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EXECUTIVE SUMMARY

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This report describes the marine amateur fishery in the Fiordland Marine Area. The surveys from which the characterisation is derived provide baseline information on the nature and extent of amateur fisheries in this area. The information provides a snapshot of the fishery which is intended for comparative monitoring in the future.

The amateur fisheries in the Fiordland Marine Area are accessed by four groups of fishers (sub-fisheries); those fishing from charter vessels, private/syndicate vessels, trailer boats, and commercial vessels fishing under a particular approval under s111 of the Fisheries Act 1996. The methods used to assess these four sub-fisheries were aerial surveys, charter boat logbooks, private/syndicate logbooks, and boat ramp surveys.

Four aerial overflights found charter vessels, private/syndicate vessels, and trailer boats in 19 out of the 21 areas in the Fiordland Marine Area. Charter vessels were seen predominantly in the southern fiords whereas private/syndicate vessels were distributed throughout the fiords.

The charter vessel logbook survey identified that this fleet fished predominantly from February to April and fishing was most frequent in coastal waters surrounding Dusky and Doubtful Sounds and off Preservation Inlet. Baited line was the most popular method for fishers on charter vessels, and the greatest effort was spent in coastal waters off Preservation Inlet. Blue cod and rock lobster were the main target species, with sea perch the most frequently caught fish and also the most frequently released fish. The highest abundance of blue cod were harvested from coastal Preservation and the highest abundance of rock lobster were harvested from coastal Dusky.

The private/syndicate vessel logbook survey suggests that this fleet fished predominantly from September through to November, and fishing was most frequent in coastal waters off Doubtful Sound. Baited line was the most popular method for fishers on private/syndicate vessels, and the greatest effort was spent potting in Preservation Inlet. Rock lobster and blue cod were the main target species and sea perch was the most commonly caught and released species. The highest abundance of rock lobster and blue cod were harvested from coastal Doubtful Sound.

The boat ramp survey identified that the number of fishers using the boat ramp at Milford Sound was higher than at Doubtful Sound, probably due to easier access and lack of DOC access concessions required here. Rod and line was the most common fishing method by fishers using both ramps and most fishing effort was for blue cod. The most commonly caught species was blue cod which was predominantly taken from coastal Milford. About 70% of the caught and released catch was sea perch (Jock Stewart).

Commercial vessels fishing under a particular approval under s111 of the Fisheries Act 1996 were not a significant sub-fishery. Nine vessels reported taking 729 kg of fish over the survey period, of which only 590 kg could be confidently assigned to the Fiordland Marine Area given the coarse resolution of this reporting system.

A second objective of this research was to monitor changes in amateur catch rates of key fish species. This study identified three fisheries that potentially provide sufficient data to enable harvest per unit effort analysis (baited line, potting, and extractive diving from charter boats and other concession holding vessels). Catch rates for blue cod targeted and harvested by baited line averaged 1.7 fish per hour for charter vessels and 1.2 fish per hour for private/syndicate vessels. Rock lobster targeted and

harvested with pots had an overall catch rate of 0.9 fish per hour by charter vessels and 0.3 fish per hour by private/syndicate vessels. Rock lobster targeted and harvested by extractive diving had a catch rate of 3.6 fish per hour by charter vessels and 2.3 fish per hour for private/syndicate vessels.

Any future monitoring should focus primarily on the charter boat fleet as they are the predominant source of harvesters in this region. This trend is likely to continue as charter vessel operators tend to maintain their concessions over the long term. The success of such programmes, however, will be highly dependent on fisher participation. Blue cod and rock lobster are the only two species caught in sufficient numbers to enable ongoing monitoring.

1. INTRODUCTION

Fiordland offers a variety of fishing opportunities within the very special environment of the fiord waters and adjacent coastline. Commercial fishing has always been important in Fiordland and is excluded from internal (fiord) waters. Anecdotal reports and this research suggest that the area has become increasingly popular for amateur fishing.

In 1995, concerns about the use and sustainability of marine resources led to the establishment of the Guardians of Fiordland Fisheries and Marine Environment Incorporated (later the Fiordland Marine Guardians, "the guardians") who wished to preserve the quality of the 'Fiordland experience' for future generations (Guardians of Fiordland's Fisheries and Marine Environment Inc. 2003). The new management regime created two distinct fishing areas within the Fiordland Marine Area; the internal waters of Fiordland and the outer waters of Fiordland. As part of the gifts and gains process that characterised the Guardians' strategy development, commercial fishers agreed to stop fishing within the internal waters and amateur fishers agreed to take a bag limit reduction. Also blue cod fishing has been limited due to a closure of this fishery in Doubtful and Milford Sounds since 30 June 2005 (initially for a period of two years, the closures were extended in 2007 to 29 June 2009).

There are many sub-fisheries in the Fiordland amateur fishery. They include charter vessels from within and outside Fiordland, syndicate vessels owned by groups of people, private amateur vessels that remain berthed or moored, trailer boats that use the boat ramps at Milford and Doubtful Sounds, and commercial operators who take an amateur catch under s111 of the Fisheries Act 1996 general or particular approval. It has been generally thought that the main amateur fishing areas in Fiordland are Milford and Doubtful Sounds; however, the degree to which amateur fishing has spread to the other fiords is unknown.

This survey collects baseline information on the nature and extent of amateur fisheries within the Fiordland Marine Area. The information provides an initial snapshot of the fishery that can be used for comparative monitoring in future years, so that the impact of management (e.g. closed areas, fish accumulation changes, bag limits) on amateur fisheries can be assessed.

The first objectives of this research are to determine areas fished, species targeted and caught, and methods used in the main amateur fishing areas in Fiordland. The second objective is to monitor changes in amateur catch rates of key amateur species.

2. METHODS

The Fiordland Marine Area extends 12 nautical miles from the coast and includes the area from Awarua Point to Sand Hill Point (west of Te Waewae Bay) (Figure 1). For this survey we maintained the same boundaries already established by the Fiordland Marine Guardians (Guardians of Fiordlands's Fisheries and Marine Environment Inc. 2003). The boundaries divide the FMA area into inner and coastal strata areas. This resulted in 13 inner areas and 8 coastal areas.

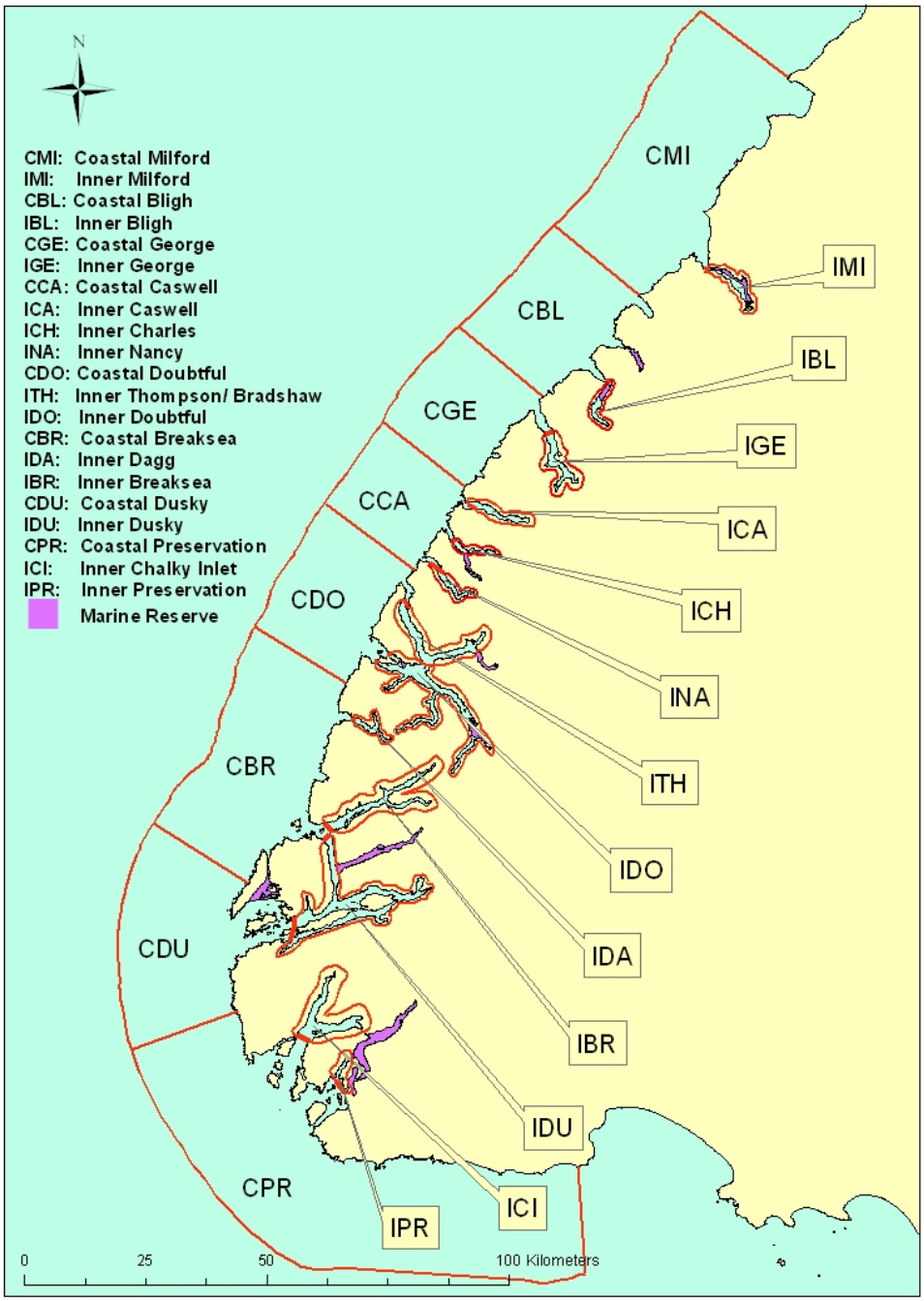

Figure 1: Map showing the Fiordland Marine Area and the boundaries of the fishing strata areas used for the aerial, logbook, and boat ramp surveys.

Objective 1. Determining areas fished, species targeted and caught, and methods used.

The first objective of this programme was to characterise amateur fisheries in the Fiordland area. The various sub-fisheries in the Fiordland fishery must be considered in turn, as there is no single unified way of monitoring them collectively. Preliminary enquiries identified four sub-fisheries to be addressed: charter boats, private/syndicate vessels, trailer boats, and amateur harvests taken from commercial fishing vessels. Characterisations of these sub-fisheries were achieved using four methods; aerial survey, a vessel logbook survey, a boat ramp survey, and analysis of MFish catch effort data.

Aerial surveys

Because of the broad geographical extent and relatively low density of amateur fishing effort in the Fiordland Marine Area, an overview was required to provide a snapshot of the fishery. The purpose of these flights was to determine the relative levels of fishing effort in different parts of Fiordland, by different types of fishing vessels (charter vessels, private/syndicate vessels, and trailer boats). This provides a means of assessing the relative importance of the three fishery components, and gives us an idea of the relative level of fishing in the various areas.

Four days (weekend/public holiday) that were assumed to be of high amateur use were preselected for the survey. Weather forecasts were monitored leading up to the survey dates and if adverse weather conditions were predicted, survey dates were rescheduled to the next most suitable day. Only popular amateur fishing days with good weather were flown, providing us with the best possible view of the overall fishery given the resources available.

A Hughes 500 helicopter was used for the surveying, due to the advantages of this aircraft type over fixed wing aircraft in this steep mountainous environment. The aircraft was flown at between 500 and 1000 feet during the survey, except when crossing ridges between different fiords. The observer was chosen for the survey for his knowledge of Fiordland and his familiarity with locally operated vessels likely to be encountered during the survey. The pilot acted as secondary observer who communicated with the primary observer when a vessel was sighted on the pilot's side of the aircraft.

The route flown was at the discretion of the pilot providing the observer was happy that all areas of interest were covered. Maps of each of the 21 survey areas were carried by the observer who recorded the time in and out of each area, vessel types observed, and vessel locations. Environmental conditions on the day (wind direction, wind speed, precipitation) were also recorded.

As with previous aerial surveys recently undertaken by NIWA, vessels were classified as categories trailer boats (usually outboard-powered and of trailerable size), yachts, private/syndicate vessels, charter vessels, kayaks and diving boats (Hartill et. al. 2007, Davey et. al. 2007, 2008). Each of these categories have different catching capacities, fishing ranges, and weather tolerances therefore it is useful to identify each category separately. Any vessels that were underway or deemed to be commercial fishing vessels were ignored, as were boats that were obviously not involved in any fishing activity, such as moored or unattended craft. Vessels were to be recorded as fishing if there was doubt as to whether they were fishing. No yachts or kayaks were observed fishing, although it is probable that this will have occurred at some stage during the year.

Charter vessel fishery logbook

Preliminary enquiries suggested that charter vessel fishing was the main source of amateur fishing effort in Fiordland. All charter vessel operators were approached before the start of the survey and encouraged to take part in a year long logbook programme. The logbook was designed in consultation with the Guardians and charter vessel operators to ensure it was as user-friendly as possible (Appendix 1). Each logbook consisted of:

- a map delineating strata areas within Fiordland
- a list of species and method codes
- a daily activity sheet where the operator was asked to record number of fishers, fishing effort, target species, fish harvested, and fish released. We also asked for size measurements of blue cod, groper, and sea perch.

Operators were asked to record these data at the group level to keep it simple, and to encourage continuing participation. Every three months a phone call was made and a letter sent to all operators asking them to send back completed trip reports. The programme was highly reliant on the cooperation of vessel operators for these data and the Guardians were asked to encourage operators to send back their data.

The returned data were groomed, checked, and entered into Microsoft Excel and Access databases. Any immediate problems were followed up by contacting the charter operators. Summaries of the data were then made.

Size frequency data of harvested blue cod, groper, and sea perch are not presented here. The data provided were variable in quality as only a few operators completed this section of the logbook. Also, some of those operators that did carry out size measurements acknowledged that it was a subset of the fish they had caught. The reliability of these data is hence questionable as the operators may have measured only the largest fish, or the first few fish caught.

Private/syndicate vessels logbook

Private/syndicate boats are non-charter displacement vessels, which hold a concession to fish in the Fiordland Marine Area. Syndicate boats are vessels owned by several individuals, and these vessels are often ex-commercial fishing vessels. All concession vessels were sent logbooks identical to those used by charter boat operators, although many returned them and stated that they had no intention of fishing in Fiordland in the coming year.

Trailer boat ramp survey

The most cost-effective means of sampling this sub-fishery is to conduct surveys at commonly used access points such as boat ramps. There are only two public boat ramps in Fiordland; one at Doubtful Sound and the other at Milford Sound. Boat ramp interviews were conducted during summer months only, over two seasons (October 2006 to April 2007 and October 2007 to April 2008). Preliminary enquiries suggested that there was very little traffic at boat ramps during the winter months, especially at Doubtful Sound. Therefore winter interviewing was not considered cost-effective.

Boat ramp interviewing was scheduled over 24 days in each summer season, with 16 days falling on weekend and public holidays when most of the fishing was likely to occur (Table 1).

Table 1: Sample design for the boat ramp survey at Milford and Doubtful Sounds over the summer periods of 2006–07 and 2007–08 (October to April).

Temporal strata	No. of available days in strata	Days sampled	Sampling intensity
Midweek days	134	8	0.060
Weekends/holidays	78	16	0.205

Survey days were randomly preselected. This ensured the data were temporally representative, and scheduled in advance for the boat ramp workers. The interviewers were stationed at the two ramps for 8 hours, ending at dusk, when most fishers are likely to return to the ramp. The format of all

interviews followed that of previous boat ramp surveys (Hartill et. al. 2007, Davey et al. 2008) (Appendix 2), to provide information on catch and effort by fisher, fishing method, areas fished, and boat type. These data can potentially be used to determine where fishing took place, at what time, which methods were used, and which fish were caught by each fisher. Interviewers measured as many fish as possible, but the limited number of fishers encountered, and the fact that much of the landed catch was already processed meant that few length measurements were available for each species.

Commercial vessels fishing under s111 of the Fisheries Act 1996 (general and particular approvals)

Amateur fishing may also occur when commercial fishers operating in the Fiordland Marine Area land a recreational catch. To do this they are required to apply for either a general approval (a permit which lasts one year) or a particular approval (where the vessel is deregistered for a specified period of time). The fisher must land and record this catch. Unfortunately, it is not possible to get specific fishing areas to a finer scale from this data.

For vessels with general approval, it was possible to extract the information from the MFish database. This provided us with:

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

For operators applying for particular approval, a fax system was set up encouraging them to record their catch and fax it back to NIWA (Appendix 3). This relied on the cooperation of the commercial fisher.

The data were then summarised (in tabular form) looking at the number of commercial fishing vessels with general or particular approval, the number that fished over the one year survey period, the species caught, the weight of each species, and the overall amateur take from this sector.

Objective 2. Monitoring catch rates

The methods used to monitor catch rates were the same as those used in the sections on charter vessel fishery and private/syndicate vessel. Sufficient data were available from two of the fishery components assessed: logbook data supplied by charter boats and private/syndicate vessels (fishing effort, number of fish caught and number of trips in each area) were used to produce a harvest per unit effort (HPUE) estimates for each area. Catch rates of the most frequently used fishing methods and the major species targeted and caught by this method are calculated.

3. RESULTS

Aerial surveys

The first survey day was in early summer (19 November 2006) (Figure 2). Only four trailer boats were seen fishing. Other vessels such as charters and syndicates were seen in the Fiordland Marine Area, but as they were not actively fishing at the time of flying they were not counted in the survey.

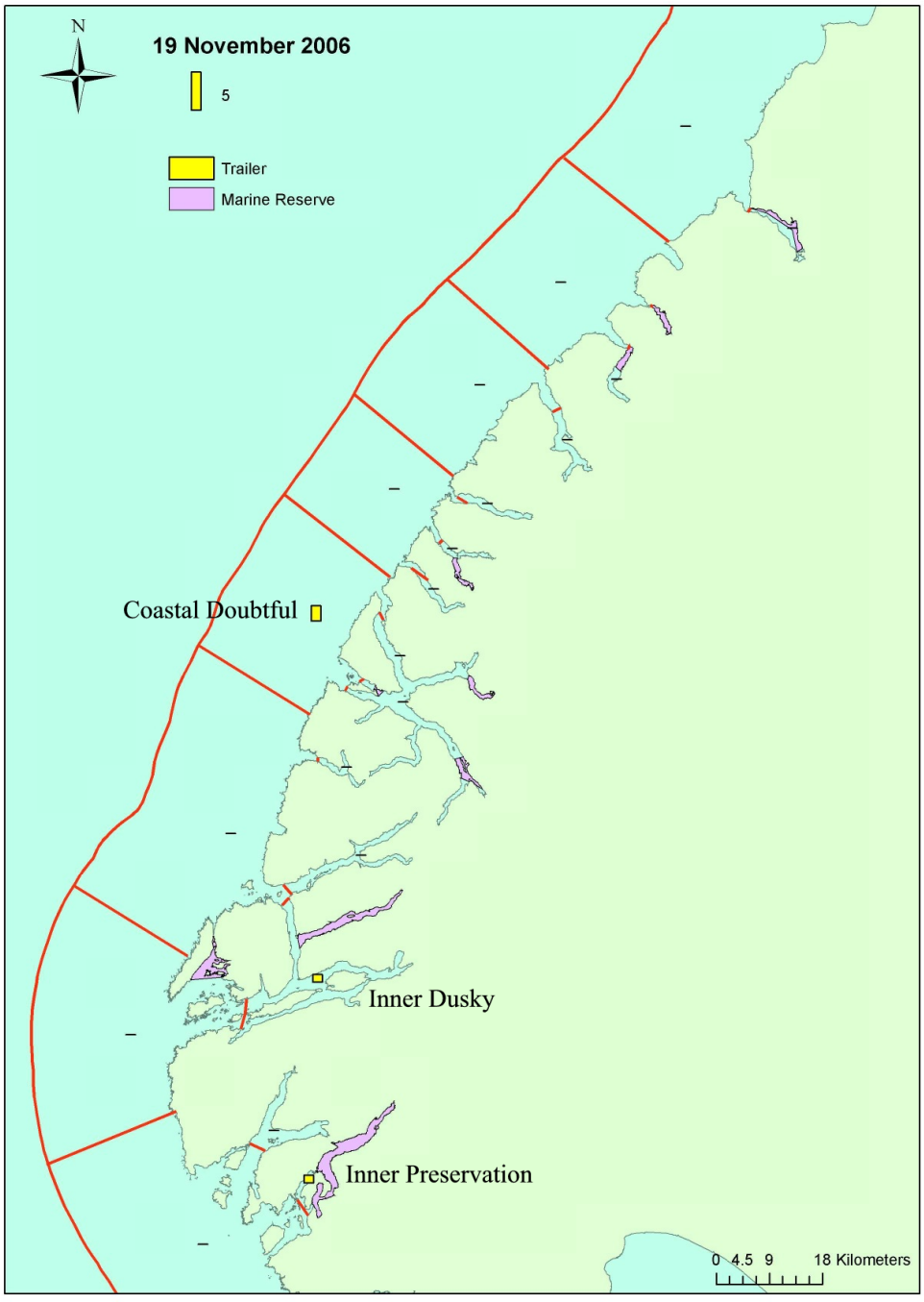

Figure 2: Aerial survey on the 19 November 2006. Types of fishing activity are indicated in the key.

The second survey was on 2 January 2007, in the height of the summer holiday season (Figure 3). Trailer boats were seen predominantly around Milford Sound (boat ramp location) with a few seen as far south as coastal Bligh. Trailer boats were also seen in inner Doubtful and inner Breaksea Sounds. Fishing from charter vessels was also observed in the southern fiords (Dusky Sound).

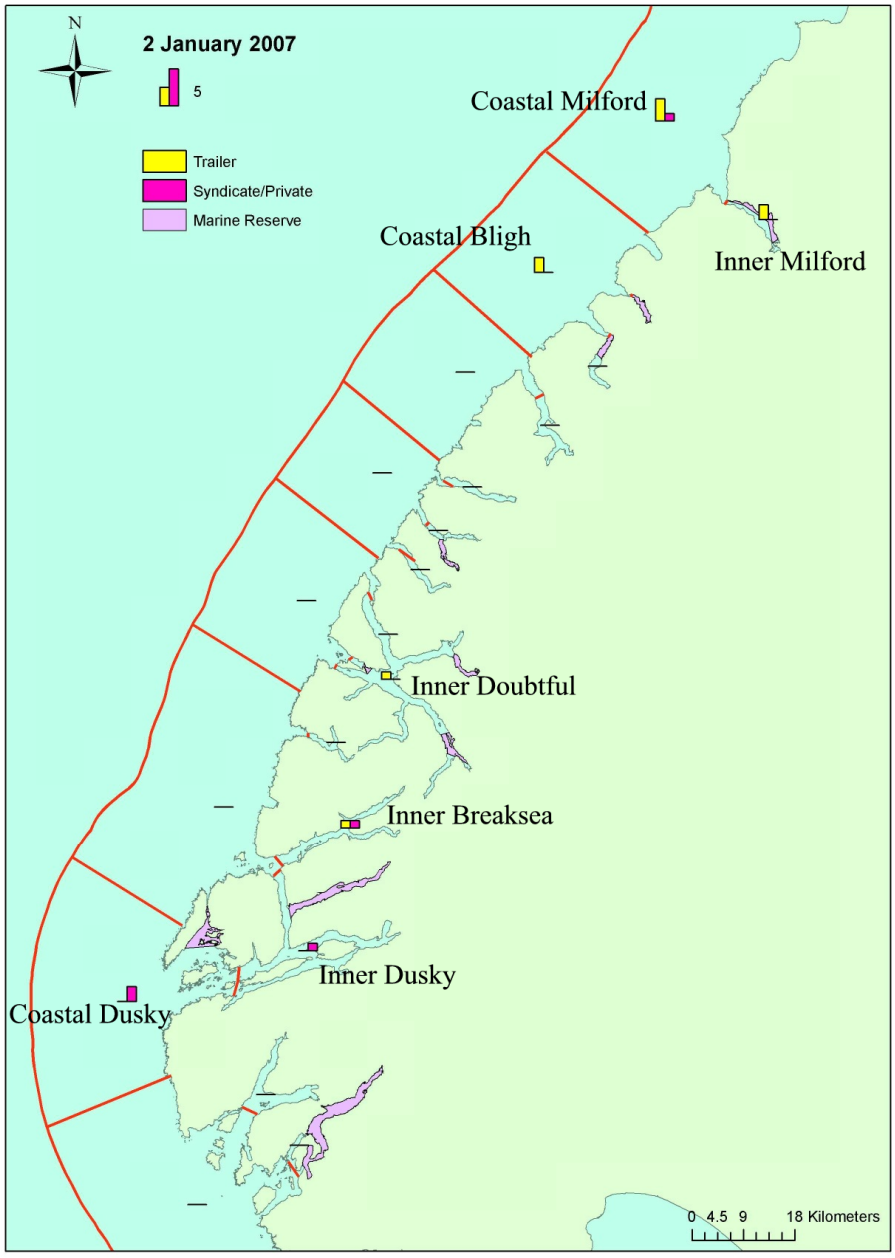

Figure 3: Aerial survey on 2 January 2007. Types of fishing activity are indicated in the key.

The third aerial survey day occurred two days before Waitangi Day (4 February 2007) (Figure 4). All four categories of fishing were observed. Charter vessel fishing was predominant in the southern fiords, with one vessel seen in coastal Doubtful. Trailer boats were seen in Milford and Doubtful (near ramps) and also in inner George, Breaksea, and inner Nancy Sound.

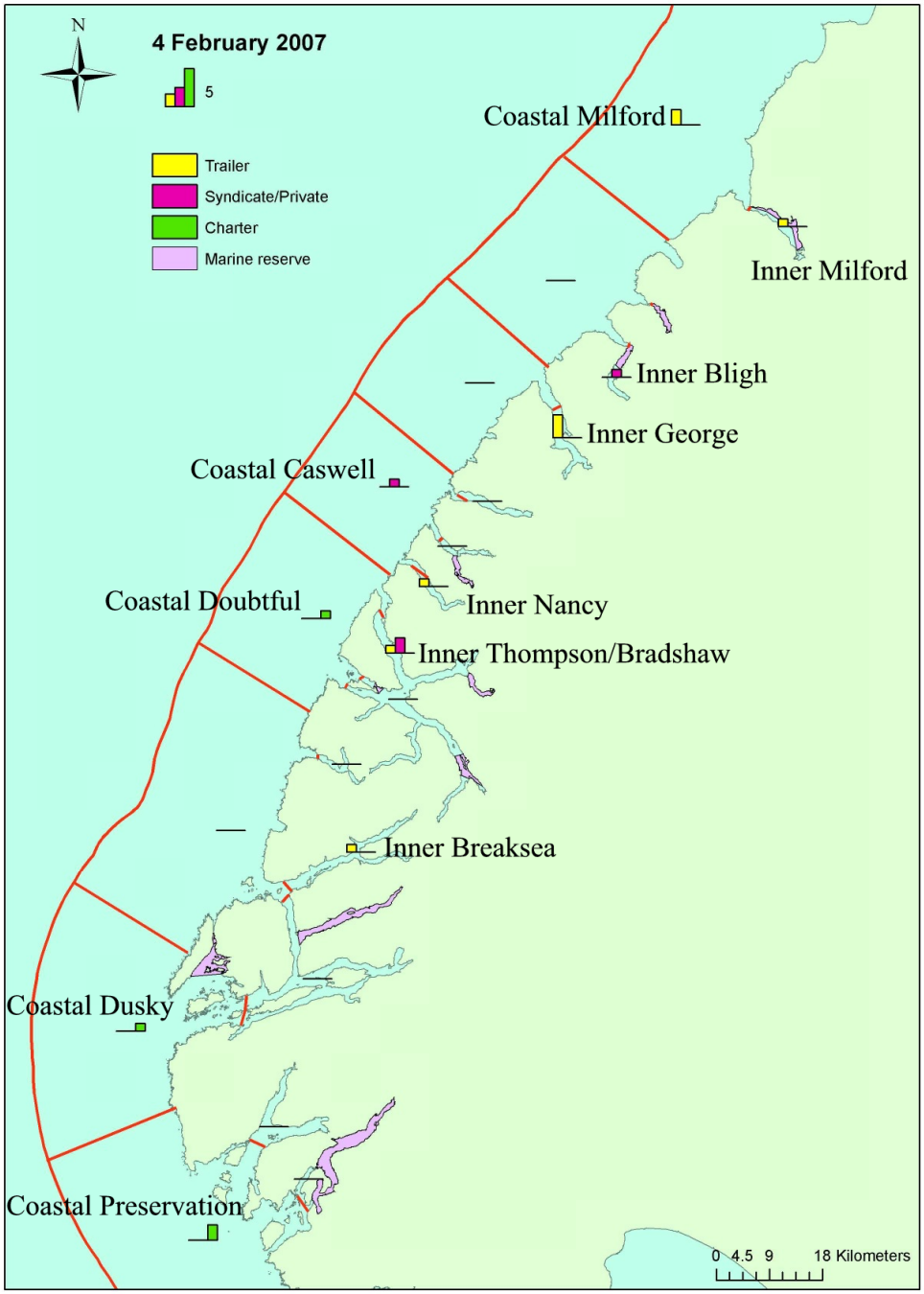

Figure 4: Aerial survey on the 4 February 2007. Types of fishing activity are indicated in the key.

The final aerial survey day was on Saturday, 7 April (Easter), which also coincided with the roar (the peak breeding season for deer) (Figure 5). This survey had the highest number of trailer boats seen, with 18 observed in the Doubtful Sound area. There were a high number of trailer boats fishing offshore in the northern fiords. Trailer boats were also seen fishing in the inner Charles, Bligh, and Milford Sound areas. Charter vessels and launches (either private or syndicate operated) were predominantly in the southern fiords.

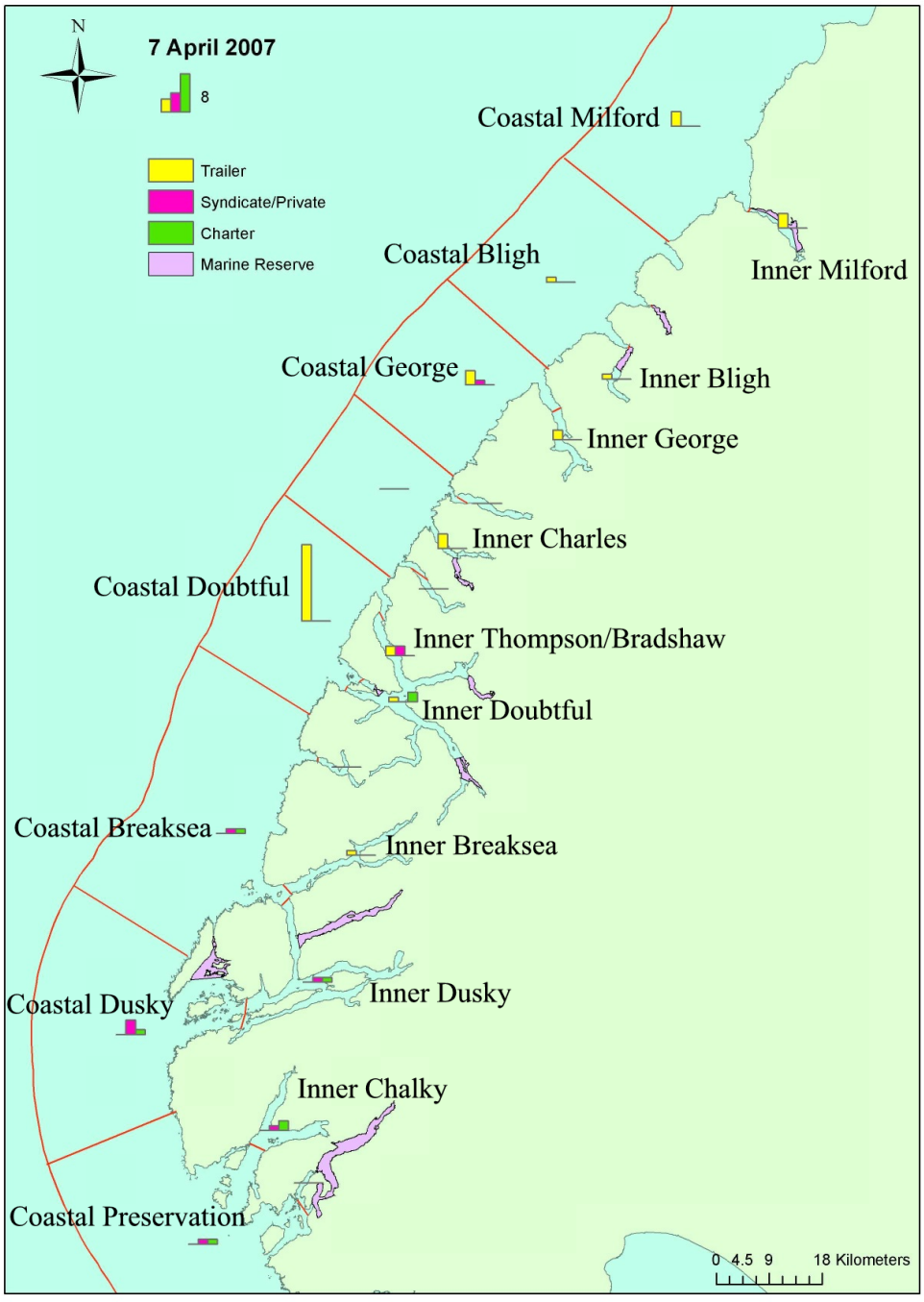

Figure 5: Aerial survey on the 7 April 2007. Types of fishing activity are indicated in the key. Note the key differs in scale from previous three figures.

The levels and types of fishing observed on these days were variable, therefore, the results are best viewed collectively (Table 2). The overall intensity of daily fishing effort is low compared to much of New Zealand's coastline. Charter boat and private/syndicate fishing was more common in the southern fiords. Surprisingly, trailer boat fishers were observed throughout the study area, especially on the open coast and often at some distance from boat ramps.

Table 2: Total number of each vessel type observed during four overflights of the Fiordland Marine Area.

Area	Charter boats	Private/syndicate	Trailer boats
Coastal Milford	1	–	8
Inner Milford	–	–	6
Coastal Bligh	–	–	3
Inner Bligh	–	1	1
Coastal George	–	1	3
Inner George	–	–	5
Coastal Caswell	–	1	–
Inner Caswell	–	–	–
Inner Charles	–	–	3
Inner Nancy	–	–	1
Coastal Doubtful	1	–	18
Inner Thompson	–	4	3
Inner Doubtful	2	–	2
Coastal Breaksea	1	1	–
Inner Dagg	–	–	–
Inner Breaksea	1	–	3
Coastal Dusky	4	3	–
Inner Dusky	2	1	1
Coastal Preservation	3	1	–
Inner Chalky	2	1	–
Inner Preservation	–	–	1
Total	17	14	58

The intensity and distribution of fishing effort will partly reflect the selection of flight dates, which intentionally coincided with good weather. Nonetheless, it is evident that fishing can take place throughout the Fiordland Marine Area, which should be taken into consideration when assessing the following results. For example, boat ramp interviewing took place at Milford and Doubtful Sounds, but trailer boats were observed some distance from these access points. It is possible that at least some of these smaller vessels were associated with larger craft such as tenders.

The charter vessel fishery

The following section summarises the trip log information from the 11 charter vessels that have a Fiordland Marine Area charter vessel concession. Trip logs and associated catch information was received from 9 of the 11 charter vessels. To protect the identity of the vessels, only logbook numbers are reported from hereon. A trip log (or trip) is defined as a single fishing event, by a group of fishers, using one method, in one area, on one day. The results are presented at either the group level (trip log frequency) or at the individual fisher level (effort).

The vessels allocated logbooks 3 and 18 did not return any trip log data. As we were calculating a harvest estimate, we needed a complete set of all vessel fishing trips. Trip log information and associated catch from the vessels was extrapolated from what information we could gather. In the

case of vessel logbook 3, information was available on departure dates, length of fishing trips, and numbers of fishers onboard the vessel. This was available from the helicopter pilot who transported these customers in and out of the FMA area. Information was also available on the catch taken during two of the trips. We had to assume that such catch characteristics are representative of all trips for this vessel.

Minimal data were also received from logbook 18. This included approximate timing (months) when trips took place, approximate number of fishers on board, and approximate numbers of species harvested. Actual areas where the trips took place are approximated from local knowledge of these vessels behaviour. Data for logbooks 3 and 18 are termed "Estimated (3)" and "Estimated (18)" hereon.

Charter vessels reported a total of 687 trip logs and, including the estimated data, resulted in a grand total of 1069 trip logs (Table 3). The number of trip logs reported from each charter vessel ranged from a minimum of 2 through to 352. Charter vessel logbook 3 had 2103 fishers onboard which is almost half the total fishers using charters and half the total trips. While this charter vessel is considered 'estimated' as they did not report data through logbooks, the number of people onboard was known (see above sections).

Table 3: Total number of trip logs and total number of fishers onboard each vessel as reported per charter vessel in the Fiordland Marine Area over the survey period. The estimated data are from sources other than logbooks.

Logbook	Total trips reported	Total number of fishers
1	66	275
2	205	813
5	133	473
25	73	455
26	30	263
27	106	479
28	24	126
29	2	24
30	48	232
Total (reported)	687	3 140
Estimated (3)	352	2 103
Estimated (18)	30	180
Total	1 069	5 423

Seasonality of charter boat effort

Charter boat fishing is seasonal (Table 4). The most frequently fished month was April, followed by February and then March. Although most fishers were New Zealand residents, appreciable numbers of fishers came from overseas, more so in the summer months (Table 4). Although there is information available on the timing of trips associated with vessel logbooks 3 and 18, the origin of those fishers is unknown. An overall total of 1982 New Zealand fishers and 1158 fishers from overseas fished in Fiordland over the survey period (logbooks 18 and 3 not included). A total of 5423 fishers (including estimated data) fished from charter vessels over the survey period (October 2006 to October 2007).

Table 4: Seasonality of fishing trips and origin of fishers (New Zealand residents and visitors from overseas) fishing from charter vessels in the Fiordland Marine Area during the survey period. Numbers denote the number of fishers. The estimated data are from sources other than logbooks.

Origin	January	February	March	April	May	June	July	August	September	October	November	December	Total
NZ fishers	251	442	309	570	77	31	37	24	25	93	100	23	1 982
Overseas fishers	221	226	206	52	17	6	8	8	70	45	161	138	1 158
Total (reported)	472	668	515	622	94	37	45	32	95	138	261	161	3 140
Estimated (3)	245	348	395	360	–	–	–	–	–	285	374	96	2 103
Estimated (18)	–	–	90	90	–	–	–	–	–	–	–	–	180
Total fishers	717	1 016	1 000	1 072	94	37	45	32	95	423	635	257	5 423

Areas fished by charter vessels

The areas of the Fiordland Marine Area that were fished most frequently by the charter vessel fleet were coastal Dusky, coastal Doubtful, and coastal Preservation (Table 5). 80% of the charter fishing trips took place on the open coast and four vessels did the bulk of the fishing.

Table 5: Areas fished by charter boats in the Fiordland Marine Area. Numbers denote the number of trips where fishing took place in an area. Coastal areas are listed at left, inner fiord areas at right. The estimated data are from sources other than logbooks.

	Coastal								Inner								
logbook/area	Bligh	Breaksea	Caswell	Doubtful	Dusky	George	Milford	Preservation	Bligh	Breaksea	Chalky	Dagg	Doubtful	Dusky	Preservation	Thompson	Total
1	–	3		11	13	–	–	–	–	2	–		10	17	–	10	66
2	–	7	5	112	6	–	–	–	–	4	–	1	20	3	–	47	205
5	–	–	–	75	–	–	–	–	–	–	–	–	33	1	–	24	133
25	2	22	1	4	31	1	–	–	1	–	–	–	2	9	–	–	73
26	–	–	–	–	–	–	–	30	–	–	–	–	–	–	–	–	30
27	–	–	–	–	–	–	–	77	–	–	24	–	–	–	5	–	106
28	6	4	3	–	5	5	1	–	–	–	–	–	–	–	–	–	24
29	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	2
30	–	7	–	4	32	–	–	–	–	–	–	–	–	5	–	–	48
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Total (reported)	9	43	9	206	87	7	1	107	1	6	24	1	65	35	5	81	687
Estimated (3)	–	35	–	35	211	–	–	71	–	–	–	–	–	–	–	–	352
Estimated (18)	–	7	–	8	8	–	–	7	–	–	–	–	–	–	–	–	30
Total (no. trips)	9	85	9	249	306	7	1	185	1	6	24	1	65	35	5	81	1 069

The total effort (number of hours) fished in each area (fisher hours) from each charter vessel is given in Table 6. The most intensively fished area was coastal Preservation, and this effort was largely by three vessels (26, 3, 18). Coastal Dusky also had high effort of which one vessel (3) was largely responsible. Of the inner areas, Thompson had the highest fishing effort and much of this was from one vessel (2).

Table 6: Total effort (hours spent fishing) by area and charter vessels. The estimated data are from sources other than logbooks.

	Coastal								Inner								
logbook/area	Bligh	Breaksea	Caswell	Doubtful	Dusky	George	Milford	Preservation	Bligh	Breaksea	Chalky	Dagg	Doubtful	Dusky	Preservation	Thompson	Total
1	–	28	–	32	113	–	–	–	–	35	–	–	58	63	–	49	376
2	–	48	10	581	44	–	–	–	–	19	–	2	53	7	–	255	1 018
5	–	–	–	254	–	–	–	–	–	–	–	–	98	3	–	70	425
25	48	377	8	42	571	16	–	–	16	–	–	–	9	40	–	–	1 127
26	–	–	–	–	–	–	–	1 698	–	–	–	–	–	–	–	–	1 698
27	–	–	–	–	–	–	–	668	–	–	246	–	–	–	65	–	978
28	49	66	21	–	50	48	3	–	–	–	–	–	–	–	–	–	235
29	30	–	–	–	–	12	–	–	–	–	–	–	–	–	–	–	42
30	–	35	–	88	338	–	–	–	–	–	–	–	–	45	–	–	506
Total (reported)	127	552	39	996	1 115	76	3	2 366	16	54	246	2	218	158	65	373	6 404
Estimated (3)	–	448	–	169	2 704	–	–	1 570	–	–	–	–	–	–	–	–	4 891
Estimated (18)	–	90	–	38	102	–	–	1 085	–	–	–	–	–	–	–	–	1 315
Total effort	127	1 090	39	1 203	3 921	76	3	5 021	16	54	246	2	218	158	65	373	12 610

Fishing methods used from charter boats

The most frequent fishing methods used by the charter vessel fishers were baited line fishing with 693 trip logs reported (Table 7). This was a total of 65% of the trips. Next most frequent methods were extractive diving with 221 trip logs and then potting with 124 trip logs (21 % and 12% respectively).

Table 7: Frequency of methods used by fishers operating from charter vessels operating in the Fiordland Marine Area during the survey period. Frequency is defined as the number of trips in which the method was used. The estimated data are from sources other than logbooks.

Logbook	Baited line	Baited and jigging	Drop dahn line	Hand gathering	Long lining	Potting	Extractive diving	Trolling-lure	Total
1	31	–	–	–	–	7	28	–	66
25	44	–	1	2	–	–	26	–	73
26	22	–	–	6	–	–	2	–	30
27	64	1	2	–	1	1	37	–	106
28	14	–	–	–	–	–	7	3	24
29	2	–	–	–	–	–	–	–	2
30	10	14	–	–	–	–	24	–	48
Total (reported)	487	16	3	8	1	36	133	3	687
Estimated (3)	176	–	–	–	–	88	88	–	352
Estimated (18)	30	–	–	–	–	–	–	–	30
Total (no. trip logs)	693	16	3	8	1	124	221	3	1 069

% of trips	65	1	0	1	0	12	21	0										

When looking at method and area combinations, the most common form of fishing was bait fishing in coastal Preservation, followed by coastal Doubtful, and then coastal Dusky (Table 8). Baited line had the highest effort overall with over 5000 hours fished in total. Extractive diving was the second most common form of harvesting with 524 hours concentrated in coastal Preservation and Dusky.

Table 8: Number of hours fished by method (number of hours x number of fishers), area, and charter vessel in the Fiordland Marine Area. Estimates for the number of hours fished from vessels 3 and 18 are taken from Table 6, however, no attempt has been made to separate these hours out into fishing method groupings, as there is insufficient information available to do this reliably.

	Coastal								Inner								
	Bligh	Breaksea	Caswell	Doubtful	Dusky	George	Milford	Preservation	Bligh	Breaksea	Chalky	Dagg	Doubtful	Dusky	Preservation	Thompson	Total
Baited line	124	492	36	810	732	67	–	1 708	16	54	230	2	157	110	62	329	4 928
Baited and jigging	–	15	–	56	207	–	–	8	–	–	–	–	–	–	–	–	286
Drop dahn line	–	–	–	–	–	–	–	11	–	–	–	–	–	–	–	–	11
Hand gathering	–	–	–	–	1	–	–	416	–	–	–	–	–	–	–	–	417
Long lining	–	–	–	–	–	–	–	8	–	–	–	–	–	–	–	–	8
Potting	–	–	–	79	16	–	–	24	–	–	–	–	48	7	–	35	209
Extractive diving	3	33	3	51	160	3	–	192	–	–	16	–	13	41	3	9	524
Trolling-lure	–	12	–	–	–	6	3	–	–	–	–	–	–	–	–	–	21
Total (reported)	127	552	39	996	1 115	76	3	2 366	16	54	246	2	218	158	65	373	6 404
Estimated (3)	0	448	–	169	2704	–	–	1 570	–	–	–	–	–	–	–	–	4 891
Estimated (18)	0	90	–	38	102	–	–	1 085	–	–	–	–	–	–	–	–	1 315
Total effort	127	1 090	39	1 203	3 921	76	3	5 021	16	54	246	2	218	158	65	373	12 610

Species targeted and caught from charter boats

The frequency of charter vessel trips where a species was targeted along with the effort (number of hours) spent targeting that species is given in Tables 9 and 10. Eleven species were targeted during fishing trips with the key species being blue cod, followed by rock lobster and hapuku.

Blue cod was the most important species targeted with the highest number of hours fished by all logbook holders. Rock lobster was the next most targeted species by the 11 charter vessel operators, but was a distant second to blue cod.

Table 9: Frequency of charter vessel trips where each species was targeted. The estimated data are from sources other than logbooks.

Logbook	Albacore tuna	Blue cod	Rock lobster	Hapuku/groper	Greenshell mussel	Paua	Scallops	School shark	Spiny dogfish	Sea perch	Tarakihi	Total
1	–	26	31	3	–	–	4	–	–	2	–	66
2	–	148	37	12	–	–	–	–	–	–	8	205
5	–	93	–	19	–	–	–	3	3	1	14	133
25	–	41	26	4	2	–	–	–	–	–	–	73
26	–	22	2	–	–	6	–	–	–	–	–	30
27	–	63	27	5	–	1	10	–	–	–	–	106
28	3	10	7	3	–	–	–	–	–	–	1	24
29	–	2	–	–	–	–	–	–	–	–	–	2
30	–	23	18	1	–	6	–	–	–	–	–	48
Total (reported)	3	428	148	47	2	13	14	3	3	3	23	687
Estimated (3)	–	176	176	–	–	–	–	–	–	–	–	352
Estimated (18)	–	30	–	–	–	–	–	–	–	–	–	30
Total no. trips	3	634	324	47	2	13	14	3	3	3	23	1 069

Table 10: Hours spent targeting species during the survey period in the Fiordland Marine Area. The estimated data are from sources other than logbooks.

Logbook	Albacore tuna	Blue cod	Rock lobster	Hapuku/groper	Greenshell mussel	Paua	Scallops	School shark	Spiny dogfish	Sea perch	Tarakihi	Total
1	–	238	109	15	–	–	8	–	–	6	–	376
2	–	810	153	25	–	–	–	–	–	–	30	1 018
5	–	303	–	62	–	–	–	18	9	2	31	425
25	–	980	92	54	1	–	–	–	–	–	–	1 127
26	–	1 174	108	–	–	416	–	–	–	–	–	1 698
27	–	799	108	53	–	1	18	–	–	–	–	978
28	21	163	20	26	–	–	–	–	–	–	6	235
29	–	42	–	–	–	–	–	–	–	–	–	42
30	–	383	82	6	–	35	–	–	–	–	–	506
Total (reported)	21	4 891	672	240	1	452	26	18	9	8	67	6 404
Estimated (3)	–	2 446	2 446	–	–	–	–	–	–	–	–	4 891
Estimated (18)	–	1 315	–	–	–	–	–	–	–	–	–	1 315
Total effort	21	8 652	3 117	240	1	452	26	18	9	8	67	12 610

The species most commonly caught then released was sea perch (Jock Stewart), followed by blue cod, then wrasse species (Table 11).

Table 11: Species caught and released by the charter vessels and two estimated vessels. The estimated data are from sources other than logbooks.

Species	Total released (recorded)	Estimated (3)	Estimated (18)	Total released
Blue cod	2 042	350	50	2 442
Rock lobster	348	100	40	488
Hapuku	11	–	–	11
Sea perch	2 484	950	75	3 509
Tarakihi	17	–	–	17
Trumpeter	48	–	–	48
Wrasse	656	250	25	931

The seven most commonly harvested species by the charter vessels were blue cod, rock lobster, sea perch, trumpeter, tarakihi, hapuku, and wrasse species (Table 12). The charter vessel that had the overall highest catch was vessel 3 (although these estimates are based on catches from only two trips for which we have information) followed by vessels 2 and 5. Blue cod was the main harvested species for 9 of the 11 charter vessels and rock lobster was the main species for the other two vessels. Sea perch was quite significant for one vessel (2).

Table 12: Total catch of each species per vessel over the survey period. The estimated data is from sources other than logbooks.

logbook	Blue cod	Rock lobster	Sea perch	Trumpeter	Tarakihi	Hapuka	Wrasse
1	173	206	202	–	4	11	2
2	809	246	592	2	104	33	78
5	327	–	295	–	36	13	35
25	2 940	702	–	–	–	6	–
26	2 346	57	3	29	–	63	–
27	1 072	379	28	196	36	26	–
28	193	129	–	1	33	20	–
29	7	–	–	–	–	–	–
30	308	149	27	–	11	13	18
Total (reported)	8 175	1 868	1 147	228	224	185	133
Estimated (3)	2 090	6 270	–	–	–	865	–
Estimated (18)	1 200	–	–	–	–	–	–
Total	11 465	8 138	1 147	228	224	1 050	133

The number of blue cod harvested in each area is shown in Table 13. The highest numbers of blue cod were taken from coastal Preservation, followed by coastal Dusky, and then coastal Breaksea. Rock lobster were harvested by charter vessels in 11 of the areas, with the highest numbers being taken from coastal Dusky, followed by coastal Preservation (Table 14).

Table 13: The number of blue cod harvested by each charter vessel in each area. The estimated data are from sources other than logbooks.

	Coastal							Inner								
Logbook	Bligh	Breaksea	Caswell	Doubtful	Dusky	George	Preservation	Bligh	Breaksea	Chalky	Dagg	Doubtful	Dusky	Preservation	Thompson	Total
1	–	12	–	13	74	–	–	–	16	–	–	–	43	–	15	173
2	–	80	8	525	36	–	–	–	19	–	3	1	9	–	128	809
5	–	–	–	267	–	–	–	–	–	–	–	–	1	–	59	327
25	120	1 050	20	160	1 390	40	–	80	–	–	–	10	70	–	–	2 940
26	–	–	–	–	–	–	2 346	–	–	–	–	–	–	–	–	2 346
27	–	–	–	–	–	–	780	–	–	219	–	–	–	73	–	1 072
28	41	35	20	–	56	41	–	–	–	–	–	–	–	–	–	193
29	4	–	–	–	–	3	–	–	–	–	–	–	–	–	–	7
30	–	26	–	26	209	–	–	–	–	–	–	–	47	–	–	308
Total (reported)	165	1 203	48	991	1 765	84	3 126	80	35	219	3	11	170	73	202	8 175
Estimated (3)	–	209	–	209	1 254	–	418	–	–	–	–	–	–	–	–	2 090
Estimated (18)	–	300	–	300	300	–	300	–	–	–	–	–	–	–	–	1 200
Total blue cod	165	1 712	48	1 500	3 319	84	3 844	80	35	219	3	11	170	73	202	11 465

Table 14: The number of rock lobster harvested by each charter vessel in each area. The estimated data are from sources other than logbooks.

	Coastal							Inner				
Logbook No.	Bligh	Breaksea	Caswell	Doubtful	Dusky	George	Preservation	Chalky	Doubtful	Dusky	Thompson	Total
1	–	24	–	43	35	–	–	–	48	32	24	206
2	–	18	18	126	45	–	–	–	3	6	30	246
25	–	150	–	78	258	–	–	–	42	174	–	702
26	–	–	–	–	–	–	57	–	–	–	–	57
27	–	–	–	–	–	–	349	30	–	–	–	379
28	30	7	12	–	62	18	–	–	–	–	–	129
30	–	15	–	25	100	–	–	–	–	9	–	149
Total (reported)	30	214	30	272	500	18	406	30	93	221	54	1 868
Estimated (3)	–	627	–	627	3 762	–	1 254	–	–	–	–	6 270
Total crayfish	30	841	30	899	4 262	18	1 660	30	93	221	54	8 138

The average number of blue cod and rock lobster harvested per person fishing from a charter vessel is shown in Table 15. The number of blue cod per fisher ranged from 12.3 for logbook 26 down to 0.3 for logbook 29. Rock lobster numbers harvested per person ranged from 6 for logbook 25 and 28 through to 1.9 for logbook 2. The effort spent catching blue cod and rock lobster is also tabulated and 4990 were spent catching 8175 blue cod and 689 hours were spent catching 1868 rock lobster.

Table 15: Average number of blue cod and rock lobster harvested per person per charter vessel. The estimated data are from sources other than logbooks.

Logbook	No. trips catching blue cod	Total blue cod caught	Total fishers	Average number of blue cod caught per person
1	23	173	143	1.2
2	145	809	601	1.3
5	92	327	339	1.0
25	45	2940	334	8.8
26	22	2346	191	12.3
27	65	1072	369	2.9
28	13	193	93	2.1
29	2	7	24	0.3
30	23	308	135	2.3
Total	430	8175	2229	3.7

Logbook	No. trips catching rock lobster	Total rock lobster caught	Total fishers	Average number of rock lobster caught per person
1	32	206	94	2.2
2	37	246	129	1.9
25	26	702	117	6.0
26	2	57	18	3.2
27	27	379	81	4.7
28	7	129	23	5.6
30	19	149	70	2.1
Total	150	1868	532	3.5

Private/syndicate vessel fishery

Trip logs and associated fish harvest information were received from six of the seven private/syndicate vessels fishing in the Fiordland Marine Area. Vessel 10 did not return any data, but was reported to have fished during the survey period. Data were extrapolated, therefore, from local knowledge of this vessel's fishing behaviour. These estimates are termed "Estimated (10)" hereon.

Private/syndicate vessels reported a total 191 trip logs (211 including the estimated data) over the survey period (Table 16). The highest number of trip logs from a single vessel (logbook 15) was 78, which involved a total of 416 fishers. This one vessel carried just under half the fishers.

Table 16: Total number of trip logs returned and total number of fishers onboard each vessel as reported per private/syndicate vessel in the Fiordland Marine Area. The estimated data are from sources other than logbooks.

Logbook	Total trips reported	Total number of fishers
8	32	155
11	18	85
12	4	16
15	78	416
22	49	131
23	10	48
Total (reported)	191	851
Estimated (10)	20	120
Total	211	971

Seasonality of fishing trips from private boats and syndicate vessels

The seasonality of private/syndicate vessel use varied throughout the year (Table 17). Overall, most fishing occurred in November, followed by September. No trips were undertaken in June and very few in May. Most fishers on private/syndicate vessels were New Zealand residents, with only 11 overseas fishers. The origins of fishers from estimated logbook 10 are unknown and have not been split into the two origin groups.

Table 17: Seasonality of fishing trips and origin of fishers (from New Zealand or overseas) operating from private/syndicate vessels in the Fiordland Marine Area. The estimated data are from sources other than logbooks.

	January	February	March	April	May	June	July	August	September	October	November	December	Total
NZ fishers	74	37	23	31	9	0	61	120	146	118	132	89	840
Overseas fishers	0	0	0	1	0	0	0	9	0	1	0	0	11
Total (reported)	74	37	23	32	9	0	61	129	146	119	132	89	851
Estimated (10)	20	20	20	20	0	0	0	0	0	0	20	20	120
Total fishers	94	57	43	52	9	0	61	129	146	119	152	109	971

Areas fished by private boats and syndicate boats

The area within the Fiordland Marine Area that was fished most frequently by the private/syndicate vessels was coastal Doubtful (Table 18). Almost half the total number of trips were to this area.

Table 18: Areas where private/syndicate vessels reported fishing. Numbers denote the number of trips where fishing took place in an area. The estimated data are from sources other than logbooks.

	Coastal						Inner						
Logbook	Bligh	Breaksea	Caswell	Doubtful	Dusky	Preservation	Breaksea	Charles	Doubtful	Dusky	George	Thompson	Total
8	–	–	–	28	–	–	–	–	1	–	–	3	32
11	–	3	–	5	7	–	–	–	–	1	–	2	18
12	–	1	–	–	1	–	–	–	–	2	–	–	4
15	–	3	–	39	–	–	3	–	21	3	–	9	78
22	1	5	2	4	27	4	–	–	1	4	1	–	49
23	–	–	4	5	–	–	–	1	–	–	–	–	10
Total (reported)	1	12	6	81	35	4	3	1	23	1 –	1	14	191
Estimated (10)	–	–	–	18	–	–	–	–	–	–	–	2	20
Total	1	12	6	99	35	4	3	1	23	0	1	16	211

The highest fishing effort by the fishers on board the private/syndicate vessels largely reflected the frequency of trips (Table 19). Coastal Doubtful was the area where half the fishing effort occurred and one vessel (15) was responsible for almost half the effort. The effort in areas varied markedly between vessels.

Table 19: Hours spent fishing (Effort) in the areas from private/syndicate vessels. The estimated data are from sources other than logbooks.

	Coastal						Inner						
Logbook	Bligh	Breaksea	Caswell	Doubtful	Dusky	Preservation	Breaksea	Charles	Doubtful	Dusky	George	Thompson	Total
8	–	–	–	737	–	–	–	–	8	–	–	36	781
11	–	70	–	201	255	–	–	–	–	10	–	37	573
12	–	16	–	–	12	–	–	–	–	16	–	–	44
15	–	102	–	982	–	–	90	–	537	64	–	199	1 973
22	4	13	4	9	75	8	–	–	2	12	4	–	129
23	–	–	36	53	–	–	–	3	–	–	–	–	92
Total (reported)	4	200	40	1 981	342	8	90	3	547	102	4	272	3 591
Estimated (10)	–	–	–	440	–	–	–	–	–	–	–	39	479
Total	4	200	40	2 421	342	8	90	3	547	102	4	311	4 070

Fishing methods used from private boats and syndicate boats

The most frequent method used by private/syndicate vessel fishers was baited line fishing (110 trips) followed by extractive diving (51 trips), and potting (39 trips) (Table 20). This results in 52% of the overall trips using baited line followed by extractive diving at 24%.

Table 20: Frequency of methods used to fish by private/syndicate vessels operating in the Fiordland Marine Area. Frequency is defined as the number of trips where the method was used. The estimated data are from sources other than logbooks.

logbook	Baited line	Drop dahn line	Potting	Extractive diving	Total
8	13	1	7	11	32
11	11	2	5	–	18
12	3	–	1	–	4
15	29	8	24	17	78
22	35	–	–	14	49
23	4	–	–	6	10
Total (reported)	95	11	37	48	191
Estimated (10)	15	–	2	3	20
Total no. trips	110	11	39	51	211
% trips	52	5	18	24	

The highest fishing effort (number of hours) by fishers on private/syndicate vessels was spent potting in coastal Doubtful (Table 21). Potting typically generated high effort as pots are often set overnight or for 12 hours.

Table 21: Total effort (number of hours) spent fishing by each method in each area in the Fiordland Marine Area by fishers on private/syndicate vessels. The estimated data are from sources other than logbooks.

	Coastal						Inner						
Method	Bligh	Breaksea	Caswell	Doubtful	Dusky	Preservation	Breaksea	Charles	Doubtful	Dusky	George	Thompson	Total
Baited line	4	109	12	492	151	5	2	3	88	31	4	83	983
Drop dahn line	–	–	–	71	–	–	–	–	32	10	–	10	122
Potting	–	84	–	1 175	180	–	84	–	420	56	–	168	2 167
Extractive diving	–	7	29	243	11	3	4	–	7	5	–	12	319
Total (reported)	4	200	40	1 981	342	8	90	3	547	102	4	272	3 591
Estimated (10)	–	–	–	440	–	–	–	–	–	–	–	39	479
Total	4	200	40	2 421	342	8	90	3	547	102	4	311	4 070

Species targeted and caught from private boats and syndicate boats

Seven species were targeted by fishers from private/syndicate vessels (Table 22). These were blue cod, rock lobster, hapuku, mussels, paua, scallops, and sea perch. The most frequently targeted species was blue cod followed by rock lobster. However, the greatest effort (hours spent fishing) was spent targeting rock lobster followed by blue cod (Table 23).

Table 22: Frequency of private/syndicate vessel trip logs that define the following species as their target. The estimated data are from sources other than logbooks.

logbook	Blue cod	Rock lobster	Hapuku/groper	Greenshell mussel	Paua	Scallops	Sea perch	Total
8	12	18	2	–	–	–	–	32
11	11	5	2	–	–	–	–	18
12	3	1	–	–	–	–	–	4
15	27	41	8	–	–	–	2	78
22	34	10	1	1	2	1	–	49
23	4	6	–	–	–	–	–	10
Total (reported)	91	81	13	1	2	1	2	191
Estimated (10)	15	5	–	–	–	–	–	20
Total	106	86	13	1	2	1	2	211

Table 23: Number of hours that private/syndicate vessels spent targeting fish species. The estimated data are from sources other than logbooks.

logbook	Blue cod	Rock lobster	Hapuku/groper	Greenshell mussel	Paua	Scallops	Sea perch	Total
8	348	409	24	–	–	–	–	781
11	220	335	18	–	–	–	–	573
12	36	8	–	–	–	–	–	44
15	237	1 648	84	–	–	–	4	1 973
22	111	11	2	2	3	1	–	129
23	22	70	–	–	–	–	–	92
Total (reported)	973	2 481	128	2	3	1	4	3 591
Estimated (10)	359	120	–	–	–	–	–	479
Total	1 332	2 601	128	2	3	1	4	4 070

The main species caught and released from private/syndicate vessels was sea perch (jock stewart), followed by rock lobster and blue cod (Table 24).

Table 24: Species caught and released by the private/syndicate vessels including the one estimated vessel. The estimated data are from sources other than logbooks.

Species	Total released (recorded)	Estimated (10)	Total released
Sea perch	1 029	415	1 444
Rock lobster	336	175	511
Blue cod	220	17	237
Wrasse	66	–	66
Spiny dog	65	–	65

The private/syndicate vessels varied in their harvest composition. Three of the vessels caught more blue cod than rock lobster, but this trend was reversed for the remaining three boats (Table 25) Sea perch was also prevalent in the catch of two of the vessels. Five main species were commonly harvested; rock lobster, blue cod, sea perch, hapuku, and tarakihi (Table 25). The most harvested species was rock lobster followed by blue cod and sea perch.

Table 25: Total catch of each species, per vessel over the survey period. The estimated data are from sources other than logbooks.

logbook	Blue cod	Rock lobster	Hapuku	Sea perch	Tarakihi
8	184	377	4	177	14
11	214	41	8	39	11
12	45	2	0	19	0
15	389	854	50	203	12
22	239	46	5	54	5
23	48	132	0	14	6
Total (recorded)	1 119	1 452	67	506	48
10	180	360	0	0	0
Total	1 299	1 812	67	506	48

Rock lobster were harvested from private/syndicate vessels in nine of the areas (Table 26). The highest numbers of rock lobster were harvested from coastal Doubtful.

Table 26: The total number of rock lobster harvested by private/syndicate vessels by area. The estimated data are from sources other than logbooks.

	Coastal					Inner				
Logbook	Breaksea	Caswell	Doubtful	Dusky	Preservation	Breaksea	Doubtful	Dusky	Thompson	Total
8	–	–	365	–	–	–	–	–	12	377
11	–	–	29	12	–	–	–	–	–	41
12	–	–	–	–	–	–	–	2	–	2
15	42	–	557	–	–	51	141	21	42	854
22	–	2	–	38	3	–	–	3	–	46
23	–	70	62	–	–	–	–	–	–	132
Total (reported)	42	72	1 013	50	3	51	141	26	54	1 452
Estimated (10)	–	–	360	–	–	–	–	–	–	360
Total	42	72	1 373	50	3	51	141	26	54	1 812

Blue cod were harvested from private and syndicate vessels in 12 of the Fiordland Marine Area areas (Table 27). The highest numbers of blue cod were harvested from coastal Doubtful.

Table 27: The total number of blue cod harvested by each private/syndicate vessel by area. The estimated data are from sources other than logbooks.

	Coastal						Inner						
Logbook	Bligh	Breaksea	Caswell	Doubtful	Dusky	Preservation	Breaksea	Charles	Doubtful	Dusky	George	Thompson	Total
8	–	–	–	171	–	–	–	–	3	–	–	10	184
11	–	55	–	37	98	–	–	–	–	–	–	24	214
12	–	10	–	–	25	–	–	–	–	10	–	–	45
15	–	35	–	218	–	–	8	–	66	18	–	44	389
22	3	35	11	40	109	23	–	–	–	15	3	–	239
23	–	–	36	8	–	–	–	4	–	–	–	–	48
Total (reported)	3	135	47	474	232	23	8	4	69	43	3	78	1 119
Estimated (10)	–	–	–	160	–	–	–	–	–	–	–	20	180
Total	3	135	47	634	232	23	8	4	69	43	3	98	1 299

The average number of blue cod and rock lobster taken per person fishing from the private/syndicate vessels is shown in Table 28. The number of blue cod harvested per fisher ranged from 4.1 to 2.4 depending on the vessel. It took 972 hours to catch 1119 blue cod over the survey year. The number of rock lobster harvested per person ranged from 4.3 to 0.5 depending on the vessel. It took 2483 hours to catch 2483 rock lobster.

Table 28: Average number of blue cod and rock lobster harvested per person for each private/syndicate vessel.

Logbook	No. trips catching blue cod	Total blue cod	Total fishers	Average blue cod caught per person
8	12	184	61	3.0
11	11	214	52	4.1
12	3	45	12	3.8
15	27	389	162	2.4
22	32	239	99	2.4
23	4	48	15	3.2
Total	89	1119	401	2.8

Logbook	No. trips catching rock lobster	Total rock lobster	Total fishers	Average rock lobster caught per person
8	18	377	87	4.3
11	5	41	24	1.7
12	1	2	4	0.5
15	41	854	198	4.3
22	12	46	22	2.1
23	6	132	33	4.0
Total	83	1452	368	3.9

Trailer boat fishery

The original sampling design was adhered to at Milford Sound, with the exception of one session which was missed due to a date mix-up (Table 29). Five sessions were missed at Doubtful Sound in the first season, and a further seven scheduled days were missed in the following season. This occurred despite attempts to ensure all sessions were sampled. At Doubtful Sound ramp workers

stayed in the vicinity till the following morning and in the first season they were asked to fill out an additional form indicating how many fishers arrived back at the ramp after dusk. These involved counts of trailer boats which were few.

The number of fishers encountered at the Milford Sound ramp was far higher than at Doubtful Sound, although the level of boat ramp patronage were generally low. These results suggest that boat ramp interviews are not a cost effective means of sampling the amateur fishery in this area, as the number of fishers encountered per hour is low compared to many other parts of New Zealand. The level of boat ramp traffic at each ramp was broadly similar during both years.

The aerial survey data (see Table 1) suggest that fishers used trailer boats to access the resource throughout the Fiordland Marine Area (in 14 of the 21 areas surveyed), but interviewed trailer boat fishers reported fishing in only six areas (Table 30). This suggests that the trailer boat fishery is more widespread than that encountered at the only two public boat ramps, and that it is likely that many small boats are either associated with larger displacement vessels (as tenders) or they accessed the coast from outside the Fiordland Marine Area. Therefore, the following results only describe the trailer boat fishery in areas close to the two public ramps.

Table 29: The number of hours worked, boats encountered, and fishers interviewed during survey sessions at the two public ramps in the Fiordland Marine Area (by summer season). Several of the days worked at Doubtful Sound differed from those allocated in the original schedule.

	Milford Sound ramp			Doubtful Sound ramp		
Date surveyed	Hours worked	Boats encountered	Fishers interviewed	Hours worked	Boats encountered	Fishers interviewed
7/10/2006	8	1	1	8	–	–
21/10/2006	8	1	5	–	–	–
5/11/2006	8	1	5	8	1	3
10/11/2006	8	2	8	8	–	–
19/11/2006	8	–	–	8	2	5
24/11/2006	8	–	–	8	–	–
1/12/2006	8	–	–	8	–	–
15/12/2006	8	–	–	–	–	–
23/12/2006	8	1	4	–	–	–
30/12/2006	8	2	5	8	1	1
4/01/2007	8	8	26	8	–	–
5/01/2007	8	2	4	8	1	2
13/01/2007	8	6	18	8	1	2
17/01/2007	8	–	–	8	–	–
1/02/2007	8	–	–	8	–	–
4/02/2007	8	4	13	–	–	–
6/02/2007	8	3	6	8	–	–
11/02/2007	8	3	10	–	–	–
9/03/2007	8	–	–	–	–	–
10/03/2007	8	3	8	–	–	–
21/03/2007	8	–	–	–	–	–
25/03/2007	8	3	8	8	1	1
10/04/2007	–	–	–	8	–	–
12/04/2007	–	–	–	8	1	3
24/04/2007	–	–	–	8	–	–
2006–07 total	176	40	121	136	8	17
16/10/2007	–	–	–	8	–	–
21/10/2007	–	–	–	8	–	–
28/10/2007	8	1	3	8	–	–
5/11/2007	8	1	3	8	–	–
11/11/2007	8	3	11	8	1	3
17/11/2007	8	2	5	8	1	2
21/11/2007	8	2	4	–	–	–
4/12/2007	8	1	2	8	1	1
5/12/2007	–	–	–	8	–	–
9/12/2007	8	6	16	–	–	–
16/12/2007	8	–	–	–	–	–
19/12/2007	8	1	2	8	–	–
23/12/2007	–	–	–	8	–	–
27/12/2007	8	–	–	8	–	–
30/12/2007	8	2	4	8	1	4
2/01/2008	8	2	5	8	–	–
5/01/2008	8	3	8	–	–	–
16/01/2008	8	–	–	12	–	–
9/02/2008	8	–	–	–	–	–
27/02/2008	10	–	–	8	–	–
1/03/2008	8	–	–	8	–	–
16/03/2008	–	–	–	8	–	–
21/03/2008	9	2	4	8	1	3
22/03/2008	8	4	15	8	1	2
6/04/2008	8	1	2	–	–	–
22/04/2008	8	1	4	8	–	–
25/04/2008	8	3	8	8	1	2
26/04/2008	8	–	–	8	1	2
27/04/2008	8	–	–	8	2	3
29/04/2008	8	–	–	8	–	–
2007–08 total	203	35	96	196	10	22

Rod and line fishing was the most commonly used method in the six areas where effort was reported (Table 30). Potting was documented only for the inner Milford area, and longlining and extractive diving were limited to fishers accessing the open coast. Most fishing effort targeted blue cod, with most of the remaining effort focusing on albacore, rock lobster, and hapuku/bass (Table 31).

Table 30: Hours spent fishing in areas of the Fiordland Marine Area by interviewed trailer boat fishers, by fishing method.

Ramp	Area fished	Rod & line	Longline	Diving	Potting	Trolling
Milford Sound	Inner Milford	79	–	3	28	1
	Coastal Milford	539	22	33	–	82
	Coastal Bligh	38	–	–	–	–
Doubtful Sound	Inner Thompson	37	–	–	–	–
	Inner Doubtful	22	–	–	–	–
	Coastal Doubtful	42	–	3	–	–
	Total	757	22	40	28	83

Table 31: Hours spent fishing in areas of the Fiordland Marine Area by interviewed trailer boat fishers, by target species.

Ramp	Area fished	Blue cod	Albacore	Rock lobster	Hapuku/Bass	Other
Milford Sound	Inner Milford	55	–	32	20	6
	Coastal Milford	484	108	30	21	34
	Coastal Bligh	38	–	–	–	–
Doubtful Sound	Inner Thompson	37	–	–	–	–
	Inner Doubtful	2	–	–	17	3
	Coastal Doubtful	42	–	3	–	–
	Total	657	108	64	57	43

Over 70% of the catch caught and released by interviewed trailer boat fishers was either sea perch or blue cod (Table 32). These two species also accounted for most of the landed catch (Table 33). Very few of the fishers interviewed at the Doubtful Sound ramp appear to have caught and released fish, which is unlikely. Most of the catch (both discarded and retained) was taken on the open coast with coastal Milford having the highest blue cod harvest.

Table 32: Number of fish species caught and released in each area by trailer boat fishers.

	Milford Sound ramp			Doubtful Sound ramp			Total
Species	Inner Milford	Coastal Milford	Coastal Bligh	Inner Thompson	Inner Doubtful	Coastal Doubtful	
Sea perch	66	344	59	1	–	–	470
Blue cod	38	192	28	–	2	–	260
Spotty dogfish	–	55	–	–	–	6	61
Wrasse spp.	3	54	1	–	–	–	58
Barracouta	–	36	–	–	–	–	36
Rock lobster	7	22	–	–	–	–	29
Spiny dogfish	1	17	–	3	–	–	21
Shark spp.	–	13	–	–	–	–	13
School shark	–	9	–	–	1	1	11
Tarakihi	1	2	5	–	–	–	8
Sand shark	–	2	5	–	–	–	7
Parrotfish	–	6	–	–	–	–	6
Kelpfish	–	4	–	–	–	–	4
Marblefish	–	3	–	–	–	–	3
Rock cod	–	3	–	–	–	–	3
Butterfly perch	–	2	–	–	–	–	2
Butterfish	–	1	1	–	–	–	2
Stingray	–	2	–	–	–	–	2
Red gurnard	–	1	–	–	–	–	1
Squid spp.	–	1	–	–	–	–	1
Total	116	769	99	4	3	7	998

Table 33: Number of fish species harvested in each area by trailer boat fishers.

	Milford Sound ramp			Doubtful Sound ramp			Total
Species	Inner Milford	Coastal Milford	Coastal Bligh	Inner Thompson	Inner Doubtful	Coastal Doubtful	
Blue cod	44	727	103	21	–	143	1 038
Sea perch	43	92	–	66	22	44	267
Rock lobster	11	125	–	–	–	12	148
Tarakihi	5	87	5	–	–	–	97
Hapuku/bass	9	32	–	1	–	2	44
Albacore	–	35	–	–	–	–	35
Kina	–	30	–	–	–	–	30
Paua	4	20	–	–	–	–	24
Wrasse spp.	1	13	–	–	–	–	14
Red gurnard	–	7	–	–	–	–	7
Spiny dogfish	–	–	–	4	2	–	6
Red cod	–	–	–	–	5	–	5
Stingray	–	–	–	–	4	–	4
Butterfish	–	3	–	–	–	–	3
Seven gilled shark	–	–	–	–	3	–	3
Spotty dogfish	–	3	–	–	–	–	3
Barracouta	1	1	–	–	–	–	2
School shark	–	–	–	–	2	–	2
Kelpfish	1	–	–	–	–	–	1
Moki	–	1	–	–	–	–	1
Octopus	1	–	–	–	–	–	1
Skate	–	–	–	–	1	–	1
Total	120	1176	108	92	39	201	1 737

Commercial vessels fishing under s111 of the Fisheries Act 1996

General approval

The Ministry of Fisheries provided NIWA with a list of all vessels holding a general approval under s111 of the Fisheries Act 1996 for the survey area. This enabled those vessels to recreationally fish in Fisheries Management Area 5 (FMA5). There were 51 holders of this permit from 1 October 2006 to 30 September 2007.

The recreational data from these vessels included a vessel ID code, the statistical area where they had fished, the species landed, and the species greenweight.

As some of the general statistical areas included both the areas of the Fiordland Marine Area and the adjacent open coast, the scale of these data was not fine enough to identify specific areas of Fiordland. Unfortunately, there was no indication if the fish landed had been caught in the actual Fiordland Marine Area or on the adjacent open coast, outside the area of interest.

Nine vessels reported a recreational fishing catch potentially in the Fiordland Marine Area (Table 34). These data have been split into two sets: known (likely caught in Fiordland Marine Area) and unknown (possibly caught in Fiordland Marine Area). The nine vessels reported a total catch 729 kg of fish over the survey period. They landed six species albacore, blue cod, rock lobster, hapuku/bass, kina, and tarakihi (Table 35). Blue cod, rock lobster, and hapuku/bass were reported from both known and unknown areas. Albacore was the only one of these species caught exclusively in the 'unknown' area, so is unlikely to have been caught in the Fiordland Marine Area.

About 80% of the total 729 kg greenweight landed was taken from the Fiordland Marine Area (known area). Fish harvested from the 'unknown' area accounted for 139 kg and could just as likely have come from the open coast. Rock lobster and blue cod were the species with the highest recorded greenweight landed.

Table 34: Vessels that were holders of a general approval under s111 of the Fisheries Act 1996 that reported recreationally fishing in (or near) the Fiordland Marine Area over the survey period. 'Known' are catches that were definitely taken from areas which include parts of the Fiordland Marine Area and 'unknown' catches are those possibly taken from areas of interest.

Vessel no.	Known (kg)	Unknown (kg)	Total (kg)
1	100	–	100
2	18	–	18
3	162	–	162
4	–	60	60
5	6	–	6
6	10	–	10
7	203	–	203
8	–	55	55
9	91	24	115
Total	590	139	729

Table 35: Species landed by vessels that were holders of a general approval under s111 of the Fisheries Act 1996. 'Known' are catches that were definitely taken from areas which include parts of the Fiordland Marine Area and 'unknown' catches are those possibly taken from areas of interest.

Species landed	Fishstock code	Known (kg)	Unknown (kg)	Total (kg)
Albacore	ALB1	–	10	10
Blue cod	BCO5	209	85	294
Crayfish	CRA8	195	14	209
Hapuku/Bass	HPB5	10	30	40
Kina	SUR5	170	–	170
Tarakihi	TAR5	6	–	6
	Total	590	139	729

Particular approval

Only one vessel applied for this permit and returned any data during the survey period (Table 36). MFish Southland had record of one other application, but the permit applicant chose not to return the data. This is not a significant sector of the amateur fishery in Fiordland.

Table 36: Results of the vessel recreationally fishing with S.111 Particular Approval Holder permit.

Date	Location fished	Number of fishers	Species harvested	Total number
17/10/2006	coastal Caswell	3	Blue cod	8
18/10/2006	coastal Caswell	3	Blue cod	9
18/10/2006	coastal Caswell	3	Crayfish	18
19/10/2006	coastal Caswell	3	Crayfish	18
20/10/2006	coastal Caswell	3	Crayfish	8

Objective 2. Catch rates

Following is the estimates of harvest per unit effort that could potentially be used as the basis for an ongoing monitoring programme in the future.

Blue cod targeted and harvested using baited line

Catch rates varied between vessels and areas. The highest catch rates were for blue cod taken from charter vessels in inner Blight (5 fish per hour), but this was based on only one trip. Coastal Breaksea had the next highest (2.4 fish per hour) (Table 37). The HPUE for private/syndicate vessels varied in each area and was highest (4.6 fish per hour) at coastal Preservation, again only based on only one trip. The total mean HPUE for blue cod caught with baited line in the Fiordland Marine Area was 1.7 fish per hour for charters and 1.2 fish per hour for syndicates.

Table 37: Blue cod caught per hour with baited line. Data show where the target species is blue cod.

	Charter				Private/syndicate			
	trips	hours fished	fish caught	HPUE	trips	hours fished	fish caught	HPUE
Coastal Bligh	4	98.0	147	1.5	1	4.0	3	0.8
Inner Bligh	1	16.0	80	5.0	–	–	–	–
Coastal George	4	60.5	78	1.3	–	–	–	–
Inner George	–	–	–	–	1	4.0	3	0.8
Coastal Caswell	5	32.3	48	1.5	2	11.5	47	4.1
Coastal Doubtful	159	778.5	952	1.2	29	492.0	474	1.0
Inner Thompson	60	285.0	195	0.7	8	78.5	78	1.0
Inner Doubtful	1	2.0	3	1.5	9	82.0	69	0.8
Coastal Breaksea	26	468.0	1131	2.4	10	109.0	135	1.2
Inner Breaksea	6	53.5	35	0.7	1	2.0	8	4.0
Coastal Dusky	34	714.3	1593	2.2	21	149.5	232	1.6
Inner Dusky	10	76.3	89	1.2	4	31.0	43	1.4
Coastal Preservation	64	1673.8	3102	1.9	2	5.0	23	4.6
Inner Chalky	16	230.0	219	1.0	1	3.0	4	1.3
Inner Preservation	4	61.5	73	1.2	–	–	–	–
Total	394	4549.5	7745		89	971.5	1119	

Overall Harvest Per Unit effort for blue cod

	Charter	Syndicate
HPUE	1.7	1.2

Rock lobster targeted and harvested using pots

Rock lobster potting catch rates were variable (Table 38). Pots were set for different time periods, often up to 12 hours or overnight. The private/syndicate vessels had a HPUE of 0.1 fish per hour at coastal Dusky to 0.5 fish per hour at coastal Doubtful (Table 38). Overall the HPUE for charter vessels was 0.9 fish per hour compared to syndicate/privates which was 0.3 fish per hour.

Table 38: Rock lobster targeted and caught per hour using potting. Data shows where the target species is rock lobster.

	Charter				Private/syndicate			
	trips	hours fished	fish caught	HPUE	trips	hours fished	fish caught	HPUE
Coastal Doubtful	21	79.0	114	1.4	23	1175.0	531	0.5
Inner Thompson	7	35.0	30	0.9	2	168.0	42	0.3
Inner Doubtful	4	48.3	30	0.6	5	420.0	102	0.2
Coastal Breaksea	–	–	–	–	1	84.0	18	0.2
Inner Breaksea	–	–	–	–	1	84.0	15	0.2
Coastal Dusky	1	16.0	2	0.1	3	180.0	12	0.1
Inner Dusky	2	7.0	12	1.7	2	56.0	11	0.2
Coastal Preservation	1	24.0	6	0.3	–	–	–	–
Grand Total	36	209.3	194		37	2167.0	731	

Overall Harvest Per Unit Effort for Rock lobster using potting

	Charter	Syndicate
HPUE	0.9	0.3

Rock lobster targeted and harvested using extractive diving

The rock lobster catch rate for extractive divers (usually scuba) ranges from 2.1 fish per hour (coastal Preservation) through to 12.0 fish per hour for coastal Blight and coastal Caswell (Table

39). Overall, the HPUE for rock lobster is 3.6 fish per hour for charter vessels and 2.3 fish per hour for private/syndicate vessels (Table 39).

Table 39: Rock lobster targeted and caught per hour by extractive diving. Data show where the target species is rock lobster.

			Charter				Private/syndicate
trips	hours fished	fish caught	HPUE	trips	hours fished	fish caught	HPUE
2	2.5	30	12.0	–	–	–	–
1	3.0	18	6.0	–	–	–	–
3	2.5	30	12.0	4	28.5	72	2.5
10	35.0	145	4.1	23	243.0	482	2.0
4	8.5	24	2.8	1	12.0	12	1.0
6	12.8	63	4.9	4	7.0	39	5.6
13	33.0	214	6.5	1	7.0	24	3.4
–	–	–	–	1	3.5	36	10.3
31	140.5	493	3.5	8	10.0	32	3.2
14	32.8	209	6.4	1	2.0	12	6.0
26	186.8	400	2.1	1	0.8	3	4.0
2	5.0	30	6.0	–	–	–	–
112	462.3	1656		44	313.8	712	

Overall Harvets Per Unit Effort for Rock lobster using Scuba

	Charter	Syndicate
HPUE	3.6	2.3

4. DISCUSSION

The first objective of this survey was to give an overall characterisation of the Fiordland Marine Area fishery. Initial investigation showed that amateur fishing within the Fiordland Marine Area involved four sub-fisheries, which could not be collectively surveyed and all required independent methodology and analysis. These sub-fisheries are:

- charter vessels
- private syndicate vessels
- trailer boats
- commercial vessels fishing under s111 of the Fisheries Act 1996

We firstly undertook an aerial survey to give us a snapshot of the fishery and determine relative levels of fishing effort in different parts of the fiords by the four sub-fisheries listed above. Helicopters were used as this was safer than flying fixed wing aeroplanes in such a mountainous environment and also allowed us to cover the entire fiords in 3.5 hours which is fast enough that vessels cannot be recounted and hence is a true snapshot. We used a local person as our primary observer as local knowledge of the fishery was required. As many of the charter vessels and private syndicate vessels are ‘retired’ commercial vessels, someone not familiar with these vessels would struggle to determine between the sub-fisheries. If this survey is repeated, a similar approach is encouraged.

The aerial surveys provided us with a spatial snapshot of the fishery. Charter vessels, private/syndicate vessels, and trailer craft were seen in 19 out of 21 areas in the Fiordland Marine Area during the four aerial surveys showing the fiords are well used by the fishery and that it is

not just a few select fiords which take all the fishing pressure. Charter vessels were seen more predominantly in the southern fiords (Dusky Sound, Chalky Inlet, and Preservation Inlet) whereas the 14 private/syndicate vessels seen were distributed throughout the fiords. Trailer boats, while seen predominantly near the boats ramp, also either travel extensive distances or are associated with larger craft as the aerial survey encountered trailer boats in inner Dusky, inner Preservation, coastal Blight, and coastal George, which are fiord areas not directly accessed from the two ramp locations. We did not encounter any yachts or kayaks during the aerial surveys, although both vessels use the fiords (Fiordland Guardians Inc. pers comm).

The charter vessel fishery had 11 vessels which we surveyed using logbooks. We were reliant on the skippers returning trip logs and reporting their fishing activity honestly. Overall, the charter vessel fleet predominantly fished from February to April with the fewest trips occurring between June and August. Overseas fishers used charter vessels most frequently in January to March, whereas New Zealand fishers used them more frequently in April. New Zealand fishers are regular visitors to the fiords in April as it is the time of the deer roar and the terrestrial areas are billeted out to hunters. Many use charter vessels for live-aboard facilities and tend to fish in between hunts.

Fishers using charter vessels fished most frequently in coastal Dusky Sound, followed by coastal Doubtful Sound and then coastal Preservation Inlet. The highest effort (hours fished) occurred in coastal Preservation Inlet. Baited line was the most popular method for fishers on charter vessels, followed by extractive diving and potting. Baited line is a popular method for blue cod fishing, the main reason many fishers go to Fiordland. The greatest overall effort was spent fishing with baited lines in Preservation Inlet and the most frequently targeted species was blue cod. Fishing for this species also accounted for the greatest level of effort. Rock lobster was the second most targeted species. The most commonly caught and released species was sea perch, followed by blue cod.

Blue cod had the highest total harvest with 11 485 fish landed in the survey year.

While all 11 charter vessels in this survey fished in the Fiordland Marine Area it should be noted that a few vessels were responsible for most of the effort. Charter vessel 3 would not return any trip reports but the estimated results show it was responsible for almost a third of the overall fishing effort, much of it in coastal Dusky or Preservation. We consider our estimation to be close to the actual results as communication with other vessels during the survey reported the intensity of this vessel's activity.

The two areas that had the highest number of blue cod harvested were coastal Preservation Inlet and coastal Dusky Sound. As the easily accessible fiords (Doubtful and Milford) are closed for blue cod fishing it is expected that the more distant fiords are fished for blue cod. Rock lobster was the second most harvested species with the highest numbers being harvested from coastal Dusky Sound.

The syndicate/private vessels were surveyed in the same way as the charter vessels (with a logbook) but the results were analysed independently because the characteristics of this sub-fishery are likely to differ from those of the charter vessels. The fishers onboard the charter vessels pay for their fishing experience and may choose to fish more or less intensely, in different areas and at different times of the year. The syndicate/private vessel fleet fished predominantly between September and November with the fewest trips occurring in May and June. Fishers using syndicate/private vessels fished most frequently in coastal Doubtful Sound, with the most effort concentrated in this area also. As many of the private/syndicate vessels are moored in Doubtful Sound this may explain the concentration of fishing here. Baited line was the most popular method per trip for fishers on syndicate/private vessels, followed by extractive diving and potting. The greatest overall level of effort was directed towards potting in coastal Doubtful Sound. Potting often has a high effort associated, as fishers tend to set pots for 24 hours at a time. The most frequently targeted species was rock lobster, and fishing for this species also accounted for

the greatest level of effort. Blue cod was the second most targeted species. Sea perch, as with the charter vessels, was the species most commonly caught and released.

Rock lobster had the highest total harvest with 1812 fish harvested in the survey year by private/syndicate vessels. Coastal Doubtful Sound was the area that had the most rock lobster harvested over the year. Blue cod was also harvested predominantly from coastal Doubtful Sound.

Three vessels in the charter and private/syndicate sub-fisheries did not return logbook trip reports and so the data had to be estimated. This reduces the accuracy of our data as the data collection procedure varies for these vessels. We were fortunate that we did manage to get some aspects of the fishing characteristics of these vessels through other operators. However, it is preferable if all the operators cooperate as this increases the robustness of the data.

The third sub-fishery was the trailer boats that use the boat ramp to launch and was surveyed using interviews on randomly selected days. Overall, more fishers used the boat ramp at Milford Sound than at Doubtful Sound. This was probably because access is easier at Milford Sound and there is no requirement to hold a concession here. Anyone can choose to drive to Milford and launch their boat for a day's fishing, whereas this is not the case at Doubtful Sound. Baited line was the most commonly used fishing method by trailer boat fishers at both ramps and so most of fishing effort was for blue cod. Again, like the charter and private/syndicate vessels about 70% of the caught and released catch was sea perch (Jock Stewart). The most commonly caught species was blue cod, predominantly in coastal Milford (both inner Doubtful and inner Milford are closed to blue cod fishing).

The final component of the Fiordland fishery was commercial vessels fishing under s111 of the Fisheries Act 1996. Much of the catch data supplied was reported at a coarse level of spatial resolution and did not provide us with knowledge of whether it was caught in the FMA or not. Nine vessels reported a total catch of 729 kg of fish over the survey period. Only 590 kg, however, could be confidently assigned to the Fiordland Marine Area. Blue cod and rock lobster were the species with the highest recorded greenweights.

The second objective of this research was to monitor changes in amateur catch rates of key fish species. The findings from this study showed that neither commercial vessels taking an amateur catch, or the trailer boats launching at the boat ramps are a significant part of the Fiordland Marine Area fishery. As a result, catch rates were not attempted for these sectors.

Three charter boat/private/syndicate vessel fisheries were identified that potentially provide sufficient data to enable harvets per unit effort analysis (baited line, potting and extractive diving from charter boats and other concession holding vessels). Blue cod targeted and harvested with baited line had an overall catch rate of 1.7 fish per hour for charter vessels and 1.2 fish per hour for private/syndicate vessels. Rock lobster targeted and harvested with pots had an overall catch rate of 0.9 fish per hour by charter vessels and 0.3 fish per hour by private/syndicate vessels. Rock lobster targeted and harvested by extractive diving had a catch rate of 3.6 fish per hour by charter vessels and 2.3 fish per hour for private/syndicate vessels. Catch rates were variable within the fiords and between vessels.

5. CONCLUSIONS

Any future monitoring should focus primarily on the catch rates of the charter vessels as they are the main harvesters in this region. However, the success of such programmes will be highly dependent on fisher participation. Unfortunately, while most operators were prepared to co–operate with the current survey, the dominant operator was not. This reduced the accuracy of the data set to some degree. Blue cod and rock lobster are the two species caught in adequate numbers

to enable ongoing monitoring. Private/syndicate vessel catch rates could also be monitored but data is more difficult to obtain from this sector.

6. ACKNOWLEDGEMENTS

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Appendix 1. Charter/syndicate/private vessels logbook

Fishing vessel logbook survey

Thank you for taking part in the 2006/07 logbook survey of recreational fishing from charter/recreational/syndicate vessels in the Fiordland Marine Area. 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 Fiordland 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 2006 until 30th September 2007. 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. These logbook pages are two sided with one side recording trip details and the other for fish measurements. 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 (0800WCOAST) to leave a message at any time.
5. Record the total catch and fishing effort for all fishers on board, including yourself. 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 (0800WCOAST, 0800926278) or 03 5457736, or email n.davey@niwa.co.nz

Appendix 1 continued. Charter/syndicate/private vessels logbook

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 Dusky Sound in the morning and Extractive Dive on the Dusky Coast 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.

Number of fishers: Please record all fishers on board. Include yourself if you took part. Do not include any one who did not fish. Record overseas and NZ 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 diving
- 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 Blue Cod, Jock Stewarts/Sea Perch and Groper that you have caught and kept. There is a section below the trip report for this information. All three species are to have the total length measured.

Appendix 1 continued. Charter/syndicate/private vessels logbook

Example 1. A group of 5 clients go on a one day charter out of Doubtful Sound. They spend all day inshore bait fishing for Blue Cod at the entrance of Thompson Sound and Doubtful Sound. Two of the clients 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.

Date	Locality code	Number of fishers		Hours spent fishing	Fishing method	Target Species	Species caught	Number of fish caught	
		NZ	Overseas					Kept	Released

	Measurements

Date	Locality code	Number of fishers		Hours spent fishing	Fishing method	Target Species	Species caught	Number of fish caught	
		NZ	Overseas					Kept	Released

	Measurements

Appendix 2: 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) 2=Slight (0.5 - 1.0 m) 3=Moderate (1.0 - 2.5m) 4=Rough (2.5 - 4.0m)	1=Nil 2=Light continous 3=Light scattered 4=Medium scattered 5=Heavy rain	1=Sunny continuous 2=Mainly sunny (<1/2) 3=Mainly cloudy (>1/2) 4=Continuous cloudy	1=Nil 2=Light (1-10 kts) 3=Medium (11-20 kts) 4=Strong (21 + kts)	1=Nil (no wind) 2=Variable 3=North 4=South 5=NorthEast 6=SouthWest 7=East 8=West 9=SouthEast 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 2 continued: 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

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

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

Perception survey

y/n	Name	Phone	Last yr	Next yr

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

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

Appendix 3: Form given to vessels applying for particular Approval under Section 111 in FMA5

Dear Commercial Fisher/ S.111 Particular Approval Holder

The National Institute of Water and Atmosphere Research (NIWA) has been contracted by MFish to conduct a survey to describe the recreational fishery in the Fiordland Marine Area. The survey is to provide up to date data to support sustainable management of the Fiordland Marine Area, established in 2005, which is co-managed by the Fiordland Marine Guardians. To describe the recreational fishery, we have boat ramp interviews being conducted; aerial flights over Fiordland, and a charter boat log book survey taking place.

To help us get a complete picture of the fishery we would like you to fill out the table below and fax it to NIWA, Nelson (03 5481716). Please use the appropriate coastal/ inner fiord map code from the faxed map provided.

NB: This information is being used purely for scientific reasons and will not be used for compliance or any other use.

For further information about the survey
please call Niki Davey 0800WCOAST, 0800926278).

Daily Fishing Log

DATE	Area fished	Number of fishers	Fish species retained/ consumed	Total No fish	Comments e.g. Fishing Method used?
Example 10/12/06	*CDO*	*2*	*Blue Cod*	*10*	*Spiny dogs returned*
			Groper	*3*	*Fished using bait*
				3	**Potted**