line and hook).

Code	General	Area name	Hours fished	Fish harvested	HPUE
HMB	Stewart Island	Halfmoon Bay	208.8	1022	4.90
LRS		Lord River	3.0	15	5.00
NPS		Northern Point	82.3	460	5.59
PI1		Paterson Inlet_1	17.5	7	0.40
PWS		Port William	17.8	165	9.30
WSI		West of Stewart Island	31.0	80	2.58
BHS	Southland	Bluff Harbour	450.4	768	1.71
CRS		Colac/Riverton	848.0	4021	4.74
IIS		Invercargill Inner	31.3	158	5.06
IOS		Invercargill Outer	9.0	19	2.11
RIS		Ruapuke Island	944.0	2745	2.91
SPI		Slope Point Inner	8.3	61	7.39

3.2 Logbook survey

3.2.1 Charter logbooks (including hunting parties)

3.2.1.1 General characterisation

The following section summarises the trip log information from the six participating charter vessels that operated in the Southland region during the survey period (October 2009–September 2010). These vessels returned 316 trip logs which provided data on 1910 fisher days (Table 11). The number of trips per vessel ranged from 4 to 128 trips. Approximately 50% of the fishers using charter vessels were from the greater New Zealand region (outside Southland). Vessel 5 had the most fisher days with 870, of which 611 were from fishers from the greater New Zealand region.

Table 11: Total number of trip logs returned and total number of fisher days reported per charter vessel in the Southland area during the survey period (October 2009–September 2010).

		Fisher origin			
Vessel	Total no. trips	Southland	NZ	Overseas	Fisher days
1	15	34	48	8	90
2	44	241	111	12	364
3	128	163	164	159	486
4	4	24	5	2	31
5	115	105	611	154	870
6	10	41	19	9	69
Total	316	608	958	344	1 910

Seven fishing methods were used on the charter vessels in the Southland region (Figure 11). Baited line was used on all vessels and accounted for 90% of the trips. All other methods were only used by one individual charter vessel and for a very low number of trips.

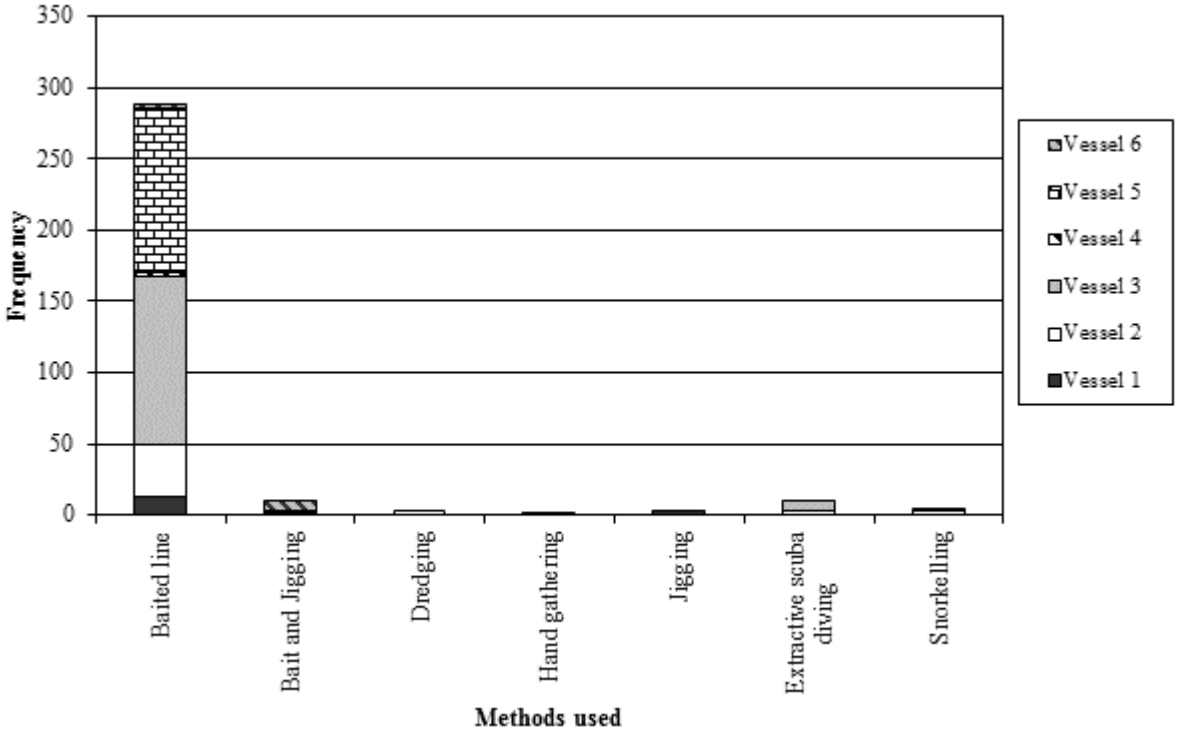


Figure 11: Frequency (number of trips) using each method by fishers onboard charter vessels in the Southland region during the survey period (October 2009–September 2010).

3.2.1.2 Spatial and seasonal characterisation

Areas fished

Fishing from charter boats occurred in 11 areas in Southland (Figure 12). The Halfmoon Bay area (HMB) had the highest frequency of trips with 210. This far exceeded any other area as it accounted for 66% of the trip log frequency. Halfmoon Bay (HMB) also had the greatest amount of fishing effort with 2752 hours. The adjacent area Ruapuke Island (RIS) had the next highest amount of fishing effort with 814 hours. The western side of Stewart Island and most of the Southland adjacent areas did not have any fishing effort.

Two areas of Paterson Inlet were fished by charter vessel users. Paterson Inlet 4 (PI4) had 30 trips with 173 hours and Paterson Inlet 2 (PI2) had 13 trips with 124 hours.

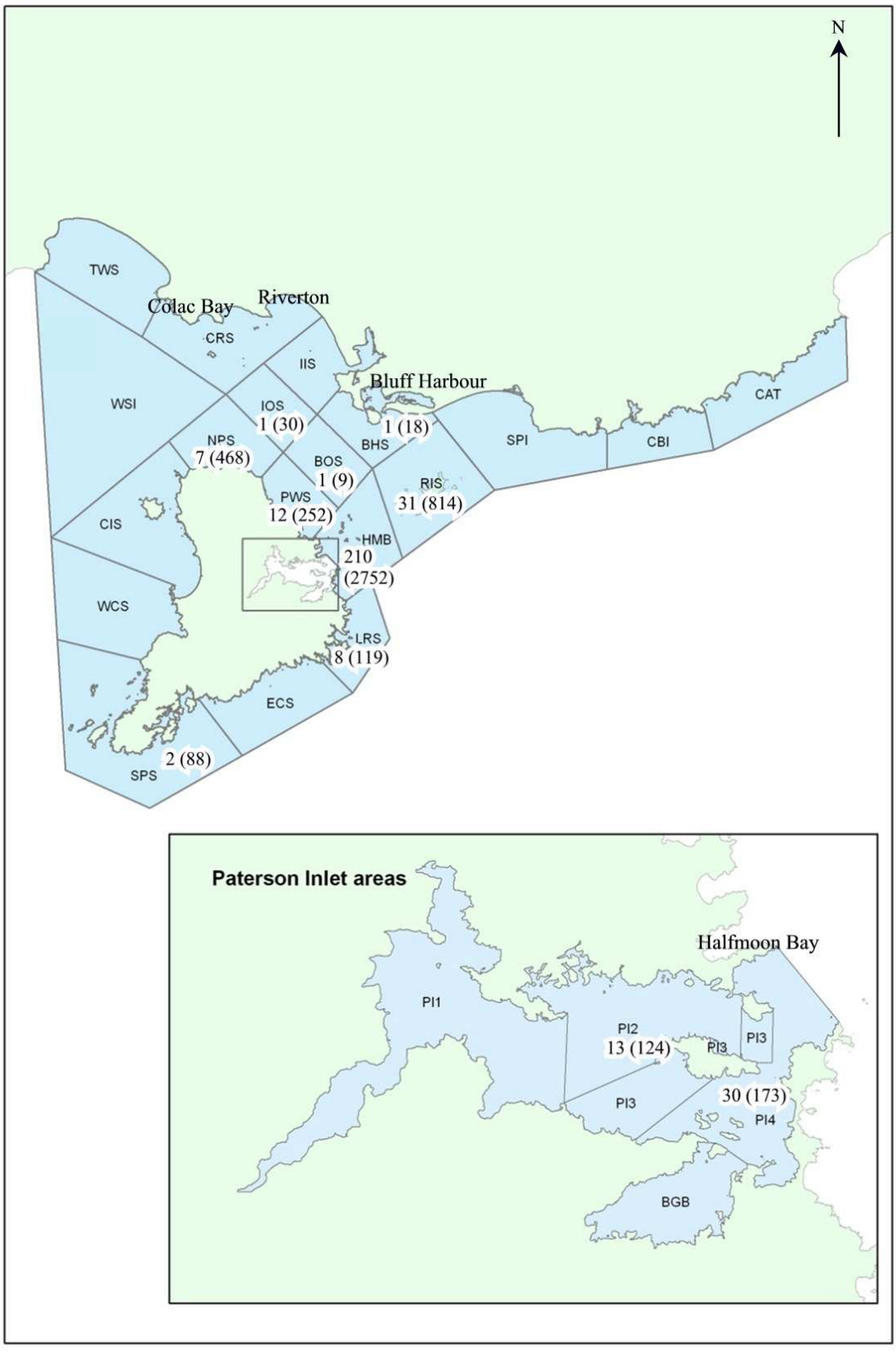


Figure 12: The number of trips reported for each of the areas fished and fishing effort (number of hours) (in brackets) by charter vessels in the Southland region.

As this survey predominantly focused on blue cod, the effort spent targeting this species by fishers using charter vessels is shown in Figure 13. A reported 2706 hours were spent targeting blue cod in Halfmoon Bay (HMB). This is almost 90% of the total effort within this area. All of the fishing trips taking place in Port William (PWS) and Northern Point (NPS) targeted blue cod. Fishers in the Ruapuke Island area (RIS) targeted blue cod for 804 of the total 814 hours (fishing effort) and almost all of the fishing effort in Paterson Inlet was for blue cod.

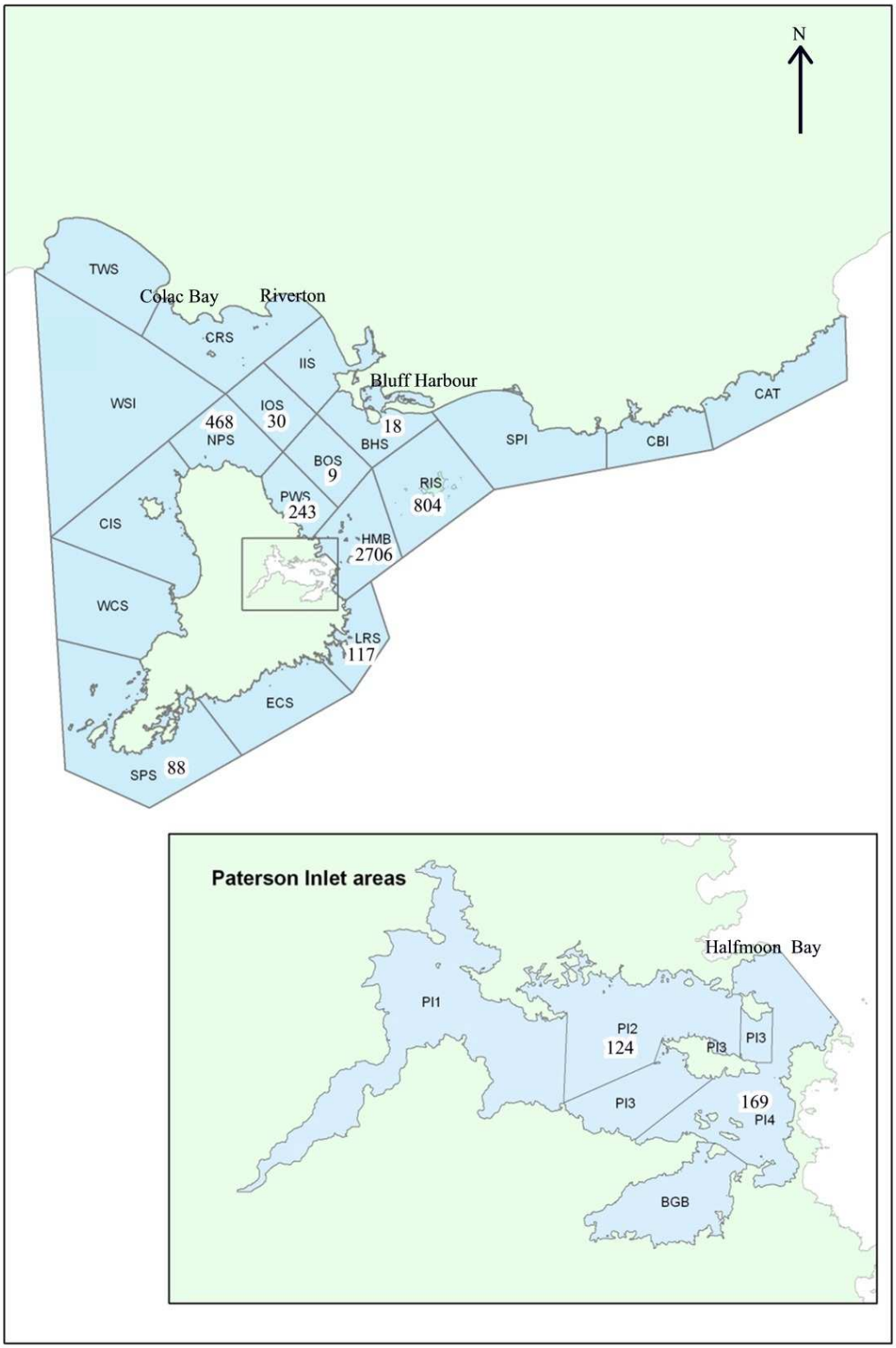


Figure 13: Map showing number of hours spent targeting blue cod in each area by charter vessels in the Southland region.

Almost all of the effort expended by this component of the fishing sector was by baited line in Halfmoon Bay (HMB) (Table 12). Scuba diving was used on a further seven trips in Halfmoon Bay (HMB) but the majority of trips to other areas used baited line.

Table 12: The frequency (number of trips) fishing each method in each area by charter vessels in the Southland region.

		Southland				Stewart Island							
	Area	Bluff Harbour	Bluff outer	Invercargill outer	Ruapuke Island	Halfmoon Bay	Lords River	Northern Point	Paterson Inlet_2	Paterson Inlet_4	Port William	Southern Point	Total
Area code		BHS	BOS	IOS	RIS	HMB	LRS	NPS	PI2	PI4	PWS	SPS	
Baited line		1	–	1	27	198	6	3	13	28	10	–	287
Bait and Jigging		–	1	–	–	1	–	4	–	1	1	2	10
Dredging		–	–	–	–	2	–	–	–	–	1	–	3
Hand gathering		–	–	–	1	–	–	–	–	–	–	–	1
Jigging		–	–	–	–	1	1	–	–	–	–	–	2
Extractive scuba diving		–	–	–	1	7	1	–	–	–	–	–	9
Snorkeling		–	–	–	2	1	–	–	–	1	–	–	4
Total		1	1	1	31	210	8	7	13	30	12	2	316

The number of hours fished by each method in each area broadly reflects the relative distribution of trips shown above (Table 13). Almost all of the hours spent fishing were associated with the use of baited lines.

Table 13: The effort (number of hours) spent fishing each method in each area by charter vessels in the Southland region.

		Southland				Stewart Island							
	Area	Bluff Harbour	Bluff outer	Invercargill outer	Ruapuke Island	Halfmoon Bay	Lords River	Northern Point	Paterson Inlet_2	Paterson Inlet_4	Port William	Southern Point	Total
Area code		BHS	BOS	IOS	RIS	HMB	LRS	NPS	PI2	PI4	PWS	SPS	
Baited line		18	–	30	804	2 682	116	308	124	165	195	–	4 441
Bait and Jigging		–	9	–	–	24	–	160	–	4	48	88	333
Dredging		–	–	–	–	21	–	–	–	–	9	–	30
Hand gathering		–	–	–	5	–	–	–	–	–	–	–	5
Jigging		–	–	–	–	1	1	–	–	–	–	–	2
Extractive scuba diving		–	–	–	1	16	2	–	–	–	–	–	19
Snorkeling		–	–	–	4	9	–	–	–	4	–	–	17
Total		18	9	30	814	2 752	119	468	124	173	252	88	4 846

Seasonality of the charter vessels

Charter vessel fishing is seasonal (Figure 14). The number of fisher days onboard charter vessels was highest in January (310) followed by April (282) but levels of effort were also high in February and March (over 200 fisher days) which suggests that charter boat fishers preferentially fish in the four months after Christmas.

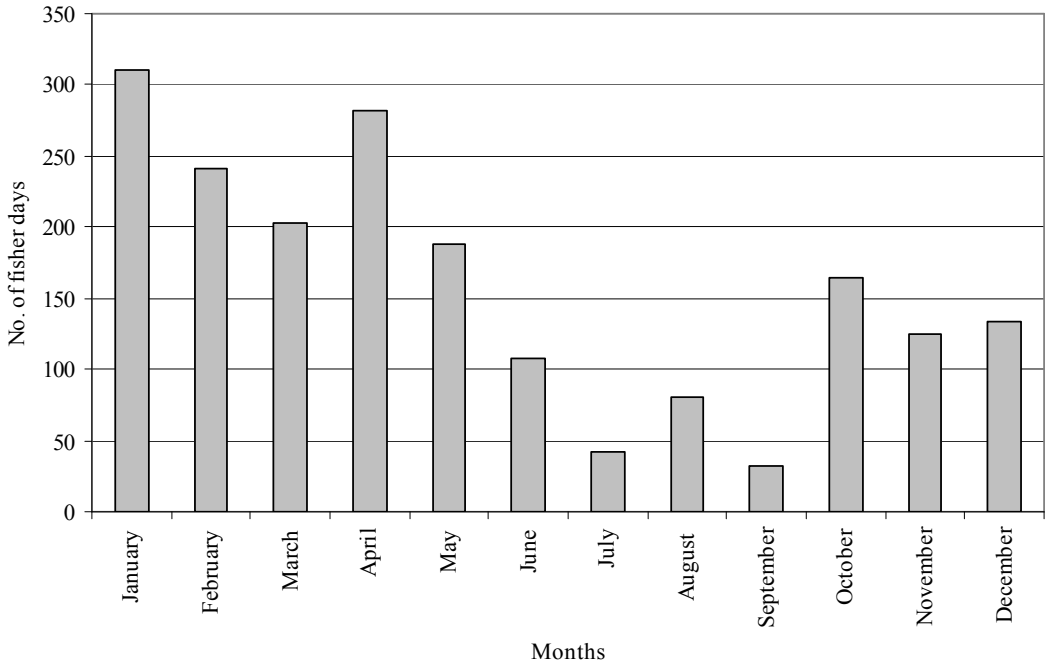


Figure 14: Seasonality of fishing trips (number of fisher days) by fishers onboard charter vessels in the Southland region.

3.2.1.3 Species targeted

Of the 316 charter vessel trips, blue cod were targeted on 299 trips (Table 14). Only 17 trips targeted other species.

Table 14: Frequency of charter vessel trips targeting each species

	Species targeted					
Vessel	Blue cod	Rock lobster	Oyster	Paua	Kina	Total
1	15	–	–	–	–	15
2	36	1	3	3	1	44
3	119	6	1	2	–	128
4	4	–	–	–	–	4
5	115	–	–	–	–	115
6	10	–	–	–	–	10
Total	299	7	4	5	1	316

3.2.2 Private recreational vessel logbooks

3.2.2.1 General characterisation

The following section summarises the trip log information from 10 participating private recreational vessels (vessels that do not use boat ramps) that operated in the Southland region during the survey period (October 2009–September 2010). These vessels returned 158 trip logs covering 467 fisher days (Table 15). The number of trips per vessel ranged from 1 trip log through to 39 trip logs. Southlanders fished for 367 of these days (79%) while fishers from other parts of New Zealand fished for 93 days.

Table 15: Total number of trip logs returned and total number of fisher days reported per private recreational vessel in the Southland area during the survey period (October 2009–September 2010).

		Fisher origin			
Vessel	Total no. trips	Southland	NZ	Overseas	Fisher days
7	10	23	1	1	25
8	37	62	18	–	80
9	32	83	8	–	91
10	1	4	–	–	4
11	12	4	43	2	49
12	6	21	4	3	28
13	6	13	10	–	23
14	2	4	–	–	4
15	13	25	9	1	35
16	39	128	–	–	128
Total	158	367	93	7	467

Nine methods were used by fishers who provided private vessel logbook data during the sample year (Figure 15). All participants used baited line except those fishing from vessel 16. Fishers on vessels 9 and 16 fished with pots on 48 trips. Snorkelling was also used for a notable number of trips (15) by fishers on vessel 8. The remaining methods were used only on two vessels, for a low number of trips.

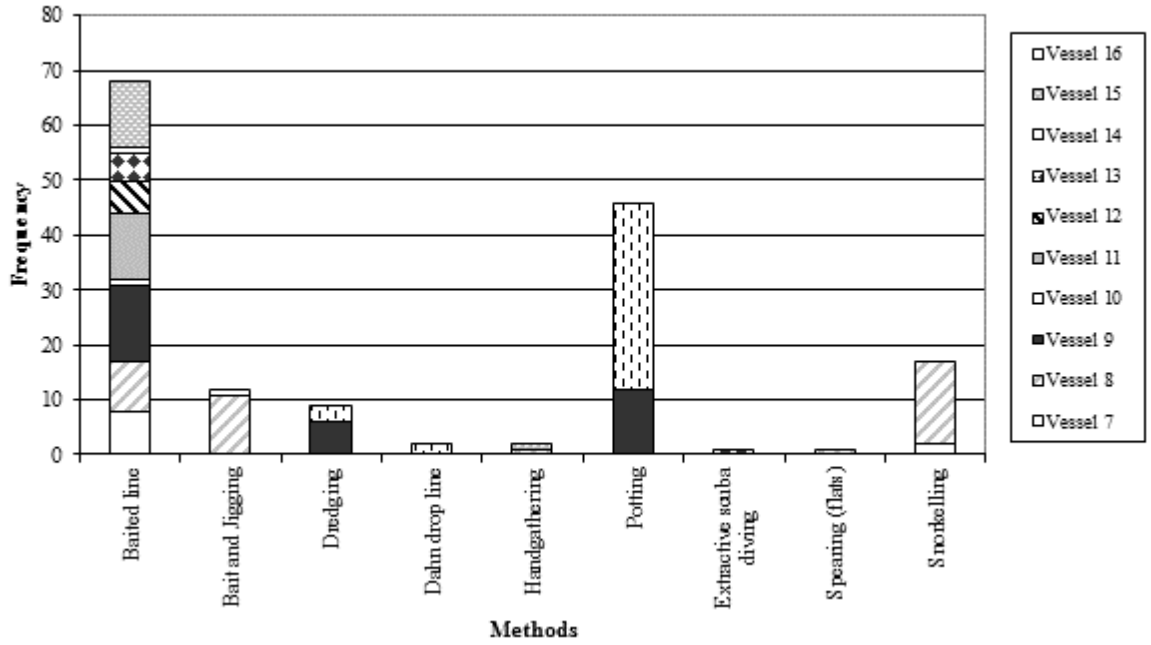


Figure 15: Frequency (number of trips) using each method by fishers onboard private recreational vessels in the Southland region during the survey period (October 2009–September 2010).

3.2.2.2 Spatial and seasonal characterisation

Areas fished

Fishers that provide logbook data for trips on private recreational vessels fished in 15 areas in the Southland region (Figure 16). The area Halfmoon Bay (HMB) had the highest frequency of trips at 65. The Colac/Riverton area (CRS) was the second most commonly fished location with 38 trips. Halfmoon Bay (HMB) also had the greatest fishing effort with 571 hours followed by Colac/Riverton (CRS) with 273 hours. Generally the effort followed a similar pattern to the trip frequency. Four areas in Paterson Inlet area were fished, with the highest number of trips taking place in the inner waters of Paterson Inlet_1 (57 hours fished during 11 trips).

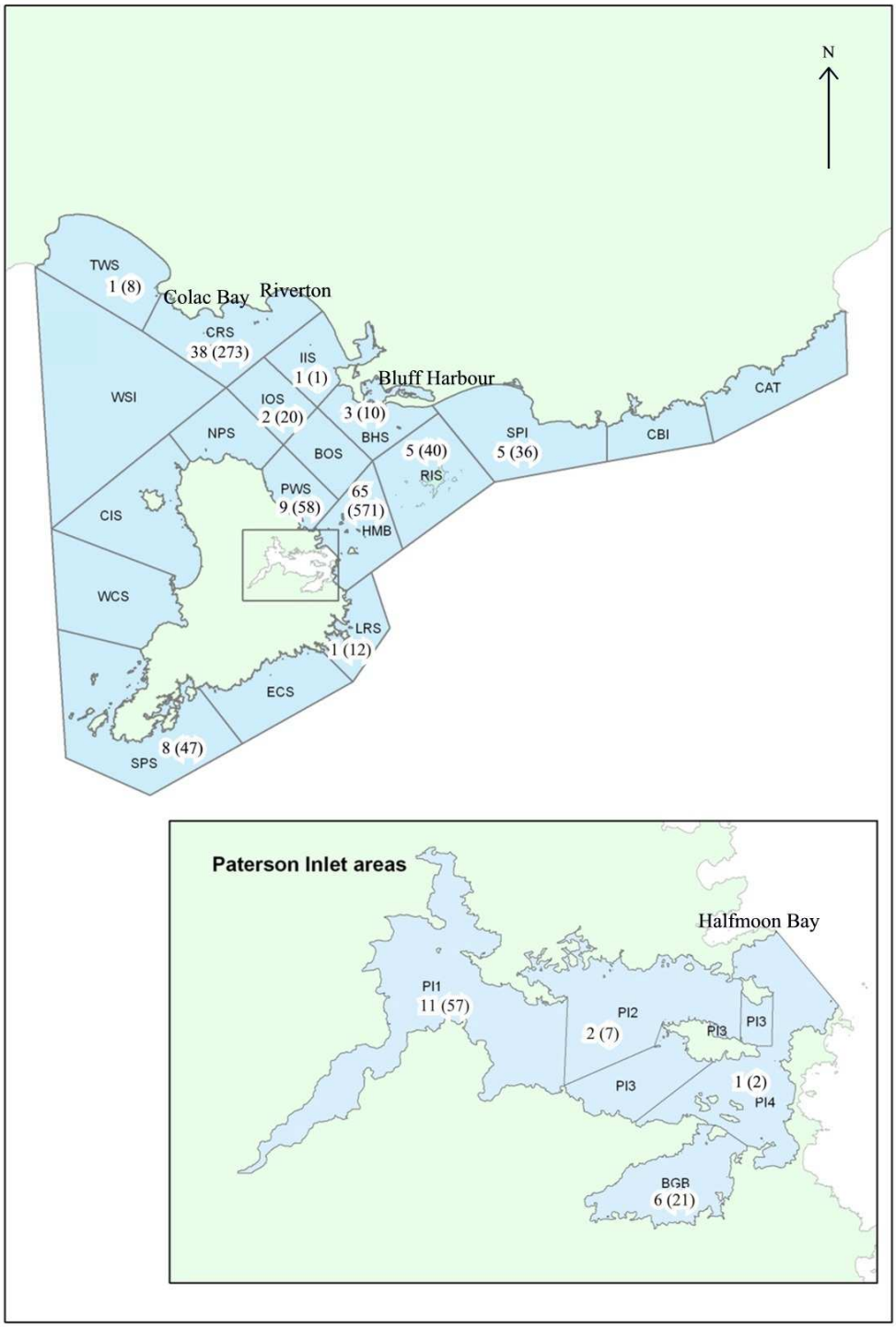


Figure 16: Map showing number of trips and fishing effort (number of hours) in each area by private recreational vessels in the Southland region.

The effort spent targeting blue cod is shown in Figure 17. At Halfmoon Bay (HMB) 495 hours (87% of the total fishing effort) was spent targeting this species. Blue cod was also targeted for 75–100 % of the time in most other areas including the two Paterson Inlet areas (Paterson Inlet_1 PI_1 and Big Glory Bay BGB).

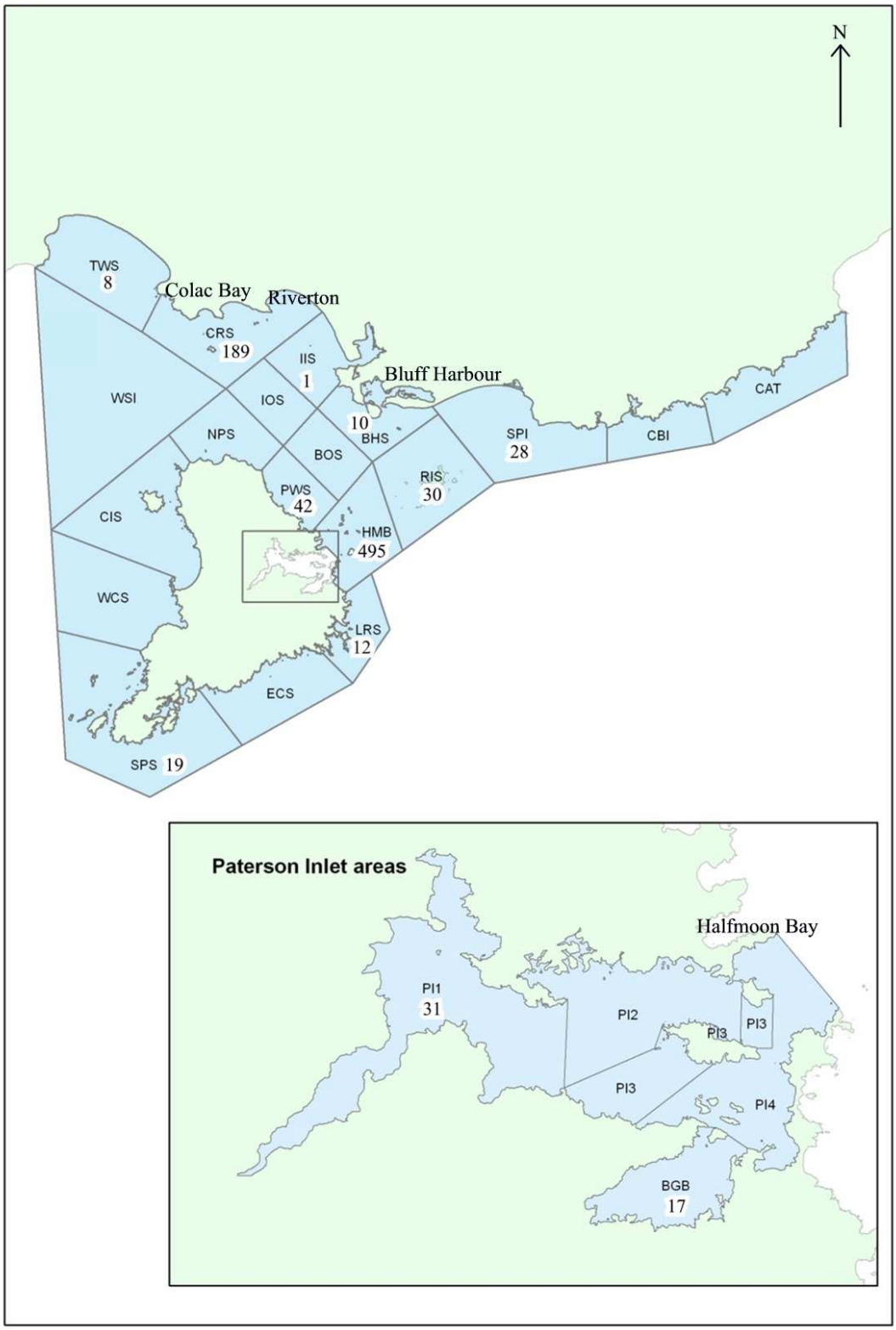


Figure 17: Map showing the number of hours spent targeting blue cod in each area by private recreational vessels in the Southland region.

The frequency of fishing trips to areas using the various fishing methods showed that baited line was the most popular method (68 trips) followed by potting (46 trips), then snorkelling (17 trips) (Table 16). Baited line was used in 12 of the areas with the highest number of trips (36) occurring in Halfmoon Bay (HMB). Potting was

predominantly used in Colac/Riverton (CRS) with 34 trips and the most snorkelling trips were in Halfmoon Bay (HMB).

Table 16: The frequency (number of trips) fishing each method in each area by recreational vessels in the Southland region.

		Southland						Stewart Island									
	Area	Bluff Harbour	Colac, Riverton	Slope Point inner	Invercargill inner	Invercargill outer	Te Wae Wae	Halfmoon Bay	Lords River	Paterson Inlet_1	Paterson Inlet_2	Paterson Inlet_4	Port William	Ruapuke Island	Southern Point	Big Glory Bay	Total
Area code		BHS	CRS	SPI	IIS	IOS	TWS	HMB	LRS	PI1	PI2	PI4	PWS	RIS	SPS	BGB	
Baited line		3	1	3	1	–	1	36	1	6	–	–	7	4	3	2	68
Bait and Jigging		–	–	–	–	–	–	10	–	–	–	1	–	–	–	1	12
Dredging		–	–	–	–	2	–	2	–	–	–	–	1	–	4	–	9
Dahn drop line		–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Handgathering		–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	2
Potting		–	34	2	–	–	–	4	–	5	–	–	–	–	1	–	46
Extractive scuba diving		–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Spearing (flats)		–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1
Snorkeling		–	–	–	–	–	–	12	–	–	1	–	1	1	–	2	17
Total		3	38	5	1	2	1	65	1	11	2	1	9	5	8	6	158

The number of hours fished by each method in each area largely reflected the relative distribution of the number of trips, with baited line accounting for a high proportion of effort in Halfmoon Bay (HMB), followed by potting in Colac/Riverton (CRS) (Table 17).

Table 17: The effort (number of hours) spent fishing each method in each area by private recreational vessels in the Southland region.

		Southland						Stewart Island									
	Area	Bluff Harbour	Colac, Riverton	Slope Point inner	Invercargill Inner	Invercargill outer	Te Wae Wae	Halfmoon Bay	Lords River	Paterson Inlet_1	Paterson Inlet_2	Paterson Inlet_4	Port William	Ruapuke Island	Southern Point	Big Glory Bay	Total
Area code		BHS	CRS	SPI	IIS	IOS	TWS	HMB	LRS	PI1	PI2	PI4	PWS	RIS	SPS	BGB	
Baited line		10	12	28	1	–	8	409	12	31	–	–	42	38	13	13	615
Bait and Jigging		–	–	–	–	–	–	76	–	–	–	2	–	–	–	2	80
Dredging		–	–	–	–	20	–	5	–	–	–	–	15	–	28	–	68
Dahn drop line		–	11	–	–	–	–	–	–	–	–	–	–	–	–	–	11
Handgathering		–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	2
Potting		–	242	8	–	–	–	19	–	26	–	–	–	–	6	–	301
Extractive scuba diving		–	8	–	–	–	–	–	–	–	–	–	–	–	–	–	8
Spearing (flats)		–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2
Snorkeling		–	–	–	–	–	–	62	–	–	5	–	1	2	–	5	74
Total		10	273	36	1	20	8	571	12	57	7	2	58	40	47	21	1 160

Seasonality of the private recreational vessels

These recreational fishing vessels were also seasonal (Figure 18). The number of fisher days that occurred in December was over double of those occurring for the remainder of the year. The rest of the months fluctuated within a range of 15 to 55 fisher days.

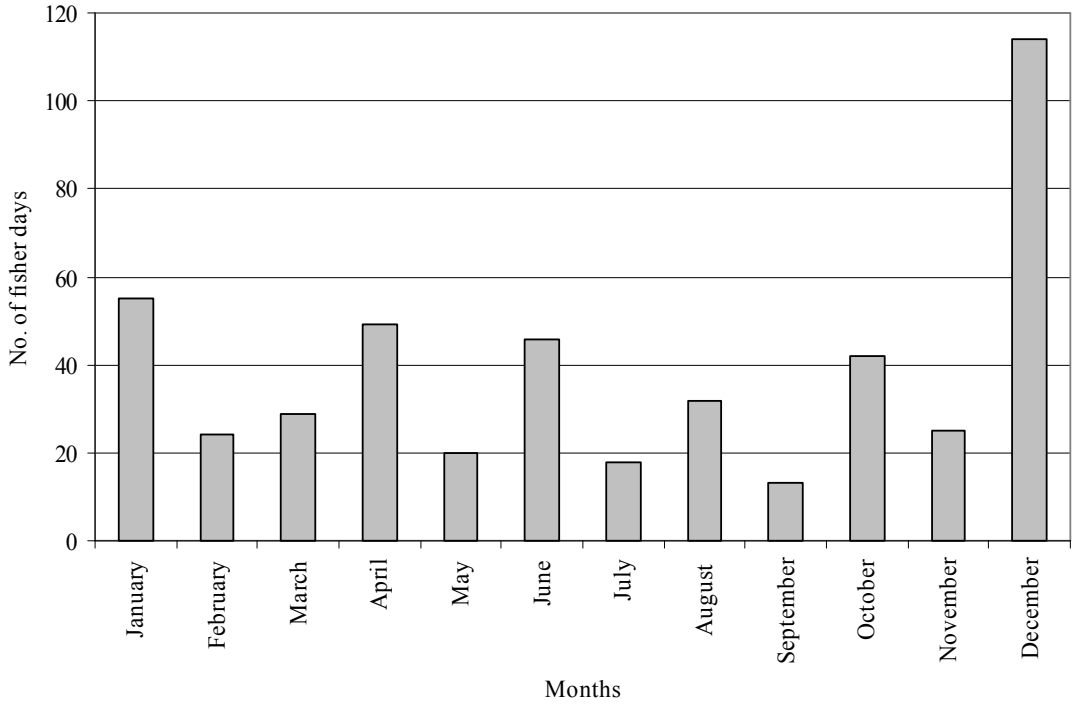


Figure 18: Seasonality of fishing trips (number of fisher days) by fishers onboard private recreational vessels in the Southland region.

3.2.2.3 Species targeted

Of these 158 private recreational vessel trips, 101 targeted blue cod. Rock lobster was targeted on 22 trips and paua on 15 trips (Table 18). The remaining species were only targeted for a few fishing trips.

Table 18: Frequency of private recreational vessel trips targeting each species

	Species targeted									
Vessel	Blue cod	Rock lobster	Flounder	Gurnard	Hapuku	Oyster	Paua	Skate	Trumpeter	Total
7	10	–	–	–	–	–	–	–	–	10
8	16	–	1	2	1	–	14	1	2	37
9	19	7	–	–	–	6	–	–	–	32
10	1	–	–	–	–	–	–	–	–	1
11	10	–	–	–	1	–	–	–	1	12
12	6	–	–	–	–	–	–	–	–	6
13	5	1	–	–	–	–	–	–	–	6
14	2	–	–	–	–	–	–	–	–	2
15	12	–	–	–	–	–	1	–	–	13
16	20	14	–	–	2	3	–	–	–	39
Total	101	22	1	2	4	9	15	1	3	158

3.2.3 Species composition and size frequency - Charter and Private recreational vessels

The most commonly harvested species by both charter and non-boat ramp private recreational vessels was blue cod with 12 310 fish reported (Table 19). This is much higher than the next most commonly harvested species, the butterfish with 1685 reported. Charter vessels also harvested high numbers of sea perch, tarakihi, and flounder. These recreational vessels also caught notable numbers of rock lobster, sea perch and flounder.

A variety of other fish and shellfish were harvested by these vessels. Charter vessels caught 24 species while private recreational vessels caught 23 species.

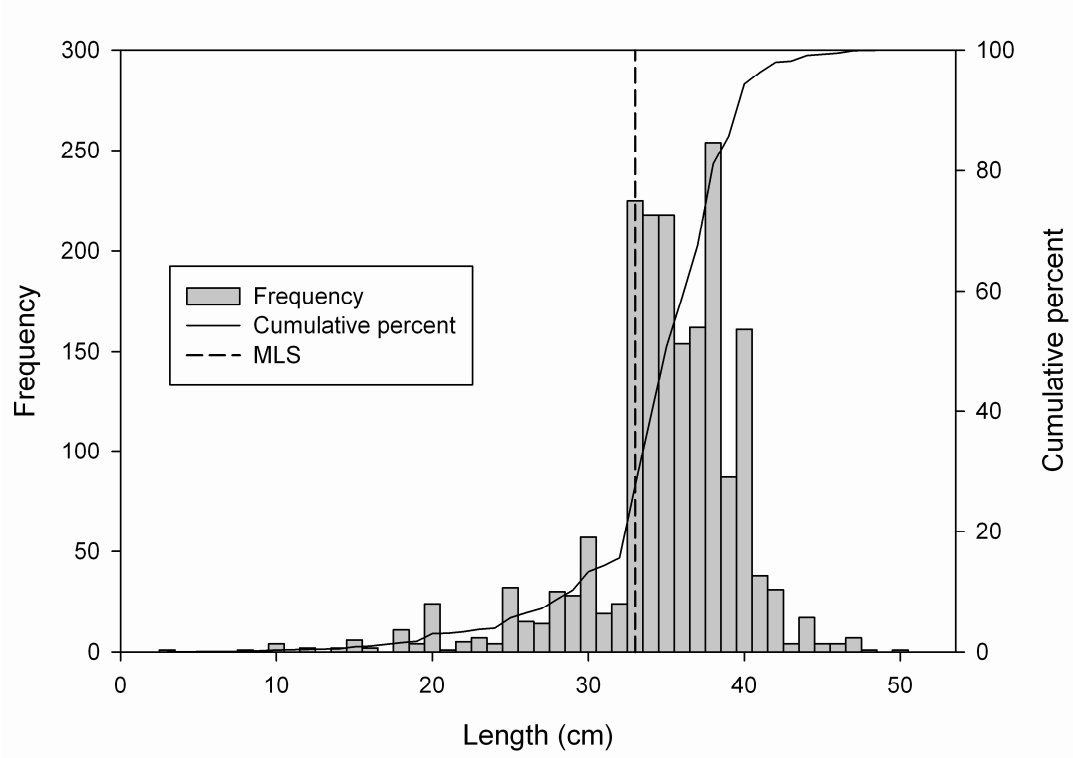
Table 19: Composition of species and number of fish harvested in the Southland region by charter and private recreational vessels filling out a logbook during the sample period.

	Charter	Recreational	Total
Blue cod	9 857	2 453	12 310
Butterfish	240	1 445	2 445
Sea perch	599	214	813
Tarakihi	392	24	416
Rock lobster	20	271	291
Flounder	136	155	291
Greenshell mussel	–	112	112
Gurnard	69	32	101
Oyster	76	2	78
Cockles	75	1	76
Kina	34	9	43
Blue mussel	25	12	37
Rig	31	1	32
Wrasse	28	2	30
Congar eel	23	1	24
School shark	–	23	23
Barracouta	18	4	22
Hapuku	–	20	20
Paua	4	12	16
Trumpeter	11	–	11
Skate	2	7	9
Red cod	8	–	8
Octopus	6	–	6
Spiny dogfish	–	3	3
Red scorpion fish	–	2	2
Warehou	–	1	1
Scallops	1	–	1
Paddle crab	1	–	1
Flatfish	1	–	1
Carpet shark	1	–	1

The charter and recreational vessel skippers were asked to measure the first 10 blue cod that were caught in a fishing trip. These measurements were for fish regardless of whether they were intended for harvest or release. A total of 1878 fish were measured from the charter vessels and 585 fish from the recreational vessels. Considering that 12 310 blue cod were caught overall from these two components the proportion of fish measured was low. The length distributions for each of these components of the fishery ranged from below 7 cm through to 50 cm (Figure

19). Both length frequency distributions peaked in the 30–40 cm length range. The recreational vessels caught a slightly greater size range than the charter vessels as about 80% of the charter vessel fish caught was within 30–38 cm whereas only about 60% of the recreational vessel fish was in this range. The mean length of blue cod caught by charter vessel fishers was 34.9 cm and for recreational vessels was 34.6 cm. Both means are above the Minimum Legal Size (MLS) of 33 cm.

a. Charter vessels



b. Recreational vessels

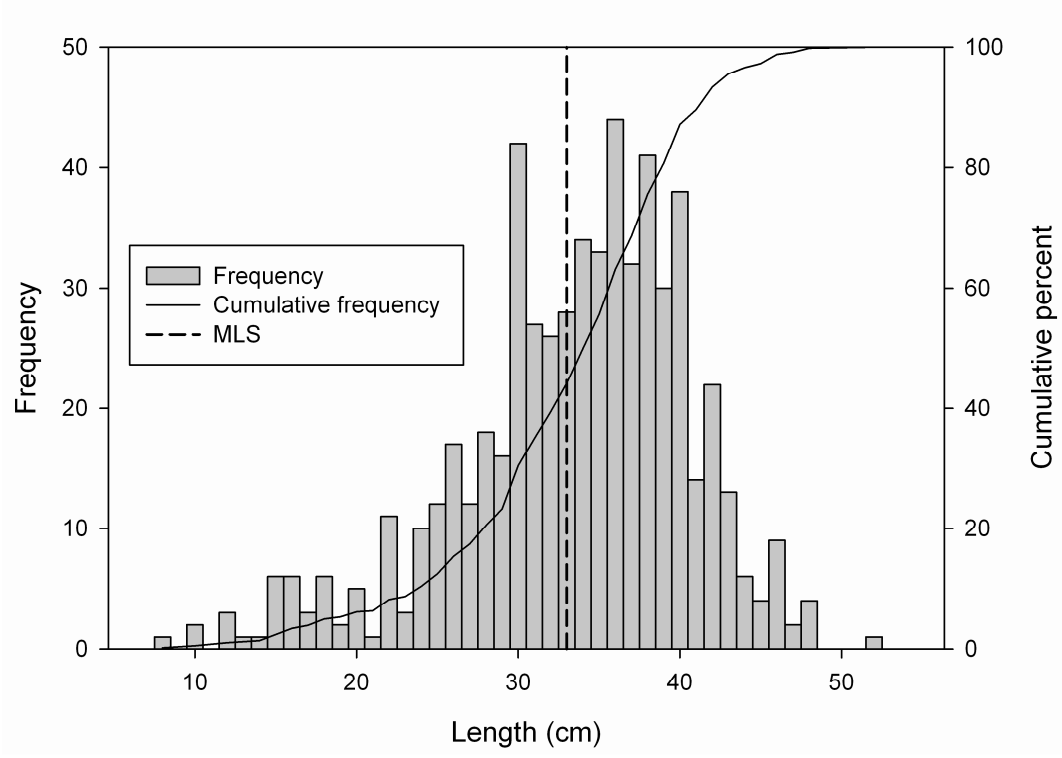


Figure 19: Size-frequency and cumulative frequency of blue cod caught by fishers onboard charter vessels (a) and recreational vessels (b) in the Southland region. Minimum Legal size (MLS) is indicated by a dashed line.

3.2.4 Harvest per unit effort (HPUE) from charter and private recreational vessels

The harvest per unit effort (HPUE) onboard the charter vessels was calculated for all methods combined (Table 20). All methods used to target blue cod came under the general method boat (hook and line) which included baited line, jigging and jig and bait. The HPUE was calculated in each area using the location information given by the fishers. HPUE ranged from 0.73 fish per hour in Paterson Inlet_2 (PI_2) to 10 fish per hour in Bluff Outer (BOS).

The overall HPUE for fishers onboard charter vessels targeting and catching blue cod was 2.1 fish per hour (overall HPUE =Total fish harvested (9857)/Total hours fished (4776)).

Table 20: Blue cod HPUE for method boat (hook and line) for fishers on charter vessels.

Code	General	Area_name	Trips	Hours fished	Fish harvested	HPUE
BHS	Southland	Bluff Harbour	1	17.5	28	1.6
BOS		Bluff Outer	1	9	90	10.0
RIS		Ruapuke Island	27	804	2530	3.2
IOS		Invercargill Outer	1	30	65	2.2
LRS	Stewart Island	Lord River	7	117	102	0.9
NPS		Northern Point	7	468	1135	2.4
PI2		Paterson Inlet_2	13	124	90	0.7
PI4		Paterson Inlet_4	29	169	150	0.9
PWS		Port William	11	243	647	2.7
SPS		Southern Point	2	88	230	2.6
HMB		Halfmoon Bay	200	2706	4790	1.8
		Total	299	4776	9857	

The HPUE for private recreational vessels was calculated for two methods: hook and line, and potting for blue cod (Table 21). Snorkelling was also used to target blue cod but there was insufficient data to calculate a HPUE as this method was only reported for trips during the survey year.

For boat (line and hook), the HPUE ranged from 0.8 fish per hour at Big Glory Bay (BGB) through to 5.2 fish per hour in Bluff Harbour (BHS). The overall harvest rate for private recreational vessels using this method was 1.7 fish per hour. (Overall HPUE =Total fish harvested (998)/Total hours fished (574)).

Table 21: Blue cod HPUE for method Boat (hook and line) for fishers on private recreational vessels.

Code	General	Area_name	Trips	Hours fished	Fish harvested	HPUE
BGB	Stewart Island	Big Glory Bay	2	13	10	0.8
HMB		Halfmoon Bay	33	375.5	521	1.4
LRS		Lord River	1	12	20	1.7
PI1		Paterson Inlet_1	6	30.5	51	1.7
PWS		Port William	7	42	97	2.3
SPS		Southern Point	3	13	23	1.8
BHS	Southland	Bluff Harbour	3	10	52	5.2
CRS		Colac, Riverton	1	12	50	4.2
IIS		Invercargill Inner	1	0.5	2	4.0
RIS		Ruapuke Island	3	29.5	80	2.7
SPI		Slope Point Inner	3	28	52	1.9
TWS		Te Wae Wae	1	8	40	5.0
		Total	64	574	998	

Pots were used on 25 trips to target blue cod. The overall HPUE was 5.1 fish per hour (Table 22) (overall HPUE =Total fish harvested (1034)/Total hours fished (202)).

Table 22: Blue cod HPUE for method Potting for fishers on private recreational vessels.

Code	General	Area_name	Trips	Hours fished	Fish harvested	HPUE
HMB	Stewart Island	Halfmoon Bay	4	19	20	1.1
SPS		Southern Point	1	6	2	0.3
CRS	Southland	Colac, Riverton	20	177	1012	5.7
		Total	25	202	1034	

3.3 Exit surveys

3.3.1 General characterisation

The Stewart Island airport and ferry terminal collection boxes received 42 exit survey returns over the twelve month period. Of these, 13 fishers reported their fishing platform as 'charter boats', and these records were discarded from the analysis as the charter operator had already reported this activity on their vessel logbook (vessel names were given on exit survey).

A private boat was recorded as the platform for 22 people and the shore was the platform for 7 people (Table 23). Baited line and snorkelling were the only two methods reported in the exit survey. Twenty of the 22 private boat fishers and all of the shore fishers used baited line.

Table 23: Frequency of methods used by fishers in the Southland region who reported their fishing by exit survey during the survey period.

	Platform		
	Private	Shore	Total
Baited line	20	7	27
Snorkelling	1	–	1
Not reported	1	–	1
Total	22	7	29

3.3.2 Spatial and seasonal characterisation

People using private boats or the shore as their fishing platform fished in a range of areas (Table 24). The majority of the trips by fishers on private boats were in the Halfmoon Bay area (HMB). Shore fishers predominantly fished in Paterson Inlet_1 (PI_1).

Table 24: Fishing platforms used in various areas in the Southland region, as reported by exit surveys.

	Platform		
Area/platform	Private	Shore	Total
Big Glory Bay	1	–	1
Halfmoon Bay	12	1	13
Northern Point	–	1	1
Paterson Inlet_1	2	4	6
Port William	2	1	3
Not reported	5	–	5
Total	22	7	29

Fishing from a private boat was most popular in January, followed by February (Table 25). Of the seven trips reported by shore fishers, four took place in December.

Table 25: Seasonality of fishing trips by fishers in the Southland region who used an exit survey to report their fishing activity in the Southland area during the survey period.

	Platform		
	Private	Shore	Total
January	11	–	11
February	8	1	9
March	1	–	1
May	–	–	0
June	1	–	1
October	1	2	3
December	–	4	4
Total	22	7	29

3.3.3 Species harvested

Fishers recording their fishing activity by means of exit survey reported harvest catches of 10 finfish species and one shellfish species (paua) (Table 26). The most frequently harvested fish was blue cod (211 fish) followed by trumpeter (18 fish).

Table 26: Composition of fish and shellfish species, and number caught and harvetsed, by fishers who recorded their fishing activity by exit surveys.

Species	No. caught
Blue cod	211
Trumpeter	18
Paua	10
Spotty	8
Barracouta	4
Wrasses	5
Tarakihi	3
Butterfish	1
Rock cod	1
Sea perch	1
Spotty dogfish	1

3.4. Recreational take from commercial Catch and Effort Landing Returns (s111 of the Fisheries Act, 1996)

There were 562 records accessed from the statistical areas 025, 027, 029, 030, 923, 924 (all within BCO 5). A total of 56 vessels were identified who used general approval to land fish in these statistical areas for non-commercial purposes. The only species landed was blue cod with a total greenweight of 10 293 kg. As these data were recorded by type of containers (box, bag, fish) and in a processed state (gutted, filleted etc) we have only reported on green-weight as the actual number of fish landed is unknown. The individual vessel catch is not shown but one vessel landed over two tonne of blue cod in the survey year, however the average weight landed per vessel was 184 kg.

4. CONCLUSIONS

The overall objective of this survey was to characterise the recreational fishery for blue cod in Southland. We reported on all aspects of this fishery, including all species targeted and caught. This involved looking at the two major sub-fisheries separately. The two sub-fisheries are the boat ramp users or the trailer boat fishery and the charter/recreational vessel fishery.

Recreational fishers were interviewed at key boat ramps (Bluff, Riverton/Colac Bay and Halfmoon Bay) when they returned from their day's fishing. The number of days surveyed was initially intended to be 96 session days at four boat ramps (Bluff, Riverton/Colac bay and Halfmoon Bay). There were many cancelations due to adverse weather however, particularly in October-November 2009, and this meant that only 82 survey sessions took place. The intended level of sampling effort was achieved at Halfmoon Bay, but a significant degree of non-random rescheduling was necessary at Bluff and Riverton/Colac Bay, where almost all interview sessions in October-November 2009 were cancelled due to poor weather (only one session took place). Our wind speed data indicated that we had surveyed during a particularly bad weather year in terms of wind strengths during the summer in comparison to the previous two years.

Interviews were conducted with 1486 fishers on 361 boats at the boat ramps. The Bluff boat ramp contributed 1052 of the interviews, which may be due to ease of road access and a larger adjacent population. Riverton/Colac Bay and Halfmoon Bay do have road access but the accessibility is much less and the adjacent population centres are much smaller. The majority of vessels using these ramps were trailer boats with only two interviews taking place with fishers onboard a charter vessel, yacht, or using a Maori permit. Three interviews also involved fishers operating from a trailered launch. Only two fishing parties refused to be interviewed, indicating a high level of cooperation and support for the survey from the local and visiting fishers. Most of the interviewed fishers claimed to have fished for 0–10 days per year, and over 800 of these fishers were from Southland or Stewart Island, indicating a locally driven recreational fishery. The avidity of fishers is likely to be largely driven by the weather conditions in the region. The gender of trailer boat fishers was predominantly male (88%) and the age groups spanned from 10–90 years old with the highest frequency being 40–49 years old.

The most commonly fished areas were between Stewart Island and the mainland, with Ruapuke Island (RIS) having the highest frequency of trips and effort (hours fished). The Colac Bay/Riverton (CRS) and Bluff Harbour (BHS) areas were also frequently fished, which is probably due to the proximity of the surveyed boat ramps. The sea and weather conditions may restrict fishers from venturing too far from the ramps, and very little effort appears to occur in the more southern and western areas of Stewart Island. As the majority of overall effort was spent targeting blue cod, fishing characteristics for this species largely reflects the general effort and spatial patterns discussed. Boat (hook and line) methods including baited line and baiting and jigging were the major methods used from trailer vessels. Again this reflects the most common method used for catching blue cod. Baited line was used in highest frequencies in Colac/Riverton (CRS) and Ruapuke Island (RIS), followed by Bluff Harbour (BHS). Dredging (presumably for oysters) and snorkelling (various target species) also occurred in the commonly fished Ruapuke Island area (RIS). The dominant species caught by fishers from trailer boats was blue cod. This species was caught ten times as often as the next most common fish species, trumpeter. The shellfish most frequently caught was oysters, an expected outcome due to the well-known Bluff oyster beds in Southland. The daily bag limit for blue cod in this region is 30 fish and our boat ramp data indicated that few individual fishers interviewed harvested 30 or more fish in a fishing trip. This shows that most fishers are not restricted by the bag limit.

Trailer boat HPUE estimates were possible for three methods used to catch blue cod. Blue cod was targeted and caught with boat (line and hook) with an average HPUE of 4 fish per hour compared to diving which had a HPUE of 8 fish per hour. The amount of data available for HPUE estimates for methods potting and diving was very limited compared to boat (line and hook) and should be interpreted conservatively. The HPUE for method boat (line and hook) was the highest at Port William (PWS) with 9.3 fish caught (and harvested) per hour. This area is on the northern side of Stewart Island.

Charter boat operators in Southland were also asked to keep a logbook. This major sub-fishery was extended to become two sub-fisheries (charter vessels and recreational vessels). The first sub-fishery, the charter logbook survey, included six participating charter operators. As this survey objective was characterisation and harvest rates (not a total harvest estimate) we did not require all operators to take part but it was disappointing that the major charter operator at Stewart Island refused to take part as it would have greatly strengthened our HPUE estimates.

Anecdotally it was estimated that this charter vessel undertook about 60% of the fishing trips. The six participating vessels returned 316 trip logs which provided data on 1910 fisher days, and almost half of these fishers were from the greater NZ region (outside Southland). One vessel was responsible for 45% of the data provided while the other five vessels provided data for 31 to 486 fisher days. All vessels used baited line and/or bait and jigging, and occasionally other methods. Baited line is logistically easy, and a reasonably successful method of catching fish for fishers, in particular for paying clients in a region where blue cod is clearly a dominant species.

The charter vessel based fishers operated in the Halfmoon Bay (HMB) area for 66% of the trips. Three of the charter vessels operated from Halfmoon Bay (HMB) and the other three from Bluff Harbour (BHS). The Halfmoon Bay charter operators were more active than the Bluff operators, perhaps reflecting tourist interest in fishing waters off Stewart Island. Only two areas in Paterson Inlet were fished by charter vessel based fishers. The majority of fishing effort (2706 hours) was for blue cod, in Halfmoon Bay (HMB), (almost 90% of the total fishing effort suggesting that this species is a highly valued recreational species). The frequency and effort of the various fishing methods in areas again reflected a similar pattern to that already discussed, with baited line in Halfmoon Bay being the clearly dominant mode and fishing location. This was not surprising as blue cod was the dominant target species here also. Charter fishing is seasonal with most effort in 2009–10 occurring between January and April. This again may be due to the greater incidence of settled weather during this period.

The second sub-fishery was private recreational vessel fishers who were also surveyed using logbooks. The recreational vessels are privately owned vessels that are moored or berthed and passengers who go fishing onboard are not paying (this is not a commercial activity). Twenty vessels agreed to take part, but only ten ultimately returned trip logs as the others recorded that they did not fish. Of the 158 trip logs returned, there were a total of 467 fisher days, of which 367 were local Southlanders/Stewart Islanders. As all vessel owners who volunteered lived in the region, this local origin dominance was anticipated and contrasted with the charter fishers who were predominantly from other New Zealand regions. Baited line was the most popular method (as with charters) but potting was also frequent from two of the vessels. This was the only sub-fishery of this survey where a method other than baited line was even slightly frequent.

The areas most commonly fished by these fishers were Halfmoon Bay (HMB) and Colac Bay/Riverton (CRS). As all operators of the recreational vessels were from one of these areas effort is likely to be driven by easy access to these areas. This sub-fishery also saw a greater amount of fishing trips and effort in Paterson Inlet (PI). Again, the close proximity to Halfmoon Bay is likely to drive this. The number of hours spent targeting blue cod reflected the overall patterns of fishing effort as blue cod was again the major target species.

The frequency of fishing each method in each area indicated that potting trips occurred from two vessels only. Potting results in high effort despite a lower number of trips due to the nature of the method. Pots are often put out overnight and are technically continuously fishing.

Seasonally the private recreational vessels fished predominantly in December. This was a shorter high season compared to the charter operators which had a high frequency of fishing trips for four months. Weather and holiday periods dictated that December was more popular for the locals, whereas fishers from greater New Zealand are likely to have booked and planned prior and charter operators may go out in less congenial conditions than a recreational vessel hence extending the fishing season. The major species targeted by recreational fishers was blue cod, which was the same as for all other sub-fisheries. However a few of the trips also targeted rock lobster.

The overall HPUE for fishers targeting blue cod onboard charter vessels was calculated for method boat (hook and line) at 2.1 fish per hour. We also calculated HPUE for each area for this sector and these values ranged from 0.7 fish per hour at Paterson Inlet to 10 fish per hour at Bluff outer (BOS). The HPUE for recreational vessels were calculated for two methods. For method boat (line and hook), the HPUE was 1.7 fish per hour and for method potting it was 5.1 fish per hour. Potting tends to have a higher effort due to the ‘deployment’ time required for the pots.

The exit surveys were intended to capture fishers who did not use charter vessels or trailer ramps, however this sector produced a small amount of data with only 42 returns. Therefore it is not a significant sector of this survey.

Recreational catch data reported on commercial Catch and Effort landing reports (Section 111 of the Fisheries Act) indicated that ten tonnes of blue cod was caught and landed in the statistical areas of interest. A HPUE was not attempted as the number of fish caught and effort (hours) spent fishing was not available from these data.

This survey was supposed to consider all of the BCO 5 Quota Management area which begins at Slope Point (Catlins), includes Foveaux Strait, Stewart Island and extends to Awarua Point on the West Coast. However, the Fiordland Management Area (FMA) from western Te Waewae Point through to Awarua Point was already surveyed in 2006 (Davey & Hartill 2010). A characterisation of the fishery, a harvest estimate and HPUE (reported as CPUE in report however did not include discarded fish and hence was actually HPUE) (blue cod and rock lobster) were produced from this region. Charter vessels, recreational vessels and fishers using trailer boats were surveyed by means of logbooks and boat ramp surveys. Similar to Southland, this survey also identified that line (boat and hook) was the most common fishing method by all sub-fisheries of the fishery. Blue cod was also the most frequent species caught, however crayfish was also commonly captured in the Fiordland region. HPUE for blue cod targeted and harvested in the Fiordland region varied between the sub-fisheries with charter vessels averaging 1.7 fish per hour and recreational vessels averaging 1.2 fish per hour. The trailer boat sub-fishery was not a significant part of the Fiordland fishery and there is very little data available that could be used to provide a HPUE estimate. Fiordland HPUE estimates were similar to those calculated for Southland, with the charter vessels having a slightly higher value at 2.1 fish per hour compared with the recreational vessels at 1.7 fish per hour. HPUE were also calculated in the 2004 blue cod survey at Stewart Island. The data used to generate this HPUE was a combination of diary surveys and exit surveys, and hence not directly comparable to the present survey. The overall HPUE for blue cod was 3.4 fish per hour which was higher than our logbook survey estimates but more comparable to our trailer boat HPUE of 4 fish per hour (when using method boat (hook) and line).

This survey has provided a characterisation of the present state of the blue cod recreational fishery in Southland. It has identified the areas fished, species caught and subsequent HPUE. The HPUE for blue cod targeted and caught using boat (line and hook) from BCO 5 (Southland and Fiordland) have been presented from the various sub-fisheries within the fishery. These values will be able to be compared with future surveys to monitor trends in the BCO 5 recreational fishery.

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DATA STORAGE

All boat ramp data and logbook data is stored in the Ministry of Fisheries Rec_data database.

Appendix 1: a. Session form for boat ramp survey.

RECREATIONAL FISHERY BOAT SURVEY FORM
SESSION INFORMATION

Page …....of…..…

Interview location: ______________________ Interviewer name: ______________________

Interview location code	Date (d d m m y y)	Session time start (24 hour)	Session time finish (24 hour)	Day type	Interviewer Initials

Day type: 1=Weekend or public holiday, 2=Weekday

Number of trailers near ramp in carpark: Start ___ Finish ___

Interview type: ___
1=Ramp
2=Beach
3=Roving boat
4=Other
5=Marina

Environmental data:

Sea conditions	Rain	Overhead conditions	Wind speed	Wind direction
1=Smooth (0.1 - 0.5m)	1=Nil	1=Sunny continuous	1=Nil	1=Nil (no wind), 6=SouthWest
2=Slight (0.5 - 1.0 m)	2=Light continous	2=Mainly sunny (<1/2)	2=Light (1-10 kts)	2=Variable, 7=East
3=Moderate (1.0 - 2.5m)	3=Light scattered	3=Mainly cloudy (>1/2)	3=Medium (11-20 kts)	3=North, 8=West
4=Rough (2.5 - 4.0m)	4=Medium scattered	4=Continuous cloudy	4=Strong (21 + kts)	4=South, 9=SouthEast
	5=Heavy rain			5=NorthEast, 10=NorthWest

Boat data:

Boat No.	Boat type	Intercept outcome	Time of Intercept (24 hour)	Boat No.	Boat type	Intercept outcome	Time of Intercept (24 hour)	Boat No.	Boat type	Intercept outcome	Time of Intercept (24 hour)
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
0				0				0			
1				1				1			
2				2				2			
3				3				3			
4				4				4			
5				5				5			
6				6				6			
7				7				7			
8				8				8			
9				9				9			
0				0				0			

Outcome codes: I = Interviewed O = Other activity N = Not intercepted R = Refused F = Fishing but refused
Z = Incomplete (ie still actively fishing)

Boat types: T = Trailer boats Y = Yachts L = Launches C = Charter boat M = Maori permit S = Surfcaster

Appendix 1 continued: b. boat form for boat ramp survey.

RECREATIONAL FISHERY BOAT SURVEY FORM

BOAT INFORMATION

Page …….of……..

Interview location code	Date (d d m m y y)	Boat no.	Page no.	Boat type	Intercept outcome	Time of intercept (24 hour)

Fisher name: ______________________ (optional)

Fisher phone: ______________________ (optional)

Fisher No.	Combo	Fishing location	Fishing method	Target species	Time start (24 hour)	Time finish (24 hour)	All the same	Time not fishing Hrs	Time not fishing Mins	Days/year	Before Y / N	Sex M / F	Age group	Resid

Residency: 1=Southland/SI, 2= South Island, 3=New Zealand, 4=Overseas

Fisher No.	Combo	Species	Length (cm)	MM if not FL	Count	Observed*

Fisher No.	Combo	Species	Length (cm)	MM if not FL	Count	Observed*

Did any of your group catch any fish that were…
...filleted (including headed fish)? = **F**
…used as bait? = **B**
…of legal size but thrown back ? = **L**
…undersized but thrown back ? = **U**
If yes to any of these, which species, how many and by which fisher ?

*Observed 1=measured 3=observed
2=counted 4=not observed

F=fish filleted L=thrown back - legal size (dead or alive)
B=fish used for bait U=thrown back - undersized (dead or alive)

Appendix 2. Logbook pages for charter and recreational vessels

Fishing vessel logbook survey

Thank you for taking part in the 2009/10 logbook survey of recreational fishing from charter/recreational/syndicate vessels in Southland. This survey is being conducted for the Ministry of Fisheries (MFish) by the National Institute of Water and Atmosphere Research (NIWA). Your data, and those of other vessels, will contribute to characterising the Southland Recreational Fishery. The data you supply will remain confidential, with results only from the combined charter fleet being reported to MFish.

1. The logbook survey runs from 1st October 2009 until 30th September 2010. During this time you should fill out the logbook each time you make a charter trip with recreational fishers to catch fish, shellfish, or rock lobsters.
2. The logbook contains permanent pages of instructions, fish codes and a map. It then contains a series of logbook pages that can be torn out. You can put up to two 'trips' on each page.
3. Please return the completed log book pages to NIWA at least every 3 month period, or more often if you wish. Use the prepaid envelopes provided.
4. Keep in touch. We will call you at least every two months, but feel free to let us know in plenty of time if you are running out of logbook pages/envelopes. Use our freephone (0800 926278) to leave a message at any time.
5. Record the total catch and fishing effort for all fishers on board, including yourself if you fished. This is important even if your clients caught nothing.
6. Please send in a three-month logbook return even if you didn't go charter fishing. Just write 'didn't go fishing' across one page and send it back. This is very important for the survey results.
7. DO NOT include any commercial fishing.
8. Examples of how the logbook should be filled out are shown on the following pages.

If you have any questions about the log book survey please contact Niki Davey (0800926278, 0800WCOAST) or 03 5457736, or email n.davey@niwa.co.nz

Filling out a trip report

What is a trip?

For the purposes of this log book survey, a trip is defined as **one** fishing event, with **one** group of fishers, using **one** method, **in one** location, at the most **one** day. This is the 'unit' you will use to record your fishing effort, catch and fish measurements.

- One day charter with a group of clients who are *eg* Bait fishing is **one** trip
- One day fishing on a private boat with a group of fishers who are *eg* Jigging fish and Extractive diving is recorded as **two** trips
- One day charter with a group of clients who Extractive dive in area RIS in the morning and Extractive Dive in area LRS in the afternoon is recorded as **two** trips.
- Two half day charters with two groups of clients who *eg* Troll with a lure is recorded as **two** trips.
- 7 day fishing trip with one group of fishers who *eg* Bait fish is **seven** trips.

Log book no: Your independent logbook number is on the front of your log book. Please put it at the top of each trip report.

Date: To be recorded as day/month/year

Locality code: Please refer to the map (back cover) for your locality code. If you fished in more than one locality in one day please record the information as separate trips.

Latitude and Longitude: This section is optional. If you could record the degrees and minutes of your locality then this would be helpful. No seconds needed.

Number of fishers: Please record all fishers on board. Include yourself if you took part. Do not include anyone who did not fish. Record Southlanders/Stewart Islanders, New Zealanders, and overseas residents in separate columns.

Hours spent fishing: Please record as precisely as possible the number of hours your clients spent fishing. Do not include travel time/food breaks/ onshore walks etc. This question is very important for the analysis.

Fishing method: Please specify which fishing method was used. If the method changes it becomes another trip report.

- BA Baited line fishing
- JI Jigging
- BJ Baited line fishing and jigging
- SC Extractive scubadiving
- SK Snorkelling
- HA Hand gathering
- TL Trolling with lure
- TB Trolling with bait
- LB Trolling with lure and bait
- PT Potting
- DR Drop Dahn Line
- LL Long lining

Target species: Please specify the main species you and your clients/group are targeting. There is a list of codes on page 6. If a code is missing please just write the name of the fish and we will assign its code when you return the data.

Species caught: Please record all species of fish/shellfish that you and your clients/group caught on the trip, using the codes on page 6. Include any fish you used for bait or that you released. Please be as specific as possible. For example, was it red cod or blue cod?

Number of fish caught: Please record the total catch of legal sized fish/shellfish by all fishers on the vessel, including yourself if you were fishing. Record separate tallies in the appropriate columns for fish kept and for fish released alive.

Measurements: Please measure the 1st 10 blue cod you catch.

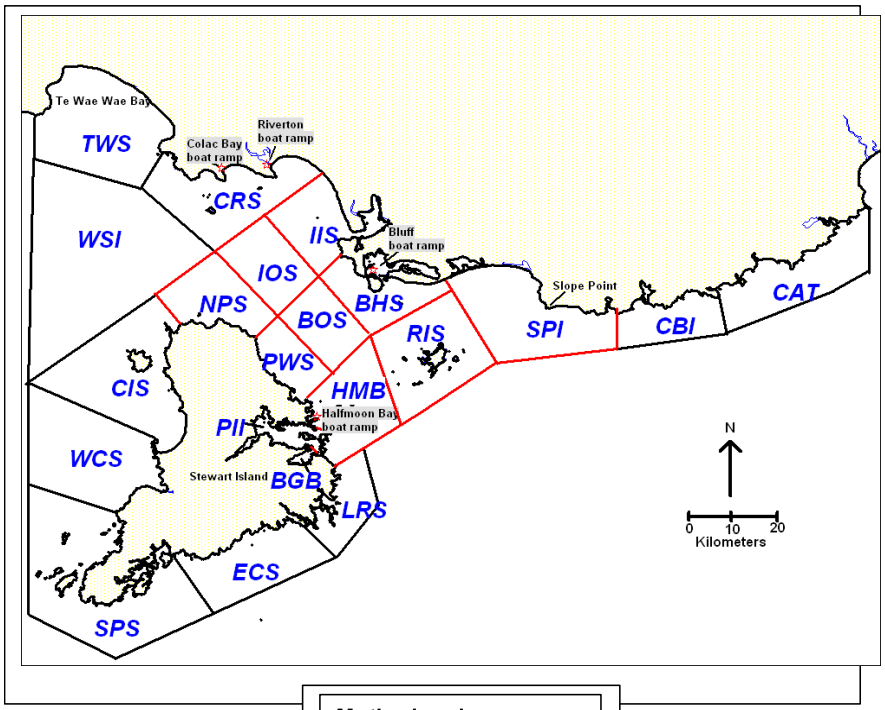
Appendix 2 continued. Logbook pages for charter and recreational vessels

Example 1. A group of 5 clients go on a one day charter out of Bluff. They spend all day inshore bait fishing for Blue Cod just off Slope Point. Two of the clients then go for a scuba dive in the same area. At the end of the day they have a mixture of Blue Cod and Sea Perch, and the divers have returned with two rock lobsters.

Log book number:	TRIP RECORD									
Date	Locality code	Number of fishers			Hours spent fishing	Fishing method	Target Species	Species caught	Number of fish caught	
		Southlander	NZ	Overseas					Kept	Released
Optional (lat)										
Optional (long)										
Blue cod-1st 10	Measurements									

Log book number:	TRIP RECORD									
Date	Locality code	Number of fishers			Hours spent fishing	Fishing method	Target Species	Species caught	Number of fish caught	
		Southlander	NZ	Overseas					Kept	Released
Optional (lat)										
Optional (long)										
Blue cod-1st 10	Measurements									

Appendix 3. Exit surveys used at the airport and the Ferry terminals.



Method codes:	
Baited line fishing	1
Scuba diving	2
Snorkelling	3
Set netting	4
Potting	5
Trolling	6
Dredging	7
Hand gathering	8
Other	9

Please return your completed questionnaire to the box provided at the airport/ferry terminal. We thank you for your co-operation. The data is confidential and no names are required.

SOUTHLAND RECREATIONAL FISHING SURVEY

NIWA (National Institute of Water and Atmosphere Research) is undertaking a survey of the recreational fishery around Southland. This project will run from 1st October 2009 until the 30th September 2010. The aim of this project is to characterise the recreational fishery of Southland, in particular focusing on blue cod. It has been identified there is a need to quantify the nature and extent of the recreational fishery and we aim to gather information on areas fished, seasonality, methods used and species caught.

As a visitor to Southland who has been fishing, we would be grateful if you could take the time to fill out the questionnaire on the reverse of this page. Please use the area and method codes given at the back of this pamphlet.

Niki Davey
NIWA Nelson
P.O. Box 893
Nelson

NIWA
Taihoro Nukurangi

Freephone: 0800 926 278

RECREATIONAL FISHERS – PLEASE FILL IN A SURVEY

Appendix 3 continued: Exit surveys used at the airport and the Ferry terminals.

SOUTHLAND RECREATIONAL FISHING SURVEY

(If you fished on more than one occasion, please fill in a separate survey for each occasion)

During your time in Southland…

Did you fish from a charter vessel? Yes ☐ No ☐

If yes, please write vessel name _____

Did you fish from a private vessel? Yes ☐ No ☐

If possible please write vessel name or length _____

Or was the fishing shore based? Yes ☐ No ☐

When did you fish? Date d d m m y y and what time of day? am ☐ pm ☐

In what area did you mostly fish? ___ (see map on front of survey)

What method did you use? ___ (see list of methods on front of survey)

Please list below the **numbers** of species caught and kept (including those used for bait), and the number of fish caught and released.

Species caught	NUMBER OF FISH kept	released

PLEASE RETURN TO BOX PROVIDED AT AIRPORT/FERRY TERMINA