



National Panel Survey of Marine Recreational Fishers 2011–12 Rationale and Methods.

New Zealand Fisheries Assessment Report 2015/48

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EXECUTIVE SUMMARY

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This project was driven by a requirement by the Ministry of Fisheries (now Ministry for Primary Industries) to be able to estimate the annual harvest of marine species by the recreational sector. Estimated recreational catch by species and fishing method are necessary to enable decision making around total harvest, recreational and commercial allocation, design of regulations for recreational fisher management, and the management of defined fisheries.

Surveys to estimate recreational harvest are either on-site or off-site in design. On-site designs often combine boat counts and ramp intercept interviews to record fisher numbers, species harvested and species length for fishers using major boat ramps. These on-site studies need to be complemented by off-site studies in order to collect harvest and related fishing data from fishers accessing marine fishing in ways not readily covered by on-site surveys such as shore fishers, divers, marina based fishers, and fishers patronising the many dispersed ramps and landing points along New Zealand's long coastline.

Guided by the Ministry's principal scientist, and in collaboration with the Amateur Fisheries Working group which the Ministry convened, the contractor NRB Ltd (National Research Bureau) set out to consider the requirements for a valid and reliable off-site estimate of harvest. Work proceeded concurrently with the programme of on-site studies being undertaken by NIWA (National Institute of Water and Air) and by other commissioned independent research providers.

The design chosen was based on a first principles consideration of each step needed to construct an unbiased harvest estimate. Specifically the process was to consider whether bias was possible and if so, how it could be minimised or eliminated at each step.

From consideration of the sampling frame required to survey fishers, it became clear that while economical, the landline phone sampling option was open to bias due to the low level of public acceptance of contact by this mode. Furthermore, the diminishing penetration of landlines into households indicated an uncertain fit for future iterations of the survey. A dwellings based sample with data updated by the 5-yearly Census was identified as supporting both the sampling for fishers and the subsequent expansion of the survey harvest quantities to national population equivalents.

Importantly this sample design recognised that amateur marine fishing is an unstructured recreation with its participants varying their involvement both within and between years as their circumstances and the fishing conditions direct. Defining fishers on the basis of their intention to fish in a given period was rejected in favour of following the entire sample over the monitored year, while grading the frequency of contact with them by their stated avidity at the start, and then customising this as their actual frequency of fishing indicated.

Off-site surveys require fishers to report their harvest over a period of time, ideally over the full year. Detailed reporting of harvest that relied on voluntary recording onto paper or into electronic "diaries" was rejected because of high responding burden, leading to inadequate compliance and consequent memory loss and recall error.

In order to minimise responding burden, it was necessary to minimise the effort required from the fishers with respect to how often they reported and the level of detail they had to report. This was achieved by incorporating SMS texting at frequencies customised to each fisher's avidity to determine initially whether they had fished in the period, and then conducting a structured computer assisted phone interview to record harvest in detail from those who had fished. The conditional branching in the

interviewer-administered computer interview made it possible to collect a level of detail that would not be possible in any self-completion mode.

This report details the rationale and methods that led to the design of the 2011–12 National Panel Survey. The harvest estimates it produced and the correspondence of these with estimates from on-site surveys for matching fisheries and species are reported elsewhere in this series. In brief, however, the estimates from the two approaches have shown considerable correspondence. Further critical reflection and development in either or both methods is encouraged in achieving control of the measurement of recreational harvest.

1. INTRODUCTION

1.1 Background

The Ministry for Primary Industries has an on-going need to estimate the absolute harvest of marine species by recreational fishers, and to update these estimates at acceptable intervals. These data are needed both for managing recreational fisheries, and for assisting in stock assessments and fisheries management at QMA level, and nationally. Both on-site and off-site surveys have been commissioned in the past to estimate recreational harvests.

There is no standard off-site recreational harvest survey methodology. Off-site methods used to measure recreational harvest vary from country to country. Population distribution, administrative boundaries, resources, the preceding history of measurement, and the available expertise interact to influence the choice of methodology for measuring recreational harvest.

This report describes an off-site recreational harvest survey conducted in 2011–12, called the National Panel Survey (NPS). It deals with the reasoning behind choices made for the design of the survey, how this affected the survey's development, and details of the final practical implementation. Fisheries managers and scientists are generally more familiar with on-site approaches so this rationale for off-site surveys may be useful in considering how the two approaches complement each other. Harvest estimates from the survey are presented in Wynne-Jones et al. (2014a).

Off-site population based surveys of recreational harvest have been conducted previously in New Zealand. The NPS design sought to evolve from these to a more valid and defensible approach by addressing shortcomings detected in the earlier designs and capitalising on emergent telecommunications (Hartill et al. 2004).

The process for developing the National Panel Survey (NPS) on marine recreational fishing that was implemented in 2011–2012 was not trivial. In addition to a close examination of the previous NPS off-site surveys (known as “telephone-diary surveys”), additional projects were undertaken to determine the feasibility of alternative approaches. For example, an examination of the potential of Respondent Driven Sampling (i.e. ‘Snowballing’) was conducted in 2010. This, unfortunately, showed that such an approach had serious shortfalls in its ability to determine the harvest of particular species (in this case lobster, but the issues would apply to any species) as documented in Heinemann & Gray 2010.

Also in 2010, a comprehensive marine fishing survey was conducted using SMS texting by cell phones to report catch details. This study showed that there was great potential in utilising this personal and accessible method of communication for fishing surveys (Wynne-Jones & Heinemann 2010).

Finally, in early 2011 a dress rehearsal of the survey was conducted, for a period of 13 weeks. The results from this were closely examined and various small improvements were implemented for the main survey (NRB 2011, Wynne-Jones et al. 2014b).

Important in the development of the survey was the fact that this was not undertaken by a single party. The Ministry of Fisheries (now Ministry for Primary Industries), the National Research Bureau Ltd (commissioned to conduct the survey), representatives from NIWA, other fisheries scientists and involved parties met over many months under the auspices of the Marine Amateur Fishing Working Group (MAFWG), to discuss and inform the development of the survey. In this way, learnings from the past and a diversity of knowledge and insight, fed into the development of what is considered a superior form of the recreational marine fishing survey.

1.2 About This Report

There are two main components to this report:

- Documentation of the rationale and ‘reasons why’ for the NPS design.
- A summary of the methods employed for the 2011–2012 survey together with a presentation of the key materials used.

This report is intended for a general readership to explain the survey’s origins. It is also for the purpose of being able to specify and conduct the survey in the future.

The main body of this report discusses 20 key design elements of the survey, explaining how they came about and the advantages of these aspects of the survey design.

Following this is a detailed look at the sampling for the main survey and the statistics applied to expand from the data collected by the sample to the New Zealand population. Many of the materials used to enrol the fishers into the panel survey are shown, as well the instructions they were asked to follow when responding over the survey period. Subsequent sections describe how the fishing of the enrolled sample of fishers and non-fishers was monitored over the year and the survey resources used are also provided here.

2. DESIGN OVERVIEW

The NPS survey aimed to measure the marine harvest by recreational fishers over a complete 'fishing year' running from 1 October 2011 to 30 September 2012. This twelve month period coincides with a standard fishing year definition used by MPI when managing most finfish species.

The NPS survey followed a two-phase population survey design (see Figure 1). The first phase drew a nationwide random probability sample of approximately 30 000 dwellings and physically visited each of these to screen the adult residents for participation in marine fishing. A reporting sample of fishers and non-fishers was enrolled from the households interviewed in the initial screening survey, for the purpose of monitoring their marine fishing over one year.

The monitoring system utilised systematic periodic texting and phone contact over the year to determine whether the sample went fishing in a marine environment or not, followed by a computer assisted phone interview of those who fished, in order to gather detail of their fishing activity for the period. The contact pattern covered all 52 weeks of the year for each survey respondent.

The data gathered focused on fish and other marine species caught and kept (i.e. 'harvested'), as distinct from caught (i.e. it did not count fish returned to the sea). For each species harvested, the survey recorded the date, area, platform, number, and method used. Harvest by the survey sample can be extrapolated to New Zealand population harvest estimates using the most recent Census data.

We note the following differences over earlier off-site approaches:

1. Recognising the decline in landline penetration of phones to households, the initial population survey was conducted face-to-face, at the home. That is, dwellings provided the sample frame, rather than the telephone directory. The declining coverage of the white pages as a sample frame coincides with declining landline penetration.
2. Self-reporting paper diaries were abandoned in favour of personal interviews. Diaries were considered not to attract week-to-week recording in the way intended, with completion often happening only at the time that the fisher is reminded to mail their diary back. Quality of completion of details can be uneven, and fidelity of the assignment of harvested fish to the reporting diarist is therefore uncertain.
3. A regime of periodic texting to those fishers who had cellphones, and phone calls to those who had only landlines, was devised to engage reporting of harvest with the minimum delay between the fishing activity and the interview.
4. A structured CATI interview was deployed to capture the information from any marine fishing trips undertaken in the period between texts or calls and probed recall of detail (i.e., ensuring a short recall period).
5. The devices of asking "intention to fish" or "fished in the last year" were not relied on to identify marine fishers. If a sampled individual identified from the definition card shown to them that they were a marine fisher at some frequency they become eligible for the fisher monitoring sample. If they did not fish in the marine environment they became eligible for the non-fisher sample. A sample of putative non-fishers was retained within the sample frame, embracing drop-ins and new recruits to fishing, as well as ex-fishers who may unexpectedly resume some fishing.

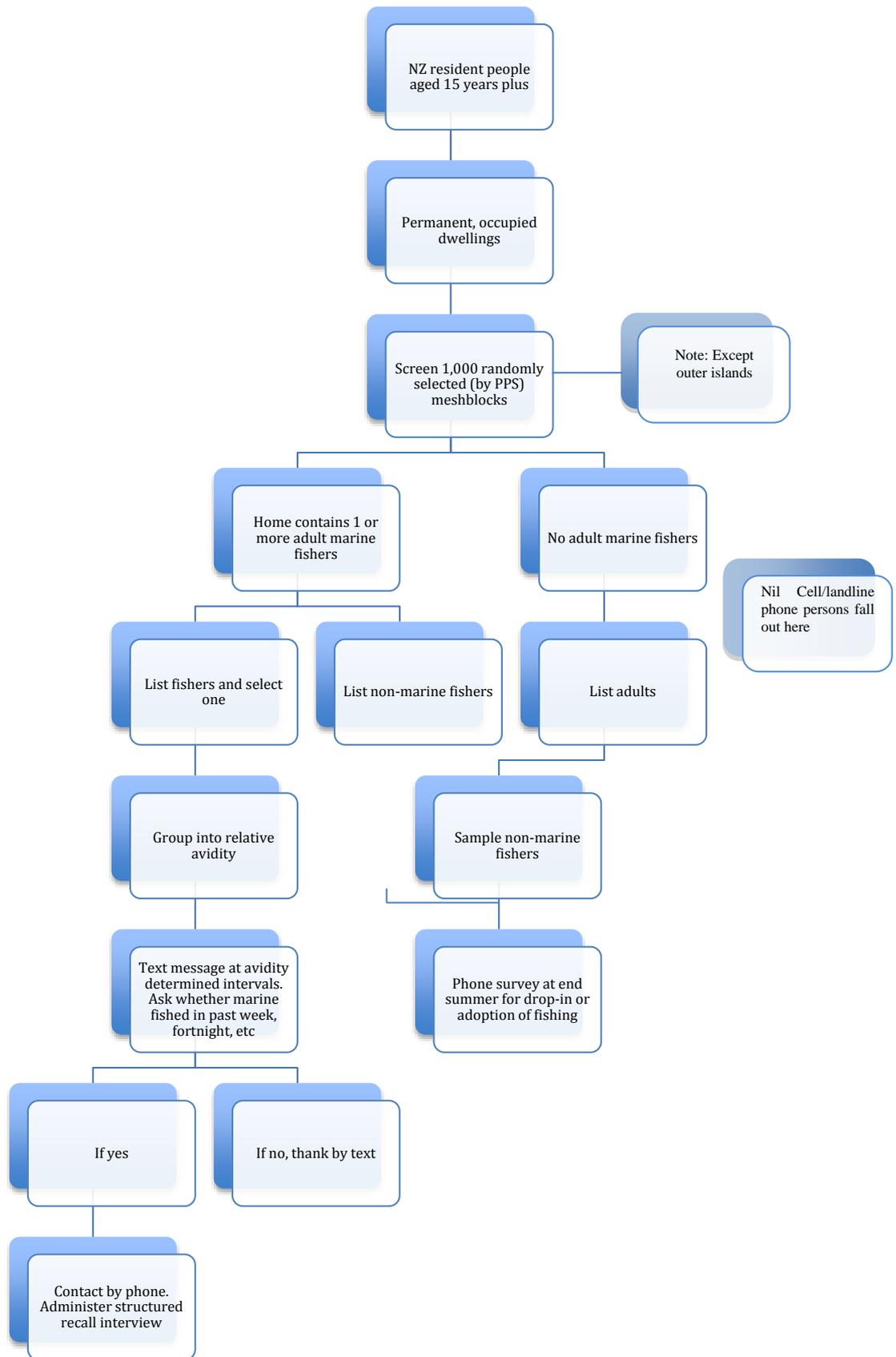


Figure 1: Schematic of the NPS survey approach.

3. RATIONALE FOR NPS DESIGN

3.1 In scope and out of scope fishers

Which fishers are covered by the survey, which are not and why?

The 2011–12 NPS is a survey of marine recreational fishing by adults normally resident in permanent private, occupied dwellings. The Geographical coverage of the survey is the North and South, and Waiheke Islands. Dwellings on other Islands including the Chatham Islands do not fall within the sample frame, and harvests from fishers living on these islands are not included in the harvest estimates provided by this survey.

- Adult fishers are defined as aged 15 years and over at the time of drawing the sample. Persons aged below 15 years were not included for two reasons. Enrolling them in a survey sample would require permission being obtained from parents to meet New Zealand survey ethics conventions. While their fishing participation may be relatively high it was judged that their contribution to overall harvest would be relatively low. The expected return on effort of including them was considered to be too low.
- Overseas visitors on short-term tourism travel are known to participate in marine fishing. By virtue of being mainly resident in commercial accommodation and being composed of continually changing individuals, they could not be included in the residents' frame suited to the major coverage requirement of the NPS. The marine harvest taken by non-residents fishing on a charter vessel, with a New Zealand friend or family member, or from a hire arrangement is not covered by the NPS.
- Anglers who only fish in freshwater systems are regarded as non-fishers for the purpose of this survey because the purpose of the survey is to estimate marine harvests. Where a fisher participates in both marine and freshwater fishing, only their marine fishing is included, explicit structured questioning is used to achieve this.

3.2 In scope fishing activity and out of scope fishing activity

Which fishing activity is included in the survey, which is not and why?

Insofar as the NPS covers the normally resident population it will include individuals who conduct marine fishing that attracts different regulatory designations. An individual fisher can potentially harvest fish under two or more of these designations.

Regulatory distinctions are signalled to the respondents in the NPS in the expressions built into the questions put to them. Question phrasings distinguish:

- Recreational/amateur.
- Commercial.
- Customary.
 - Customary kaimoana or South Island authorisations.
 - Customary permit.
 - Some other (customary).
- Personal allowance from a commercial catch.
 - In accordance with a general approval.
 - In accordance with a particular approval.
 - Other designation offered (personal allowance).

Respondents are asked about all harvests which are not considered to be for commercial purposes, which respondents are explicitly asked to exclude. Collectively these distinctions are expected to signal all the activity that respondents should include in reporting. These inclusions satisfy the prime objective of the survey, which is to estimate absolute recreational harvest.

Some Māori may regard themselves de facto as customary fishers, while others may more accurately distinguish their recreational from their customary activity. The definition of a customary fisher used by the Ministry for Primary Industries is “a non-commercial fisher harvesting fish under a customary permit or authorisation issued by Māori (Māori may issue a permit to non-Māori)”. Survey respondents who claimed to be customary fishers were asked if they took their catch against a customary permit, and this information was used to assign their catch as either “Customary” or “Recreational”.

Fishing activity in freshwater systems is out of scope.

3.3 Inclusion Of Fishers And Non-Fishers

Why include non-fishers in the survey?

The proportion of people eligible for the survey who fish is a critical factor in getting accurate harvest estimates. While frequent fishers may be able to predict whether or not they will go fishing with some confidence, the participation rate of infrequent, “tag along”, drop-in, or new recruit fishers is far harder to predict. The eligible person selected in a household may not know whether they will fish in the coming year or not. It is therefore better to include fishers of all avidities and also non-fishers in the survey to fully account for all fishing that may take place. Generally it is better to estimate participation rates from interviews with those who actually went fishing, rather than to estimate prevalence of fishers from claimed behaviour in the past. This is because a respondent’s ability to accurately recall an event decreases with time, and because there is a seasonal trend in the percent who claim to have fished.

In the NPS design people were assigned to avidity classifications ranging from highly avid fishers to infrequent/sporadic fishers. This permitted even those who rarely fished in the marine environment to be included in the initial fisher stratum. Monitoring fishing behaviour over the year would then determine whether or not they actually fished. This is therefore a screen of high sensitivity – i.e., inclined to capture all cases, although at the expense of false positives (some non-fishers incorrectly classified as fishers). The contrasting screen would have been one with high specificity, i.e., people defined as fishers would have been likely to be correctly classified, but the screen would have been inclined to produce false negatives (some fishers incorrectly classified as non-fishers).

The NPS design retained both fishers and non-fishers in the sample. Fishers were the subject of behavioural monitoring through the year, with relative (claimed) avidity serving only to schedule contact and interviewing. Non-fishers (by far the greater proportion of the initial sample) were sampled at the end of the summer season, and also the end of the winter season, to see how many had “dropped in” or had been recruited to the recreation.

Given that a screen of high sensitivity (low specificity) was used to identify fishers, the yield of actual fishers from the non-fisher sample was expected to be low. This proved to be the case.

The specific benefit of retaining all respondents in the sample is that the later stage of elevating reported catch to national population does not rely on vulnerable, recall based, perhaps social desirability or prestige affected, proportions of the population.

3.4 Has Prioritisation Of Key Stocks Influenced The Design Of The NPS Survey?

Does the NPS interface with any prioritisations the Ministry may have regarding particular species, or particular geographically defined fisheries?

This question is one which is most relevant for on-site surveys of harvest from geographically defined fisheries, and more particularly the principal fish species associated with those geographical areas. Researchers placed on appropriately chosen ramps or shore exits from the water can intercept the fishers who have been fishing in the territory and count and measure the harvest. However some forms of fishing and catch are not readily sampled at access points, and another approach involving off-site surveys is required to account for these harvest components.

For off-site surveys it is not feasible to select a sample of fishers who target a particular area or a particular species. While in some cases fishers utilise the fisheries close to where they live, it is also the case that they may travel to fisheries quite far from home. The more desirable the species, and the more conducive an area is to fishing, the greater the travel distance is likely to be. This generally makes it problematic to throw a sample frame around the population local to a particular fishery. Catch by fishers who travel by land or sea would become an unknown but significant missing component of the harvest.

The conclusion from this is that an off-site survey for the most part cannot be geographically disproportioned to enhance the accuracy and precision of the estimate for a given species. Prioritisation of species is a valuable endeavour for fishery and species management purposes, but the extent of an off-site survey such as this should not be constrained by the geographic distribution of priority fish stocks.

3.5 Population Proportionate As Against Stratified, Area Disproportionate Sampling

Was a higher rate of sampling done in areas where more people fish, or important species are found?

This topic is interlocked with that covered in the preceding Section 3.4. The same points are briefly re-presented here to maintain the connection.

Past on-site surveys have focused on those fisheries where fishers return to boat ramps and the seashore, and these have yielded acceptable harvest estimates of the adjacent fishery, and the species peculiar to that fishery. Where the fishers have travelled from, may be recorded. This gives rise to the suggestion of sampling disproportionately in particular areas, either to simply get more fishers and fish into the sample, to get more fish of the species peculiar to those waters, or even to enable (small area) estimations of harvest for that fishery.

However the observation is that fishers for the species in that fishery may come predominantly from the local area in some instances, but from widely afield in others.

Researchers sometimes look for sampling advantage in the sense of picking up more fishers, and thereby more harvested fish, by suggesting sampling that is disproportionate to population where the disproportion favours areas where fishing is more prevalent, e.g., rural areas or seaside towns. However, the total sample size for the off-site survey is generally fixed. Any reallocation of the sample to favouring inevitably, lower populated areas at the expense of higher populated ones causes a loss in the precision of the national estimate. In statistical terms moving the sample away from higher population areas reduces the coverage of variance in those areas. When the national harvest estimate is calculated, the over representation of targeted areas has to be weighted back to population proportions. The result is a smaller net national sample for national precision.

The NPS survey sample is therefore nationally proportionate to population spread.

3.6 The Choice Of Households As The Sample Frame

Why were physical households rather than landline phone numbers from the directory chosen as the sample frame?

The NPS aims to project the marine recreational harvest of the adult population over a 12-month period. This requires drawing a cross sectional sample of the adult population. In countries like Sweden, for example, a population register is maintained such that a simple random sample can be drawn in one step. New Zealand does not have a population register so the population sample has to be accessed in a three-step approach. The first is to select meshblocks (as discussed in Section 3.7), the second is to select households, and the third is to select individuals within households.

Historically, relatively good use has been made of the register of landline phone numbers maintained by the public utility monopoly operating the country's telecom services. With minor accommodation there was one unique phone number for each household such that a random sample of landline numbers roughly equated to a random sample of households. Government encouraged very high phone penetration to households on a social equity basis so sample coverage was near complete.

Privatisation of the telecom sector and the rapid innovation of cell phones has progressively diminished the coverage of the landline, from 91.6% in 2006 to 85.5% in 2013, and the utility of the landline register of numbers (also known as White Pages Directory). As in other countries, cellphone only homes grew as a proportion of all homes. They are more common among young, lower income earners, and in Māori and Pacific population groups.

The decision to move from landline sampling to face-to-face sampling was therefore driven principally by the need to future proof sampling coverage and representativeness in successive replications of this survey. Attempts at dual framing landline and cell phones have not so far proved satisfactory.

In recent years, the telecom sector has also developed computer assisted database services, which have been rapidly adopted by telemarketing, fundraising and market research providers. Households have felt the pressure of a perceived high frequency of calls and have responded by pressuring governments internationally to initiate "do not call" registries, and by increasingly refusing to participate in telephone surveys. Response rates for phone recruitment for public-good topic surveys have fallen to an average of around 55%, and for commercial surveys to around half of this.

Declining household and thereby population coverage, along with declining recruitment effectiveness, both of which will change at an unknown speed and with unknown cross sectional character in the future, suggested that sampling based on landline phones should be rejected in favour of physical visits to households for the first step of the NPS survey sampling.

3.7 Meshblocks as the basis for sampling

What is the reasoning for using meshblocks as the first stage of creating the national sample for NPS?

The decision to directly visit dwellings rather than calling households stems from the need to get complete population coverage in 2011–12 and to future proof the approach against further declines in listings of landline phones in the phone directory. The number and location of dwellings and the population is updated on a 5 yearly basis as part of the national census, so this frame is constant for use in subsequent replicate surveys.

For purposes of understanding and reporting on the New Zealand population at a fine grained level, Statistics New Zealand (as with government statistics agencies worldwide) has divided the country into 43 376 small geographical units called meshblocks (Figure 2). These are represented on maps, with streets, roads, rivers, etc, defining their boundaries. Meshblocks contain typically between 10 and 50 homes, though this number varies substantially.



MB 0802900 - OPAHEKE - PAPAURA DISTRICT

Date Created : 12/09/05

Figure 2: Example of a meshblock which defines a cluster of dwellings.

The value of meshblocks is that they are the smallest unit for which the population census reports household and population demographics detail. The meshblock framework provides a control for survey sample design with regard to achieving known probability of selection. Meshblocks are the building block of large statistical areas. At the first level of aggregation contiguous meshblocks can be aggregated into CAU's (census area units) about the size of a "suburb" in urban areas, and then into territorial local authority units.

Physical visits to households are naturally more expensive than phone contacts. House to house surveys try to offset this greater cost by including a cluster of households to be visited from any selected sample point. The increase in cost associated with face-to-face interviews is offset if the behaviour being measured varies from home to home within the cluster, i.e. if intra cluster correlation is low.

The role of meshblocks in the NPS is to select the clusters within a known national dwellings framework, such that the probability of selecting the cluster is known. The procedure for selecting the clusters goes by the acronym "PPS sampling", meaning probability proportionate to size (i.e., household numbers) of the meshblock. Since the meshblocks serve as groupings of households, those with larger numbers of households necessarily have a higher probability of selection into the sample, at the first stage of sampling.

This does not mean that households in larger meshblocks have a greater representation in the sample. At the second stage of sampling the number of homes selected from the meshblocks are the same regardless of the size of the meshblock.

3.8 The Rationale For Drawing A Population Sample Rather Than A Dwellings Sample

Why was population rather than household chosen as the basis for projecting recreational harvest, and how this is achieved through a dwelling sample frame?

Given that a dwelling frame provides a secure base for physical enumeration and visiting, it might be considered that dwellings could also provide the basis for extrapolation.

However, both the total number of dwellings and the population composition of dwellings is subject to change over time, and this change is not fully monitored between census readings at the household level. Survey samples are not, therefore, readily calibrated by data from the most recent census, i.e., there is no such concept as the age group or ethnicity of a household. Population data by contrast is subject to ongoing updates through cross-referencing relative to deaths, births and permanent migration, and contains the variables whereby differences between the sample and the population can be adjusted.

The NPS employs a population sampling approach which is the standard approach for social science surveys in New Zealand. A sample of household clusters is drawn for a given area as the first step, and a population sample of adults is drawn from these households as the second step. Marine fishers are then identified, and a random selection is made (following the Kish method) if the dwelling has more than one resident. Non fishers are also identified and placed into a separate stratum to enable later sampling for the drop-ins/new recruits survey. Formal statistical procedures ensure known and equal probability of selection for each dwelling sampled, and then for each fisher in the dwelling (Kish 1949,1987).

The framework for the sample is that composed by Statistics New Zealand when implementing a five yearly census, to provide the units of aggregation within which counts of virtually every monitored dwelling, population, business and government attribute or activity are prepared. The smallest such unit is the meshblock, of which 43 376 cover all of New Zealand. Meshblocks can then be aggregated into progressively larger units (CAUs) called census area units, which in turn can be aggregated into Territorial Authorities and finally Regions (TLAs).

The comprehensiveness and continuity of dwelling and population counts from census to census is the basis for engaging the meshblock framework when drawing samples. A sample drawn within this framework can be authoritatively extrapolated up to the New Zealand population equivalent.

In overview, a series of random sampling steps is applied to select a population sample, from which a marine fisher sample is recruited and monitored over a 12 month period. Meshblocks and then households represent the first and second stages in a sampling design that leads to a population sample where the probability of selection is known for every respondent. While a number of procedural calibrations need to be applied to correct for response rate imbalances, an individual selection probability can be calculated for each monitored fisher. The inverse of that selection probability is applied to each fisher's activity and harvest when extrapolating from the sample to the population.

3.9 The Choice Of Only One Fisher Drawn At Random From Multi-Fisher Homes

What was the reasoning for not selecting two or even all the fishers in the dwelling, or favouring the more/most avid fisher?

Random sampling is most effective when it provides an unfettered coverage of the variance in the subject population, as in the ideal case of the SRS or simple random sample. Cost driven pragmatism generally prohibits a SRS being applied in area based face-to-face surveys such as the NPS. For example, the meshblock selections produce clustering of dwellings in the first stage of the sample. To the extent that fishers within a meshblock fish or harvest in a more similar fashion than fishers at large, each fisher in the cluster adds less information to the total sample, than would be expected under SRS. The effect is that the true size of the sample is decreased, and the confidence intervals widened. The effect is minimised by planning for only small clusters.

The NPS sample encounters clustering at the second stage of the sampling also. This is where a household may contain two or more fishers. Given the likelihood of shared boats, travel to sites, species of interest, etc, the inter-correlation between them is potentially high. The additional information from a second or third interview in the home in this context would be small. In statistical terms the additional variance covered would be low. In budgetary terms the cost of monitoring a second or third person in the same home is less effective than if that money was spent on monitoring a fisher from another household. In a population sample, utilising additional eligibles in the home adds to the gross sample number but less so to the sample.

While multiple fisher interviews in the home are not favourable from a statistical error point of view, experience shows that some operational benefit, and perhaps measurement error reduction, may be available through taking that approach. For the former there is less pushback from respondents who feel that someone else in the home fished and that person should be interviewed, rather than themselves. For the latter, interviewing every fisher in the home would give comprehensive fishing activity and harvest for the household and thereby the basis for inspecting reports to ensure no double counting.

3.10 Fisher Avidity Classification – The Choice Of Proportionate Versus Disproportionate Avidity Representation

Marine fishers may be of high, moderate or low avidity. Why did the sample not target high avidity fishers to increase the base of harvested fish for analysis?

Research has identified two potential uses for fisher avidity classification:

- A stratification of avidity that enabled disproportionately more avid fishers to be included in the sample on the basis that a larger proportion of the recreational harvest could be covered, and a larger sample base of most species would be yielded for species and fishery estimates.
- Avidity stratification could be used operationally to guide the frequency at which fishers were texted, to ask if they had fished. The more avid, the more frequent the need to contact.

There were two reasons against the sampling and interviewing of fishers, disproportionately favouring higher avidities.

Firstly, oversampling of the most avid group in a sample assumes a favourable balance between their relative proportion in the population and the proportion of harvest they account for. It was initially thought that highly avid fishers might reflect a Pareto relationship such as a 20/80 presence to harvest, which was not borne out. The pilot study indicated that these relative proportions were lower than would justify significant boosting of their presence in the sample. Rather it was found that moderate and lighter marine fishers, while harvesting less, and less often, accounted for a substantial share of the harvest, due to their population proportion among fishers (Wynne-Jones et al. 2014b).

Secondly, any desire to boost sampling of the most avid fishers was contrary to the design choice of sampling only one person per home. This arose because avid fishers lived together in the same homes

as other avid fishers, to a marked extent. Intra home correlation would be expected to be high, which would offset the benefits of using second-avid fisher interviews.

Therefore, the displacement of interviews from one avidity group to another was recognised as being able to:

- improve precision estimates for avid fishers, if this was desired;
- boost the number of fish caught reflected in the sample for species analysis

but have the offsetting design effect of:

- reducing the effective sample size for national, all species, estimates; and
- thereby reducing the precision delivered as over a proportionate sample of the same size.

By contrast the decision to set respondent contact frequencies based on their claimed avidity proved to be essential. The survey began with nominal avidities obtained at the screening interviews at households (often by proxy). Feedback from fishers on the frequency of contact generally related to how this should be varied to suit their current activity. Most providing feedback requested fewer contacts as their fishing became less frequent, or had ended as summer drew into winter.

3.11 The Choice Of SMS Texting As The Basis For Monitoring The Fishers Activity

Why was SMS texting to fishers introduced in preference to the previous approach of self-complete paper diaries or the alternative of periodic phone contact to recall recent fishing?

The purpose of SMS texting to fishers was to place the reporting of harvest as close to the week of harvest as possible. The expectation is that memory loss and recall error are thereby minimised. This benefit is expected to be progressively greater as the avidity of the fisher increases, since the frequency of SMS texting can be set to the stated avidity of the fisher.

Texting to establish whether a fisher has or has not fished in a given period also limits the number of calls made to those who actually went fishing, making a more economical use of interviewer's time.

Paper diaries by comparison are a relatively passive recording approach, even when facilitated by periodic phone or mail reminders to diarists. There is no management of the time between the fishing trips and the time the diarist makes entries describing their harvest. This is also the case when periodic phone calls are made to record fishing for the past period.

While initially aligned to the fisher's nominal avidity, the frequency of texting is adaptive to changes in the individual's avidity and also to the preference they express.

3.12 Use of a structured Computer Assisted Telephone Interview (CATI) for reporting

What was the reasoning for developing a structured CATI interview to record fishing?

In the paper diary record there is relatively little control over the detail that can be asked for, without the document becoming forbidding to the diarist. With the periodic phone call approach the skill required of the interviewer rises progressively as the required amount of detail increases. Intensive training of the interviewer is called for. The effectiveness of this training can only be partly assessed from inspection of the paper records that are the output of the interview. Similarly the interpersonal interviewer-to-fisher relationship is not readily assessed.

Computer Assisted Telephone Interviews (CATI) can be viewed as replacing the craft skill of the interviewer with a consistent systemised approach. The interview questions, sequence and branching, prompts and assists are embedded in the software and appear on the computer screen (see Section 12 for CATI questions and structure). The interviewer retains the responsibility for voice inflexions and variations that avoid monotonic delivery of the questions, and for responsiveness to any remarks and asides offered by the fisher.

Paradata from the CATI software date and time stamps the interview, logs the duration and enables inspection of the pacing of the interview. Week to week inspection of this data can highlight aberrant interviewing as a departure from the normal pattern, but is not complete protection against interviewer misconduct.

The two principal benefits of the CATI approach over paper based systems for the NPS are, firstly, removing the considerable branching complexity needed to deal with trip-method-harvest detail by the interviewer, and secondly, enabling standardised delivery of the questions and other material by all interviewers across all fishers.

Rather than encourage an interviewer-respondent relationship, this approach treats this as a source of variation and seeks to distribute interviewer-respondent effects randomly across the interviews. Specifically, the CATI delivers the next required interview to the interviewer from the pool of fishers who texted that they had fished. Interviewers only conduct a second or subsequent interview with a given fisher on a random basis.

3.13 Identification Of The Species Harvested

What reliance can be placed on recreational fishers correctly identifying species?

The researchers were not aware of any definitive work on how well amateur recreational fishers could correctly name species they might be expected to encounter in the waters they fished. Given that the NPS proposed to produce species based projections the data gathering, needed to protect against:

- Large occurrence of "don't knows" against the fish harvested on a trip.
- Substitution of one species name with another owing to relative visual similarity.
- Attributing a popularly known species name to a lesser known one in preference to recording a "don't know" or to finding out the true species.

The approach available to off-site surveys among recreational fishers is to prepare a species identification chart and provide this to every respondent. For the NPS, high quality colour depictions of the 20 most commonly caught species, were presented on one side of an A4 foldout showcard (Appendix 12). Placed side by side on the other side of the foldout were further species shown as pairs side-by-side and cued to the reader as "sometimes confusing species". A total of 43 species were represented on the showcard but there was no restriction on the species names that fishers could give when interviewed about their harvest.

The NPS relies on the assumption, general to off-site surveys, that fishers by the nature of the recreation have a lively interest in what the species at the end of their line or in their net or trap is, and that this interest is sustained variously by the need to adapt catch methods and equipment, the choice of fishery, the sense of trophy, and the eating qualities of the species. Species depictions on the showcards are expected to reinforce this base of knowledge rather than create it, and to stimulate the mindset that the survey requires accurate rather than casual species reporting.

Future replications of the survey may be able to make use of the now ubiquitous photographic capability of cellphones to transmit species images to a researcher for professional identification of perhaps a subsample of harvest.

3.14 Identification of area Fished

What reliance can be placed on recreational fishers correctly locating the area in which they harvested?

Fishers monitored in the NPS survey were asked to try to locate the area(s) in which they fished, with each fish harvested being capable of location into the area (fishery) in which it was taken.

Area identification was supported by a number of design decisions.

Firstly, the areas were specified using the 40 relatively small areas, defined in Fisher & Dick (2007), designed to match the Ministry's ten generic Fisheries Management Areas. A further 10 areas were formed by subdividing a selection of these to allow for the boundaries appropriate to species specific management areas. The coastline of New Zealand was therefore entirely covered by 50 defined areas. The benefit of this is that these small areas could be unambiguously combined to form species quota management areas. The smaller the areas the less impact any boundary uncertainties have when these are consolidated.

Secondly, respondents were given a map of New Zealand on which the 50 areas were defined, numbered and named (Appendix 10 and 12). Naming made use of the northern and southern boundaries of the fishery or recognisable area names.

Thirdly, the CATI questioning retained control of the identification of the area by:

- asking for the nearest city or township to where they were fishing, to spatially place the event on the coastline,
- then asking for the nearest land point to where they were fishing,
- and having thereby narrowed the location to two or three of the small area fisheries (if not clearly identified it), reading out the fishery names close to the area to have the respondent choose one.

Each report of an area was scrutinised by an expert coder manually reviewing the answers given to the area questions to ensure that the correct fishery was assigned.

Reluctance to report the area fished is sometimes encountered when on-site approaches seek to plot locations within smaller territories. This difficulty did not arise. The areas were too large to be seen by fishers as giving away favoured fishing spots.

The limitation of the approach is that the further out to sea the respondent fished, the greater the likelihood of a boundary error, given that lines projected out from the coast are difficult to match to experienced boat travel. Most recreational fishing is done relatively close to land so this limitation is mostly confined to users of larger vessels.

Future iterations of the NPS may be able to make use of GPS locators, now increasingly available and progressively more affordable, as a cellphone application.

3.15 Management Of Allocation And Rounding Of Number Harvested

What is recorded for an individual fisher when two or more fished together, possibly sharing effort or sharing catch?

The NPS survey identifies the harvest of each fisher as an individual so that a population based projection of overall annual harvest can be made from the individual/population sample. This means

that where two or more fishers shared catch and effort, such as with nets or pots, or agreed to share what they caught, the fish have to be unequivocally assigned on an individual basis.

The survey deals with this allocation and resulting issues within the questionnaire stream. Specific questions are asked around these two aspects:

- The questions make use of reflexivity and the reflexive pronoun as a language device to isolate individual catch from the catch of the group.
 - Initially ... "which of these describes *your own* fishing".
 - Followed by ... "you yourself didn't catch or gather anything", "you yourself caught something, but you released them all", "you yourself caught something that you didn't release".
 - And again ... "remembering that's only the one you caught yourself – not the group catch".
- The distinctions "group catch" and "boat catch" are made recurrently for each species caught.

Where a method capable of utilising the effort of two or more fishers was the one mentioned in connection with a catch, the questionnaire asked how many people were active in the catch, including him/herself.

A subroutine in the CATI then divided the number of fish of that species, caught by that method, by the number of people 'active' in catching. This produced an answer that was stated to the respondent as a check on allocation, i.e. "so, would it be correct to say your personal catch was xx?".

The fisher could then agree or disagree, and if they disagreed, they were asked follow-up questions on what number they saw as personally theirs, and why this differed from the arithmetic average.

Part fish, expressed as decimal points from this process, were retained in the data. This was seen as a counter to the natural inclination to round upward, a bias that could lead to inflated numbers over a series of divided catches.

3.16 Management Of Auspices And Topic Bias

What if fishers are unsympathetic to the organisation sponsoring the research or to giving information on their (fishing) behaviour?

Auspices bias is said to arise when respondents alter their response given the survey sponsor, i.e., Ministry of Fisheries (now MPI), to determine whether they take part, and to whether they answer factually when doing so. For bias to arise, those not taking part would need to have answered differently, and/or those who do take part must have answered differently to the way they would have if the sponsor were unknown to them.

Presenting the NPS survey anonymously would be unconvincing, and in any case in breach of the Ministry's need to approach the public with transparency and good faith.

The important principle about auspices bias is that it is conditional upon context. It can largely be neutralised by presenting and positioning the survey in the context of its informational purpose, disclosing what is to be asked, and anchoring it in shared, public benefit and use. Its implementation by an independent research agency assuring anonymity at the individual level, may also improve management of auspices bias. The NPS survey made use of an information brochure describing the content and purpose of the survey. This included a Question and Answer section dealing with queries the public might have (Appendix 12).

Topic bias describes a reaction by people to participate or not participate in a survey according to whether the topic is of interest to them or not or raises the prospect in their mind that they may encounter

embarrassment or be asked to endure a long interview. The bias occurs before the survey interview has started. Prevalence estimates are affected because they determine the proportion engaged in an activity from a pool of respondents that is already depleted selectively.

Topic bias was avoided in the NPS survey by positioning the survey prominently as a "marine fisher **and non-fisher**" survey, during the verbal introduction on the doorstep as well as on the printed material. Quite pointedly on the Q and A brochure, the respondent is able to read, and the interviewer presents the following positioning.

Q. What if I never fish or have given it up?

A. We need a balance of people who don't fish at all, or only fish once in a while, as well as people who fish often.

Each adult in the household was then classified, with the aid of a showcard, on their marine fishing avidity, beginning at no such fishing. Sampling then included fishers of all avidities, including non-fishers.

Subsequent monitoring of marine fishing determined whether or not the person marine fished in a particular period, not whether they viewed themselves as a fisher.

3.17 Attrition Of Sample And Missing Data

What happens if people pull out of the sample panel or stop reporting?

The ideal data set emerging at the end of 52 weeks monitoring of the recruited panel of marine fishers would consist of:

- All recruited individuals retained in the sample.
- All 52 weeks completed for every individual.
- All harvest questions answered for every individual who reported a trip.

The nature of the CATI interviewing program is such that every time an individual fisher is contacted, the week(s) that have not been resolved to date are highlighted, and enter the questioning stream. This approach minimises the unresolved weeks as the survey progresses. This feature is effective where contact is temporarily lost with a fisher, e.g., they went overseas, became ill, or became separated from their phone, etc. Fishers who had not fished for a period, or stopped at the end of summer, were inclined to be less diligent with return texting. This initiated a phone call or calls to complete their record in response.

Attrition by way of a panel member becoming non-contactable is the main source of loss of completed records. When it became clear that contact had been lost, NRB tried back-up names and numbers recorded at recruitment for the person, to see whether contact could be recovered. This was successful in a small proportion of cases. In others, the explanation for uncontactable fishers was identified as that they were deceased, had migrated, were in prison, or had gone to hospital.

Attrition by way of a panel member withdrawing because of fatigue or the burden of responding to texts and phone calls also formed a small proportion. These are distinguished from fishers who asked to be removed on the grounds that they would not be fishing for the rest of the year. Fishers who desist from fishing can be recorded as nil trip and nil harvest fishers henceforth, and thereby provide a complete record. NRB took the precaution of phoning them once more, late in the season to check that their status had not unexpectedly for them, changed back.

Most challenging therefore are the former, i.e., fishers who resigned from the panel but may have continued to fish.

Conceptually the simplest option is to treat these as non-responding fishers and weight them at the stage of estimation as having the aggregate harvest of those fishers who did report fully. The assumption here is that the harvest and avidity of drop out fishers is broadly the same as that of panellists who continued with the survey.

If we consider that we can be more accurate by using some further information about the fisher, e.g., area, age, initial avidity classification, or preferred method as revealed by those weeks they did report, then the weighting can be made more sophisticated as appropriate. The assumption is that those who dropped out harvested as much as those who continued.

3.18 Non-Fishers Who Drop-In Are Recruited To Fishing

How does the survey allow for people who fish unexpectedly during the year, or who newly take up marine fishing during the year?

The concept of the NPS survey is that prior to the summer fishing season, a random sample of households is approached, and each adult aged 15 plus is classified (some by proxy) according to their marine fishing avidity. This ranges from never fishing through occasional and intermittent fishing up to avid marine fishing.

Those who claim to marine fish form the pool from which one fisher per home is drawn to be monitored over the next twelve months. Monitoring involves continuous text and phone contact throughout the year, to record any fishing activity and associated harvest. Frequency of contact is geared to relative avidity categories at recruitment, but the contact rate is then adjusted to the actual avidity and fishing and non-fishing circumstances of the respondent. Those who claim that they never marine fish form the pool from which non-fishers are sampled to assess any activity on their part.

Continuous monitoring of non-fishers is impractical and not meaningful for those who are initially classified as non-fishers. However, the survey recognises that some of those who claim that they never fish, may ultimately go fishing, either by:

- Entering the fishery during the year
- Participating unexpectedly in marine fishing on an opportunistic basis.

These fishers may harvest successfully and this harvest needs to be added to that of the pool of fishers monitored through the year. The names and contact numbers of non-fishers were recorded during the initial sampling and screening stage, so that a subsample could be separately surveyed to estimate the harvest of all "non-fishers" groups'. This survey approached a random sample of 3000 respondents who had screened as non-marine fishers during the initial survey sampling. Importantly, non-fishers who lived in homes which contained a fisher were included as eligible, as were non-fishers in non-fisher homes. This survey was timed for six months into the year, i.e., at the end of summer to recognise that marine fishing is heavily summer oriented in New Zealand, and again at the end of the year. It was expected that drop-ins and new recruits, even more so than other marine fishers, would be active in the summer rather than later in the year.

Where contact was successfully made with the respondent, they were asked whether they had marine fished in any way during the year to date. Where the answer was yes, the interviewer proceeded to collect the trip and activity details using the questioning that applied to the monitored fishers group.

The harvest by the 'non-fisher' group was then available to be added to that of the fisher group in the course of preparing national estimates.

4. SAMPLING METHOD

4.1 TARGET POPULATION

Geographic Coverage

Geographically, the survey extended across all areas of the North Island, South Island and Waiheke Island.

Households on Stewart Island, the Kermadec Islands, the sub-Antarctic Islands, and the Chatham Islands were excluded from the survey.

Dwellings Coverage

The NPS survey covered the eligible population living within permanent, private dwellings.

Expressed in terms of the Census descriptions for various dwelling types, the phrase 'permanent, private dwelling' was defined as 'either a separate house, or two or more houses or flats joined together or a flat or house joined to a business or shop or a bach, crib or hut (as long as they are not attached to a work camp), that are used as private dwellings'.

Private dwelling types that were not included in the survey were temporary private dwellings such as caravans, cabins or tents in a motor camp, or boats. All non-private dwellings were excluded from the survey. Examples of this type of dwelling are: hotels, motels, guest houses, boarding houses, homes for the elderly, hostels, motor camps, hospitals, barracks and prisons.

Eligible Respondents

All people aged 15 years and older who are usually resident within permanent private dwellings were eligible for selection as respondents.

The term 'usually resident' excluded people who were present within the dwelling at the time of interview, but who usually resided elsewhere (either within New Zealand or overseas).

4.2 SURVEY FRAME

Description

The survey frame was the list of meshblocks that fell within the geographical coverage of the survey.

A meshblock is the smallest geographical statistical unit for which data is collected and processed by the Department of Statistics. They provide the aggregation into larger statistical units such as area units, territorial local authorities and regions.

Each meshblock is characterised by its level of urbanisation into one of four types – main urban area, secondary urban area, minor urban area and rural area.

Frame To Respondent Differences

The survey frame provided the first stage in the sampling process, which proceeded to dwelling selection within the meshblock and then on to respondent selection within the dwelling.

4.3 SAMPLE DESIGN – STRATIFICATION OPTIONS

Differing sample stratification options were considered, to optimise the potential precision of the harvest estimates provided by this survey, across a wide range of fish stocks. Three options were reviewed:

- Population Proportional Sampling
- Square Root of Population Sampling
- Purposive Allocation Sampling

Both the Square Root and the Purposive Allocation have the effect of reducing the number of meshblocks selected from the larger population centres in favour of the minor urban and rural areas, and in favour of the South Island over the North.

Modelling of the possible gains and losses from these alternatives led to the selection of the Population Proportional Sampling (PPS) as the basis for drawing the sample of 1000 meshblocks. This is not a geographical stratification, but a sample design based on dwelling numbers/ proportions.

4.4 SAMPLE DESIGN – SYSTEMATIC SELECTION BY DWELLING NUMBERS

Rationale For Grouping

Grouping by region and urban area type enforced geographical representation and within this urbanisation type/level. In so far as fisher behaviour may be dependent to some degree on these considerations, its diversity was properly reflected in the subsequent sampling.

Note that these groupings do not imply that the PPS routine was restarted in each grouping. These groupings or sortings, facilitate the representation of meshblocks across the types of groups.

Grouping By Region

The frame of meshblocks was first grouped according to Regional Authority Area (Figure 3). There are 16 Regional Authority Areas in New Zealand.

Grouping By Urban Area

The meshblocks within each of the Regional Authority areas was then grouped according to their level (type) of urbanisation.

There are four types of area (as defined by Statistics NZ):

1. Main urban areas.
2. Secondary urban areas.
3. Minor urban areas.
4. Rural areas.

The main urban areas, secondary urban areas, minor urban areas and the rural areas were grouped separately within each of the regions.

Sample Selection

A systematic sample was taken from the sorted frame of meshblocks. The sampling procedure ensured that every meshblock had a probability of selection that was proportional to the number of private, permanent, occupied dwellings contained within it (as at the previous census conducted in 2006).

4.5 SAMPLE DESIGN – SAMPLING STAGES

Primary Sampling Unit

The probability of selection for each meshblock was in direct proportion to the number of dwellings within the meshblock. This unequal probability of selection was necessary to compensate for the fixed cluster size of contacts carried out within each meshblock. The two factors ensure equal probability of selection for every dwelling.

Secondary Sampling Unit

Each meshblock was exactly described according to the streets, side of street and the portion of street within the meshblock.

The secondary sampling units were the permanent private dwellings within each meshblock. Dwelling selection within a meshblock was conducted by the field workers progressing in a defined method from a preselected ‘start point’ and then counting the required number of houses (32 unless a small meshblock prohibited this). Preselecting the start point meant that the field worker could not themselves select a start point (e.g. based on the appearance of houses) thus removing this potential bias. Where an apartment building was encountered the fieldworker proceeded according to the apartment numbering sequence.

Respondent Sampling

All eligible respondents within each dwelling were identified. The names of all eligible respondents were listed in descending order of age onto a sampling grid (Appendix 7).

In households where one or more fishers were identified, the respondent to be recruited was selected by a random procedure (details on following page). In households where there were no fishers, a smaller systematic sample was taken after the screening survey for a separate ‘drop in’ survey.

4.6 SAMPLE DESIGN – SAMPLE SIZES

Primary Sampling Units

For the pilot survey, 80 meshblocks were sampled.
For the main survey, 1000 meshblocks were sampled.

Secondary Sampling Units

The core number of dwellings for the pilot was 15.
The core number of dwellings was 32 for the main survey.

Respondent Selection

All eligible residents within the sampled dwelling were categorised according to their marine fishing ‘avidity’. This was established by asking the first adult contacted at the house about the fishing status

of all the adult members (aged 15 plus) of the household, with the assistance of a Showcard. There were four marine fishing ‘avidity’ classifications, A, B, C and D.

- A Non-fisher: Either ‘never’ fished or ‘used to but given up’.
- B Fish occasionally, but no more than 3 times a year.
- C Fish several times a year, about 4 to 9 times a year.
- D Fish regularly, 10 times a year or more.

Then dwellings were allocated to either of two categories:

1. Non-Fisher dwellings containing only eligible respondents of classification A, i.e., no B, C or D fishers are present.
2. Fisher dwellings containing at least one eligible respondent with the classification B, C or D (a ‘fishing’ dwelling). An A person may be part of the household, but the presence of a B, C or D is definitive.

Fisher Sample

The person selected from a Fisher household could be of avidity, B, C or D. The B, C and D avidity fishers were selected with an equal probability, but there was a zero chance of an A being selected in the Fisher household sample.

The PPS allocation of the 1000 meshblocks, with up to 32 homes approached in each meshblock (where available), informed by the household avidity mixes revealed by the pilot survey (NRB 2011), was used to estimate the likely yield of each fisher type (Table 1). The response rate was assumed to be 85% at the household level and 85% at the individual respondent level, uniformly across fisher avidity groups.

Table 1: Expected yield by avidity based on pilot findings.

Avidity Group	Expected Yield
B	4 927
C	2 497
D	1 605
TOTAL	9 029

Selection probabilities were operationalised at each Fisher household according to a ‘Fisher Selection Table’ (second page of form in Appendix 7). This selection procedure was designed to produce the equivalent result to the commonly used ‘next birthday’ method, but with the added benefit of removing the ability of either the respondent or the interviewer ‘rigging’ the result to advance a chosen person.

The selection tables were prepared by first identifying the unique household combinations of fisher avidities B, C and D for all household sizes, up to and including six eligible respondents - there being 83 such combinations.

The set of these 83 combinations was then subjected to a random selection procedure in which each of the combinations yielded a chosen respondent.

The procedure was repeated 500 times to ensure that each avidity had been selected an equal (within limits) number of times. This sequence of 500 sets was systematically repeated to provide the 30 000 selection tables used in the respondent sampling stage.

This procedure resulted in equal selection probabilities for any fisher in a household, regardless of their fishing avidity (i.e. whether B, C or D).

Non-Fisher Sample

For the ‘drop-in fisher survey’ it was decided to survey non-fishers (from either a fishing home or a non-fishing home) twice during the one year survey period – once at the 6 month mark (end of March 2012), and finally at the end of the survey.

A list of ‘A avidity’ respondents from all households was prepared at the conclusion of the screening survey. A random sample of 3000 respondents was drawn from this list. Of these 3000 ‘A avidity’ respondents, 2621 were surveyed from non-fishing homes, and 379 from fishing homes.

4.7 SAMPLE DESIGN – SUBSTITUTION

When non-response occurs during the screening survey, there is an option of substituting the non-respondent with a further respondent. This further respondent could either be a random substitute or a specially designated substitute.

It was decided there would be no substitute for non-response within this survey for either the fisher sample, or the non-fisher sample.

4.8 LOCATION OF SAMPLED MESHBLOCKS

The number of meshblocks sampled is shown on the following map of New Zealand (Figure 3) and by Territorial Local Authority name in Table 2. The figure gives a quick view of the geographical spread of the sample per Territorial Local Authority area. The size of the number is a reflection of the size of the number of permanent private occupied dwellings in the area.

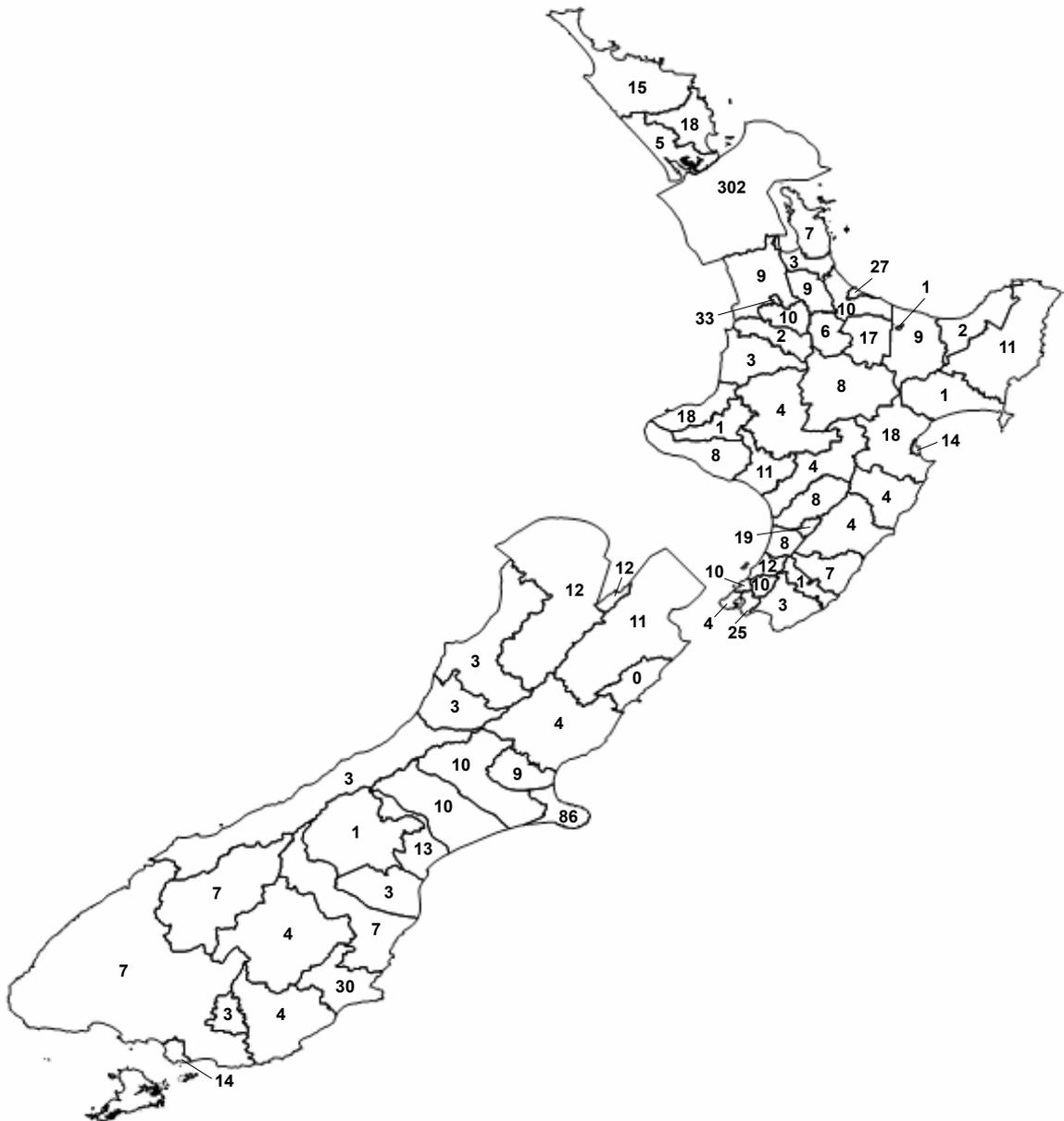


Figure 3: Number of meshblocks sampled from each Territorial Local Authority area of New Zealand by the NPS survey 2011–2012.

Table 2: Number of meshblocks sampled from each Territorial Local Authority area of New Zealand by the 2011–12 NPS survey.

Territorial Local Authority Area	Meshblock Count	Territorial Local Authority Area	Meshblock Count
Far North District	15	Rangitikei District	4
Whangarei District	18	Manawatu District	8
Kaipara District	5	Palmerston North City	19
Rodney District	23	Tararua District	4
North Shore City	49	Horowhenua District	8
Waitakere City	42	Kapiti Coast District	12
Auckland City	99	Porirua City	10
Manukau City	66	Upper Hutt City	10
Papakura District	9	Lower Hutt City	25
Franklin District	14	Wellington City	47
Thames-Coromandel District	7	Masterton District	7
Hauraki District	3	Carterton District	1
Waikato District	9	South Wairarapa District	3
Matamata-Piako District	9	Tasman District	12
Hamilton City	33	Nelson City	12
Waipa District	10	Marlborough District	11
Otorohanga District	2	Buller District	3
South Waikato District	6	Grey District	3
Waitomo District	3	Westland District	3
Taupo District	8	Hurunui District	4
Western Bay of Plenty	10	Waimakariri District	9
Tauranga City	27	Christchurch City	86
Rotorua District	17	Selwyn District	10
Whakatane District	9	Ashburton District	10
Kawerau District	1	Timaru District	13
Opotiki District	2	Mackenzie District	1
Gisborne District	11	Waimate District	3
Wairoa District	1	Waitaki District	7
Hastings District	18	Central Otago District	4
Napier City	14	Queenstown-Lakes District	7
Central Hawke's Bay District	4	Dunedin City	30
New Plymouth District	18	Clutha District	4
Stratford District	1	Southland District	7
South Taranaki District	8	Gore District	3
Raupehu District	4	Invercargill City	14
Wanganui District	11		

5. SCREENING AND ENROLMENT

5.1 OUTCOME SUMMARY

Within the 1000 sampled meshblocks, 30 390 dwellings were visited, of which 24 199 were successfully screened (i.e., a household member agreed to answer the screening questions) and 7013 fishers of B, C or D avidity¹ aged 15 or more agreed to be enrolled in the 12 month 2011–12 national panel survey (see Table 3). Over 80 percent of those enrolled agreed to text respond and the remainder agreed to report by phone.

Table 3: Number of dwellings visited and contact outcomes.

Screening Summary	
Dwellings Visited	30 390
Vacant	1 777
Household refusal	1 677
No Reply	1 515
Access Denied *	667
Unavailable **	203
Language	156
Infirm	105
Not Available ***	40
Partial	30
Other	21
Screened	24 199
	↓
Enrolment Summary	
Not Eligible	16 390
Respondent Refusal	589
Unavailable **	76
Not Available ***	55
Other	45
Language	14
No Reply	12
Incapacitated	5
Enrolled	7 013

* Gate, dog etc.

** Not in area during survey dates

*** Not available when house visited

□

In the screened sample, 7809 households included at least one fisher and 3890 of these had one or more 'A Avidity' fishers (stated non-fishers).

5.2 SCREENING RESPONSE RATE

The screening response rate of 86% was calculated as follows:

The response rate calculations were based on the screening outcomes for all sampled dwellings as recorded by the interviewers. The outcomes were allocated to categories in the following manner (Table 4) for each of the PSU's in the sample, $i = 1$ to 1000.

¹ See page 12 for avidity classifications.

Table 4: Categorisation of screening outcomes.

Category	Outcomes
Interviews (a_i)	Interviews (I)
Not Eligible (b_i)	Not eligible (NE), Vacant (V), Unavailable (U)
Eligibility Not Established (c_i)	No reply (NR), Access Denied (AD), Household refusal (HR)
Eligible Non-Response (d_i)	Respondent refusal (RR), Not available (NA), Appointment (APT), Language (L), Incapacitated (INC), Hospitalised (HOS), Partial (P), Other (OTH)

An estimate of the eligible households within the PSU is calculated.

$$a_i + d_i + \frac{c_i \cdot (a_i + d_i)}{(a_i + b_i + d_i)}$$

The response rate is the number of interviews achieved divided by the estimated eligible households.

$$\frac{a_i}{a_i + d_i + \frac{c_i \cdot (a_i + d_i)}{(a_i + b_i + d_i)}}$$

This reduces to the following:

$$\frac{a_i \cdot (a_i + b_i + d_i)}{(a_i + d_i)(a_i + b_i + c_i + d_i)}$$

The response rate for a group of PSU's is the average of the response rate for the individual PSU's, weighted by the estimated eligible households within each.

Applying this formula to the screening outcomes resulted in the final screening response rate.

$$\frac{24\,199 \times (24\,199 + 1980 + 352)}{(24\,199 + 352) \times (24\,199 + 1980 + 3859 + 352)} = 86.0\%$$

5.3 ENROLMENT RESPONSE RATE

The enrolment response rate, calculated by the same method as for the screening response rate, was 90.8% (i.e. 90.8% of 86%).

$$\frac{7013 \times (7013 + 16\,466 + 708)}{(7013 + 708) \times (7013 + 16\,466 + 12 + 708)} = 90.8\%$$

5.4 AVIDITY MIX OF SCREENED SAMPLE

The following table (Table 5) shows the raw number of those in the sample who agreed to be screened, according to the proxy reported fishing avidity of household members and their age group.

Table 5: Avidity mix of screened sample.

	TOTAL	Age Group (Years)								
		15–19	20–24	25–34	35–44	45–54	55–64	65–74	75+	Missing
Unweighted Base	51 508	4 515	4 929	8 002	9 475	9 035	6 822	4 822	3 330	578
A-Never/used to/gave it up/ retired from it now	38 780 75.3%	3 355 74.3%	3 712 75.3%	5 907 73.8%	6 748 71.2%	6 384 70.7%	5 076 74.4%	3 942 81.8%	3 105 93.2%	551 95.3%
B-Occasionally, but not more than 3 times a year	6 584 12.8%	698 15.5%	679 13.8%	1 100 13.7%	1 434 15.1%	1 314 14.5%	851 12.5%	383 7.9%	110 3.3%	15 2.6%
C-Several times a year, about 4-9 times a year	3 858 7.5%	322 7.1%	351 7.1%	635 7.9%	821 8.7%	834 9.2%	537 7.9%	288 6.0%	60 1.8%	9 1.6%
D-Regularly, 10 times a year or more	2 286 4.4%	140 3.1%	187 3.8%	360 4.5%	472 5.0%	502 5.6%	358 5.2%	209 4.3%	55 1.7%	3 0.5%

The random selection of fishers (B, C and D avidity) was taken from this sample. A further sample of non-fishers as potential 'drop ins' was later taken at the six month stage from the screened 'A avidity' household members.

6. EXPANSION TO POPULATION-LEVEL DATA

6.1 ESTIMATION METHOD

The data on recreational fishers is collected from a probability based sample survey. Hence the usual method of estimating population quantities is to weight the respondent's data by the inverse of their probability of selection. Non-response at the respondent level (unit record level), occurs in two ways: households who refuse to participate in the avidity screening questionnaire; and people who when recruited to the panel refuse to participate. To account for this non-response, the selection (sample design) weights were modified.

The probability of selecting a sampled meshblock is:

$$\frac{nM_i}{\sum_N M_i}$$

where n, N, M_i are respectively the sample size, population number of meshblocks and number of occupied dwellings in meshblock i at the 2006 Census. The probability of selecting a dwelling within a meshblock is:

$$\frac{m_i}{M'_i}$$

where m_i, M'_i are respectively the number of dwellings screened for fishers in meshblock i and the number of occupied dwellings in meshblock i when NRB re-enumerated the meshblock at the time of the survey. If there are f_{ij} fishers in dwelling j in meshblock i , then the probability of selecting a fisher is:

$$\frac{1}{f_{ij}}$$

The overall probability of selection is the product of these three probabilities and the selection weight is the inverse of this overall probability:

$$\frac{\sum_N M_i M'_i f_{ij}}{n M_i m_i}$$

Since there is some non-response these selection weights are multiplied by a factor

$$\frac{(a_i + d_i)(a_i + b_i + c_i + d_i)}{a_i(a_i + b_i + d_i)}$$

where a_i, b_i, c_i, d_i are respectively the number of Eligible Responding Households, Not Eligible Households, Eligibility Not Established Households, and Eligible Non-Responding Households in meshblock i . This is the inverse of the meshblock screening response rate as discussed in Section 4.1. Call this weight the adjusted selection weight.

Although the median adjusted selection weight for fishers recruited to the panel was 106.60 with interquartile range (58.64, 218.40), there were some fishers with very large weights, for three reasons. Firstly, the meshblock they lived in had substantial growth in the number of dwellings so that M'_i was very much greater than M_i and hence their ratio was much larger than 1. Secondly the response rate in their meshblock was much lower than average, for example 40% instead of say 80%. Thirdly, they lived in a dwelling with many fishers. Although variability in weights contributes to the overall sample error, truncating the weights (which is known as winsorization) produces some bias. For the more commonly caught species (see Section 10), the impact on the estimates by these respondents with extreme weights was much smaller than the sample errors in part because there are a large number of fishers and trips contributing to the estimate² so the weights were not truncated.

Some people refuse to participate after being recruited to the panel, but this non-response was adjusted at the calibration stage.

The above non-response adjustment controls for broad meshblock characteristics, for example, inner city dwellings may be harder to contact than suburban dwellings. But non-response also varies according to broader geographic regions as well as demographic characteristics (gender, age, ethnicity).

Having conditioned on these characteristics, non-respondents are usually assumed to be missing at random. These sorts of characteristics could be used to build a model of the probability of responding and these model derived probabilities could be used to further adjust the selection weights at the level of an individual. An alternative, which in practice has a similar outcome is to calibrate the respondent data to known population totals for these characteristics. The details of the calibration will be discussed more fully in Section 7.5. But the next paragraphs will give a summary of what is meant by calibration.

The basic idea behind calibration is an adjustment of the (non-response adjusted) selection weights derived from the inverse of the inclusion probabilities adjusted for non-response. Call these the design weights

$$d_k = \frac{1}{\pi'_k}$$

(for respondent k). The adjustment is made so that the new weights, call these w_k , match known population totals of certain auxiliary variables, e.g. for age group or sex counts but are also as close as possible to the d_k 's. In effect the d_k 's can be expressed in terms of what are called g -factors:

² For example, for snapper, for a fisher who both had an extreme weight and whose number of trips and total snapper catch were in the top 5% of fishers, truncating their adjusted selection weight to the 99% percentile of those who caught snapper reduces their weight by a third, and the estimate of snapper caught by about 40% of the sample error.

$$w_k = g_k d_k \text{ or } w_k = \frac{g_k}{\pi_k}.$$

It is sensible to consider making the g -factors close to 1 by minimising an appropriate distance between 1 and the g -factors. For example, using the usual Euclidean distance we would minimise:

$$\sum_{k=1}^N (g_k - 1)^2$$

where the sum is over all the population. Of course we only have a sample so we need to minimize a sample version of this:

$$\sum_{k=1}^n \frac{1}{\pi_k} (g_k - 1)^2$$

or

$$\sum_{k=1}^n \frac{1}{d_k} (w_k - d_k)^2$$

Hence the g -factors are sample dependent. This quantity is minimised subject to the new weights, when applied to the variables thought to be related to non-response, summing to known population totals. For example, if x_i is a (1-0 or dummy) variable which is 1 if the respondent is female aged 35–44 and zero otherwise, and the population count of such people is t_{x_i} , then the constraint is:

$$\sum_{k=1}^n w_k x_{ik} = t_{x_i}.$$

One disadvantage of the Euclidean distance is that the calibrated weights can be negative. A distance which avoids this problem is

$$\sum_{k=1}^n w_k \log \frac{w_k}{d_k} - w_k + d_k$$

based on the iterative proportional fitting algorithm used to get maximum likelihood estimates in contingency tables, and this approach has been used for this survey. With this distance, calibration can be seen to be a generalisation of the raking ratio method of adjusting sample totals to census totals where there is an incomplete multiway table. For example, there is no sex by age by ethnicity table but only a sex by age table and a sex by ethnicity table.

With a panel survey, it is possible that a person responds for some weeks but not others, for example, because they cannot be contacted. Where possible, these missing data have been backfilled at a subsequent interview. Some method of adjusting for missing data has to be applied where this backfilling has not been possible. There are two possibilities. The first is to delete the person (and all the good information) from the sample and readjust the weights. The second is to use that person's or other respondent's recent information to impute for the missing values. This is discussed in more detail in Section 7.2.

With any survey item non-response can occur. For any time period during the 2011–12 survey, some questions may not be answered. Fortunately this was not the case with key variables such as species, platform, method and area. But some participants refused to give their age or ethnicity including 21 stated avidity A, 8 stated avidity B, 8 stated avidity C and 6 stated avidity D. For 4 people recruited to the panel (stated avidity B, C, or D) we did not have a gender. So these missing values were imputed randomly based on avidity and the non-missing age gender or ethnicity distributions in the sample.

6.2 TREATMENT OF MISSING DATA

The people who did not give information for the 53 weeks the survey ran can be categorised as follows.

1. People who exit the population: In the sample of 4126 fishers who fished at least once there are 117 of these (2.8%). There are three ways this can occur: people who die during the year, people who migrate overseas during the year, people who move out of private dwellings, for example go to prison. These reflect the natural dynamics of the population. We do not capture births to the population, for example people who turn 15 during the survey, or who immigrate to New Zealand. This is for cost reasons. We might expect about 100 000 such people in the population or about 3% of the population age 15 and over. In the screening sample we would expect to pick up about 300 such people of whom about 30–40 would be fishers.
2. People who have not been able to be contacted or have resigned from the survey and where data are missing for too many weeks: In the sample there were 246 of these (6.0%). The cut-off for 'too many weeks missing data' is somewhat subjective. Many of these people have long continuous spans of missing data often ending in a resignation, as opposed to long continuous spans of non-missing data interspersed with the occasional missing week. Hence the motivation for the cut-off was whether data were available from that person for the summer season (in particular over the summer holidays) when fishing activity is highest. This suggests a cut-off of about 23 weeks: week 23 of the survey being the end of February. It is usual in household surveys to identify key variables/questions which if not answered lead to the whole record being dropped and the non-respondent being imputed by adjusting the weights. For example, in the Statistics New Zealand Labour Force Survey, if labour force status cannot be established, the record is dropped.
3. People who we would not expect to have fished in the missing weeks: In the sample there are 194 of these (4.7%). Essentially, this includes very avid fishers who have about one or two missing weeks, or not so avid fishers who have a moderate number of missing weeks.
4. People who we would expect to have fished in the missing weeks: In the sample there are 40 of these (1.0%).

The imputation categories according to stated fishing avidity is shown in Table 6. For Category 1 people their weight is retained and they remain in the sample with no imputation for the missing records. For Category 2 people their weight is set to zero: effectively the same decision as a recruited person who refuses to participate at the outset. The expectation for Category 3 and 4 people is worked out from their activity during the weeks when they did participate in the survey. The probability of these people fishing in a week is calculated by averaging over all weeks, so this is potentially biased during the summer holidays. This is multiplied by the number of missing weeks and, if this rounded is less than 1, they are assumed to have not fished during the missing weeks. So the Category 3 people retain their weight and no records are imputed. Category 4 people are candidates for imputing.

Table 6: Imputation category by stated avidity.

Imputation Category	Stated Avidity		
	B	C	D
1. Don't Impute: death in pop	62	40	15
2. Don't Impute Adjust Weights: too many missing weeks	115	77	54
3. Don't Impute: Not expected to fish	96	59	39
4. Possibly Impute	17	13	10

Table 7 gives the (weighted) percentage of total fish over all species caught by people in the four categories for the weeks they responded.

Table 7: Imputation category by catch.

Imputation Category	Finfish	Non-finfish Species
	%	%
1. Don't Impute: death in pop	0.7	0.7
2. Don't Impute Adjust Weights: too many missing weeks	0.5	1.2
3. Don't Impute: Not expected to fish	2.3	1.3
4. Possibly Impute	1.5	1.0

The imputation method used was a form of nearest neighbour imputation. The data used to determine a neighbour was fishing area, species, platform and method. For a fisher with a missing week, their data for the most recent non-missing week was used to define the nearest neighbour classes. For example, if they caught snapper by rod in a trailer motor boat in the Inner Hauraki Gulf, we would look for other fishers who fished in the week of missing data with these characteristics.

Table 8 gives the number of different fishing areas, platforms, methods and species for the fishers we might impute.

Table 8: ‘Nearest neighbour’ parameters.

		Fishing Area								
Number of areas		1	2	3	5					
Number of fishers		21	11	6	1					
		Platform								
Number of platforms		1	2	3	5					
Number of fishers		22	10	6	1					
		Method								
Number of methods			1	2	3					
Number of fishers			23	8	8					
		Species								
Number of species	of	1	2	3	4	5	6	7	8	11
Number of fishers	of	4	13	6	3	2	2	4	1	1

After analysing the data it seemed questionable to impute the missing weeks for these fishers:

- Thirteen of these were in the top decile of finfish fishers or other marine species fishers;
- Nine had no possible donor including one in the top decile;
- Ten had only one possible donor including two in the top decile;
- Looking at the number of fishers in fishing areas by week we see a big fall off after the end of the summer season (week 31) and during July and August (weeks 41–48);
- Some appeared likely to genuinely stop fishing: e.g., a fisher who last fished in week 30 at the end of the summer season, a fisher who last fished in week 49 that caught nothing, a fisher who last fished in week 21 (the second week of February) but fished frequently all January (otherwise only once in November), a fisher who last fished in week 27 (the weekend before Easter), etc.;
- In some cases the response to the survey appeared complete, e.g., a fisher who fished in week 53 for which there were contact issues for 6 weeks after week 1.

The decision was made to leave these records as they were, recognising that there could be a small undercount in the number of finfish or other marine species caught.

6.3 VARIANCE ESTIMATES

The method of calculating the variance for the numbers was to use a delete-1 jackknife where the unit deleted was the primary sampling unit (PSU), a SNZ meshblock.

Suppose we have an estimator $\hat{\theta}$ of some population parameter θ based on the full sample. Then the Jackknife Technique has the following steps.

1. Partition the sample of size n into K random groups of equal size m . We assume that, for any given sample s each group is a simple random sample from s even if it itself is not a simple random sample.
2. For each group $k \in K$, calculate $\hat{\theta}_{[-k]}$, an estimator of the same functional form as $\hat{\theta}$ but based on the data omitting the k th group.

3. Define for each $k \in K$, the k th pseudo-value $\hat{\theta}_{-k} = K\hat{\theta} - (K-1)\hat{\theta}_{[-k]}$. This is motivated by the case of the usual sample mean estimator where the sample value X_i can be written as $X_i = n\bar{X} - (n-1)\bar{X}_{[-k]}$ where \bar{X} is the sample mean for the full sample and $\bar{X}_{[-k]}$ is the sample mean for the sample with the k th observation omitted.
4. Form the Jackknife estimator of θ $\hat{\theta}_{[JK]} = \frac{1}{K}\sum_1^K \hat{\theta}_{-k}$ which is an alternative estimator to $\hat{\theta}$. The difference between these two estimators is the Jackknife bias.
5. Form the Jackknife variance estimator $\hat{V}_{[JK]} = \frac{1}{K(K-1)}\sum_1^K (\hat{\theta}_{-k} - \hat{\theta}_{[JK]})^2$.

The estimator $\hat{V}_{[JK]}$ is used to estimate $V(\hat{\theta})$ as well as $V(\hat{\theta}_{[JK]})$. If the $\hat{\theta}_{-k}$'s were uncorrelated then $\hat{V}_{[JK]}$ would be unbiased for $V(\hat{\theta}_{[JK]})$. But in general they are correlated so unbiasedness does not hold. There are no exact results for the properties (bias variance, asymptotic distribution, etc.) of the Jackknife estimator and the Jackknife variance estimator for complex estimators, but empirical evidence suggests that it gives good estimates of sample errors for many complex statistics.

A little algebra shows that $\hat{V}_{[JK]}$ has an alternative representation as $\frac{K}{(K-1)}\sum_1^K (\hat{\theta}_{[-k]} - \bar{\theta})^2$, where $\bar{\theta}$ is the mean of the $\hat{\theta}_{[-k]}$'s. This is possibly a more intuitive way of thinking about it as a modified variance of the Jackknife estimates.

If the Jackknife bias is large then it is usual to use the Jackknife Mean Square Error estimator $\hat{V}_{[JK2]} = \frac{1}{K(K-1)}\sum_1^K (\hat{\theta}_{-k} - \hat{\theta})^2$ or alternatively $\frac{K}{(K-1)}\sum_1^K (\hat{\theta}_{[-k]} - \hat{\theta})^2$.

Usually in the case of complex designs the *naive* Jackknife estimator given above is adjusted so that for linear estimators the Jackknife variance corresponds to the usual analytic expression of the variance.

For multistage sampling such as the National Panel Survey the random groups for the Jackknife technique are usually the primary sampling units (PSUs); meshblocks in the case of this study but quite often random groups of PSUs. For stratified samples one has to be more careful. One approach is to delete a PSU (or random group of PSUs) from one stratum only.

Because the non-response adjustment was carried out at the meshblock level this variance estimation procedure incorporates variability due to this process. The jackknife estimates were calibrated to the population totals. This means that the variance estimates include the variability due to different types of non-response in the categories of the calibration variables. As mentioned above there are two usual methods of calculating the variance: about the average of the jackknife estimates; and about the estimate. The latter has been used but because of the calibration these are effectively the same.

6.4 FISH WEIGHTS EMPLOYED

NIWA provided mean fish weight estimates for 26 species of finfish and 3 species of other marine species (Hartill & Davey 2015). These were based on fish measurements made during creel surveys of recreational fishers throughout New Zealand. In some cases separate mean weight estimates were provided for summer and winter. In other cases a yearly estimate was used which is a (weighted) average of the two seasonal weights. For the most commonly caught species there were often estimates for all or almost all Quota Management Areas (QMAs). In other cases the QMA weights are an average across all or some QMAs.

Final harvest estimates for a Fishstock were calculated by applying the appropriate (i.e. at the QMA level) mean fish weight to the respondent's catch count and then applying their calibrated weight and summing up across all respondents.

Because the weights of the major fish species also have measurement error, in theory this should be incorporated into the estimates of the weights. The samples to measure the species' weights is independent of the panel survey, so the usual estimator for a product of two independent variables has been used: if X, Y independent then

$$V(XY) = E(X)^2V(Y) + E(Y)^2V(X) + V(X)V(Y)$$

and hence the coefficient of variation squared (CV) is

$$\frac{V(XY)}{E(XY)^2} = \frac{V(XY)}{E(X)^2E(Y)^2} = \frac{V(Y)}{E(Y)^2} + \frac{V(X)}{E(X)^2} + \frac{V(X)}{E(X)^2} \frac{V(Y)}{E(Y)^2} = cv(X)^2 + cv(Y)^2 + cv(X)^2cv(Y)^2$$

For the most common caught species this CV is negligible because in most cases the CV of the fish weights are very small and the CV of the fish counts are less than 1 so that the last term, the product of the CVs is negligible. The CV of the product of the fish count and fish weight typically increased the CV by 0.01%, to 0.2%. So in practice they could be ignored.

6.5 DETAILS OF CALIBRATION

The intention was to calibrate the response adjusted selection weights to known population totals from the 2011 National Census of Population and Dwellings undertaken by SNZ: specifically by gender, age, and ethnicity at the regional council level. However, the 2011 Census was postponed because of the Christchurch earthquake and it was ultimately conducted on 5 March 2013. So the data were not available for estimation.

Instead, SNZ estimated resident population (ERP) data have been used. These data are accurate at the regional council level for coarse classifications of age groups and gender. The classifications by ethnicity are more problematic. The only reliable estimates are for the two broad classifications Maori and non-Maori which are published for the June year and for finer age groups.

As the panel survey started in October, the relevant population classification totals were provided by the September ERP. However, there is little difference between the estimates at the five-year age groups by gender, typically less than 0.5%.

Another complicating factor is that actual age was not collected in the panel survey, rather age in age groups: "15–19", "20–24", "25–34", "35–44", "45–54", "55–64", "65–74", "75+".

So there were two obvious ways to calibrate. We could either model using variables coarse age group, sex and ethnicity plus coarse age group and region or fine age group, sex and ethnicity plus region alone. Thinking in model terms:

agegp2+sex+eth, agegp2+region, where agegp2 is the coarser age group "15–34" "35–64" "65+"

or

agegp+sex+eth, region, where agegp is the finer age group "15–19" "20–24" "25–34" "35–44" "45–54" "55–64" "65–74" "75+".

Finally, in the panel survey some respondents refused to give their gender, age group or their ethnicity including 21 stated avidity A respondents, 8 stated avidity B, 8 stated avidity C and 6 stated avidity D. For 4 people recruited to the panel (stated avidity B, C, or D) there was no stated gender. So these missing values were imputed randomly based on their avidity alone.

The non-response adjusted selection weights by stated avidity have a Kish design effect (essentially 1 plus the square of the CV of the weights) of 1.176, 1.411, 1.564, 2.162 for the stated avidities A, B, C, and D respectively.

Using the calibration increases these slightly to: 1.207, 1.456, 1.601, 2.171 for the first option and 1.175, 1.459, 1.662, 2.185 for the second option.

After some analysis, the second option agegp+sex+eth, region was chosen.

The “coverage” factors (how much the sample estimate is rated up or down to match the population total) for the regional council estimates and age group gender and ethnicity are given for stated avidity B, C, or D in Tables 9 and 10.

Table 9: Survey coverage by region.

Region	Coverage	Region	Coverage
Auckland Region	1.12	Northland Region	1.29
Bay of Plenty Region	1.11	Otago Region	1.11
Canterbury Region	1.09	Southland Region	1.12
Gisborne Region	0.94	Taranaki Region	1.10
Hawkes Bay Region	1.12	Tasman Region	1.29
Manawatu-Wanganui Region	1.15	Waikato Region	1.10
Marlborough Region	1.20	Wellington Region	1.10
Nelson Region	1.06	West Coast Region	1.40

Table 10: Survey coverage by key demographics.

Age group	Gender	Ethnicity	Coverage	Age group	Gender	Ethnicity	Coverage
15–19	Male	Maori	1.44	15–19	Male	Non-Maori	1.24
20–24	Male	Maori	1.33	20–24	Male	Non-Maori	1.01
25–34	Male	Maori	1.07	25–34	Male	Non-Maori	1.38
35–44	Male	Maori	1.09	35–44	Male	Non-Maori	0.91
45–54	Male	Maori	1.06	45–54	Male	Non-Maori	1.05
55–64	Male	Maori	1.26	55–64	Male	Non-Maori	1.12
65–74	Male	Maori	1.59	65–74	Male	Non-Maori	0.98
75+	Male	Maori	3.51	75+	Male	Non-Maori	1.26
15–19	Female	Maori	1.14	15–19	Female	Non-Maori	1.09
20–24	Female	Maori	1.29	20–24	Female	Non-Maori	1.01
25–34	Female	Maori	1.58	25–34	Female	Non-Maori	1.18
35–44	Female	Maori	1.08	35–44	Female	Non-Maori	1.07
45–54	Female	Maori	1.01	45–54	Female	Non-Maori	1.22
55–64	Female	Maori	1.81	55–64	Female	Non-Maori	1.12
65–74	Female	Maori	1.35	65–74	Female	Non-Maori	1.15
75+	Female	Maori	2.04	75+	Female	Non-Maori	1.27

7. SURVEY TIMING

Surveying of fishing activity was conducted for a complete year, from 1st October 2011 through to 30th September 2012 (Table 11).

In terms of the survey timing, it was anticipated that approximately 8 weeks would be required for the face-to-face part of this survey – the screening of households and enrolling of selected people into the 'panel'.

Fishing activity was recorded on a per week basis, from Monday to Sunday. Because 1st October was a Saturday but the survey commenced on the Monday (26 September), there were in fact 53 survey weeks and the extra (not needed) first few days ‘trimmed’ at the end of the survey.

Table 11: Timing of survey phases.

TIMING	
<i>Date</i>	<i>Activity</i>
Fri 1st July 2011	Printing of “Information for the Public” sheets, Respondent Information Pamphlets, Cell Texting Guide.
Mon 18th July	Kits given to interviewers. Training commenced for recruitment interviewers.
Sat 25th July	Interviewers commenced face-to-face screening and recruitment from 1000 meshblocks. Also enumeration of the meshblocks.
Mon 8th August	First of interviewers' returned screeners and enrolments.
Mon 26th Sep	Beginning of the NPS first 'fishing week'.
Sun 2nd Oct	7.30pm - First weekly text broadcast to text enrolled B, C, D fishers.
Mon 3rd Oct	9.30am - First text reminder to non-responding text enrolled B, C, D fishers.
Mon 3rd Oct	Commencement of CATI calls to fishers, texting non-responders and non-texters.
March 31st 2012	Six-monthly CATI follow-up of A avidity fishers (drop-in fisher survey).
Sun 30th Sept	The last day for which fishing information was recorded. Final texting and CATI contact calls (including final follow-up of A avidity fishers) were commenced to determine any fishing for any unresolved fishing periods.
Wed 31st Oct 2012	Commencement of data analysis for the survey.

8. FIELD INTERVIEWER TRAINING

The practice of sampling on a meshblock basis is well established and used for many of the larger scale New Zealand Government research projects. The NRB interviewers who worked on the enumeration of meshblocks, screening of homes, and selection of respondents were generally well experienced in such activities, or if new, trained for this task.

In addition to training in meshblock sampling, further survey specific training was conducted with all interviewers on issues regarding the fishing survey. This included: the specific screening and sample selection procedures; training on how to encourage participation by the selected person/fisher; how to advise participants on what they need to do during the course of the survey (e.g., texting, telephone interviews); and how to make use of the various materials (fish identification chart, area map of NZ, information and Q&A page and website information site).

The training was delivered by NRB head office field managers, or by the 27 local area supervisors. All interviewers were provided with clear and comprehensive instructions on how to proceed on all aspects of screening, sampling and enrolment of fishers.

Approximately 145 interviewers were trained and used for the screening and enrolment phase of the survey. These interviewers were located throughout the main metropolitan and provincial centres of New Zealand. From these locations the interviewing team travelled to the selected meshblocks as required.

In most cases the interviewers used for the face-to-face phase of this survey were not the same as those used for the subsequent monitoring of panellists by text and CATI. The specialised training of CATI staff is described in Section 11.2.

9. FACE-TO-FACE RECRUITMENT

Screening and recruitment of participants into the survey was conducted face-to-face by NRB interviewers in all sampled meshblocks. This activity followed a prescribed protocol that was embedded in the field documentation completed by the interviewer as she/he proceeded through the task.

Interviewers were given a printed map of each meshblock along with a listing of the streets and home numbers that fell within the meshblock. A start point was indicated on the map to prevent interviewer influenced selection within the meshblock.

The interviewer then logged each home's address onto the sampling sheet and each call as regards the day, time and outcome of the call. This protocol enabled examination of the fidelity and productivity of the visits to the meshblock. Up to five visits were made to each household to attempt contact. Where response rate for a meshblock was poor, 'recovery' was usually attempted, with further visits made.

The interviewers encouraged the participation of householders with the motivation that the survey concerned a public resource and that the survey was in the interest of the wider public, not only marine fishers. To encourage enrolment, potential participants were also informed that there would be periodic spot prizes throughout the survey. Spot prizes included three iPads, and weekly prizes of either a case of wine or an iPod. The final response rates and anecdotal feedback suggest that the iPads in particular were effective motivators to participate.

Householders were informed fairly of the identity of the sponsor of the survey and of the purpose of the survey. More detailed information in the form of an information pamphlet was handed to the respondents who were recruited as panellists for the following 12 month survey. Where a fisher was selected in the home, additional information on the preferred texting procedure was provided to that respondent.

Home phone numbers were requested for at all contacted homes to enable auditing of contacts, to determine whether the interview was undertaken and whether it was carried out with consideration and civility. NRB's contact number was left at each home to enable the public to call in with queries.

There were only a handful of complaints regarding the recruitment phase of the survey which is testimony to the attitude and conduct of the interviewers involved. It is normal to have a few complaints for any survey, as there are those that are suspicious of visitors to the neighbourhood, disapproving of surveys *per se*, or occasionally negative to the purpose of a specific survey.

A relatively detailed classification of the outcome of each call was made using a prescribed classification of outcomes. This classification enabled a true response rate to be calculated for each meshblock. The response rate was used to monitor interviewer effort and performance and also used in weighting of the data in subsequent data set preparation. Copies of the fieldwork forms appear in the Appendices.

10. CONTACT REGIME WITH ENROLLED SURVEY PARTICIPANTS

10.1 SCHEMATIC OF SYSTEMS AND PROCESSES

The two main methods of contact with the survey participants were via SMS (Short Message Service, i.e., text messages to/from participant's cell phones) and via telephone contact, in this case organised by a high level CATI (Computer Assisted Telephone Interview) system. A schematic of the main systems and processes involved in coordinating panellist surveying is given in Figure 4.

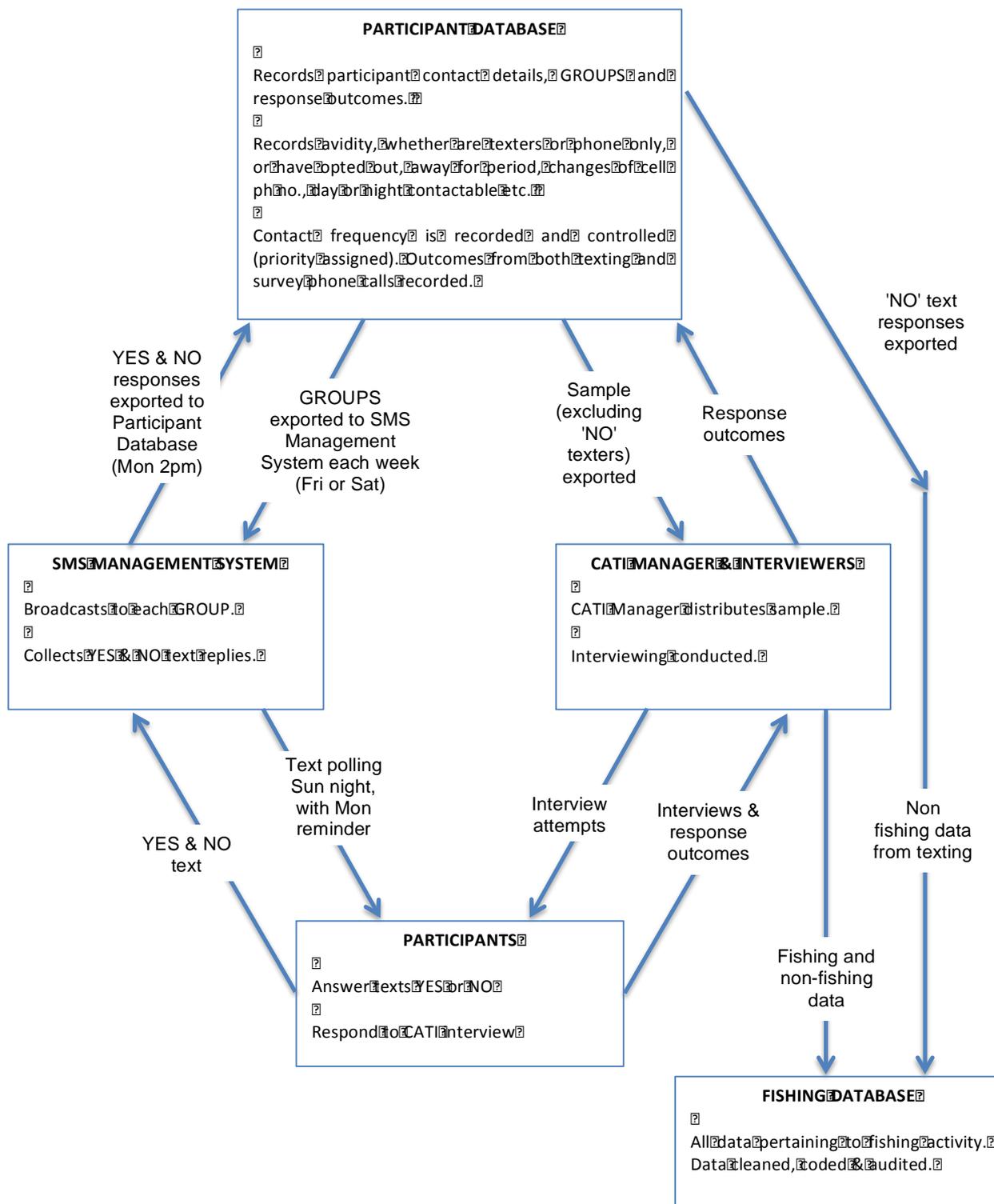


Figure 4: Schematic of systems and processes used to monitor the fishing effort and harvest of panellists over a 12 month period in 2011–12.

10.2 CHOICE OF CONTACT METHODS

Fishers who had agreed to text reporting, were first contacted by text and asked whether within a defined period (weekly, fortnight, or monthly) they had been fishing or not. SMS answer options were limited to 'YES' or 'NO'.

Where a person indicated that they had fished (i.e., texted a YES), a telephone interview was organised to gather the details of any fishing, catch, and harvest. A person who indicated via SMS that they had not fished, was not interviewed by telephone.

A person who did not send a reply text about their fishing (indicating either YES or NO) was also rung to ask about their fishing, and also asked whether there was any problem with the texting requirements, that their cell phone number was recorded correctly etc.

For participants who did not wish to be texted, or who did not have a cell phone, contact was by telephone alone. For those who indicated the lowest fishing avidity (i.e. non-fishers A1 or A2 – see 'Showcard' for definition), contact was also solely by telephone (twice in the survey period).

10.3 PARTICIPANT CONTACT SCHEDULES

Every week contact was made with a group of survey participants according to their nominated contact frequency (e.g., weekly, fortnightly or monthly). The weekly contact schedule is described in Table 12.

Table 12: Weekly contact schedule used when contacting panellists.

Sunday 7.30 pm

SMS Management System automatically broadcasts request texts to scheduled fishers. Texts spaced out over 1 hour period.

Monday 9.30 am

SMS Management System broadcasts reminder request texts to survey participants (in texting group) who did not reply to Sunday text broadcast.

Monday 2 pm

List of 'No' texters and 'Yes' texters exported from SMS Management System to Participant Database. Text replies closed for the week after this.

Monday 3 pm

List of participants to be interviewed ('Potential fishers', i.e., any scheduled for an interview who did not text 'No' for the relevant survey weeks) exported from Participant Database to CATI Manager.

Monday 4 pm

Participant Database prioritises potential respondents according to rules that can be varied according to need. The default priority is:

1. 'Yes' texters i.e., those who are believed to have fished.
2. Weekly reporters (mainly 'D avidity' – the highest avidity fishers).
3. Fortnightly reporters (mainly 'C avidity' – the second highest avidity fishers).
4. Monthly reporters (mainly 'B avidity' – low avidity fishers).

Monday evening to Thursday evening

CATI interviewers interview by taking prioritised sample automatically (and as modified by their call attempts and participant timing preference) from CATI manager.

10.4 SURVEYING FREQUENCY BY AVIDITY

The default surveying frequency used for the different avidity fishers is shown in Table 13. The schedule took into account only two fishing 'seasons' (winter versus not winter).

The schedule was based on matching the most appropriate reporting schedule according to the avidity of the fisher. This was expected to reduce the chance of annoying survey participants by an overzealous contact regime.

In addition fishers were be able to change their reporting frequency by agreement as the study progressed, either to increase the frequency (e.g., if a fisher was fishing more than had been expected), or to decrease it (e.g., if a fisher was fishing less than had been expected). This tailoring of reporting regime was believed to encourage on-going participation in the survey. A change to a fisher's schedule could also be made after discussion during the CATI interviews, or in response to direct contact with NRB.

Table 13: Default contact frequency by avidity.

	Avidity			
	A	B	C	D
Not Winter Oct to April (Incl)	6 monthly (no text)	Monthly	Fortnightly	Weekly
Winter May to Sep (Incl)	6 monthly (no text)	Monthly	Monthly	Fortnightly

Note: for this survey a month comprises 4 weeks, or 28 days.

11. SMS METHOD

11.1 ABOUT THE 'CONTACT' SYSTEM

To send and receive bulk SMS texts at specific times, a computer-based system is ideally used. For this survey, Datasquirt's 'Contact' system was used. This had a number of suitable attributes including the ability for flexible data extraction, and ability to provide a Shortcode (4 digit) 'Freetext' service (texts sent by fishers in the study were free to them). This required cooperation by the three New Zealand telecommunications providers in terms of billing arrangements.

The Contact software system is a multi-layered application which has been developed using the Microsoft technology stack c#/ASP.NET and Microsoft SQL Server. It is a system that allows two-way non-voice communications between SMS, email and fax channels. The system provides functionality not dissimilar to an automatic call distribution platform, which queues and routes phone calls from customers to relevant call centre staff using a set of configurable business rules. For non-voice communications, this includes queuing and routing any data that is text-based. The Contact 'agent desktop' is supplied via any web browser, thus removing the need to have any special computer equipment or software.

11.2 MESSAGE GENERATION

The core messages to be broadcast were set up within Contact. However, the exact contact dates for each respondent were dependent on their current contact schedule (i.e. last week, last fortnight or last month) and were exported from the Participant Database, to Contact. Message types include:

- Outbound broadcast (text request for any fishing done)
- Reminder broadcast
- Autoreply 'thank you' to YES texters
- Autoreply 'thank you' to NO texters
- Autoreply for late/other

Some examples of the text messages and timing of broadcasts are given in Appendix 9. The dates in the outbound broadcast were updated each week. The intention was to vary the non-core portion of the messages slightly to keep interest up, and where additional information needed to be conveyed. As it transpired, there was in fact little variation with compliance to the regime being relatively static over time.

The ordering of the possible reply options (NO or YES) was always the same way around. This was purposeful to keep things simple and avoid confusion. We have no evidence, either analytical or anecdotally that there should be any order effect from the rather simple reply options.

12. CATI METHOD

12.1 CATI SETUP AND MANAGEMENT

The program used for both the allocation of interviews to staff via the CATI manager, and the questionnaire itself was 'Blaise', a high-end survey tool used for more advanced surveys.

A distributed CATI on a VPS (virtual private server) was used when telephone interviewing. Interviewers phoned from their own house, but were under the control of the centralised CATI manager. Interviews were conducted via the domestic telephone system, whether to a landline or to a cell phone. Computer connection was via broadband connection. That the interviews are managed by CATI system is transparent to the respondent.

Interviewing was to be carried out from Monday evening in each week, through to Thursday evening, with further interviewing beyond this when required (e.g., Friday evening, Saturday). In practice most interviewing was completed by the end of each Wednesday evening.

The number of interviewers utilised depended on workloads and this in turn depended on the success of the texting regime. If participants did not respond to the text messages, then a CATI interview was scheduled and the amount of fishing done was checked. In the peak of the season in summer, at one point 27 interviewers were used. This number was decreased to between 11 and 16 later in 2012.

The list of fishers to be interviewed was exported from the Participant Database on Monday afternoon. Participants had already been flagged according to whether they had texted a YES, if we had not heard from them (no replies), or if they were phone-only participants. Anyone with missing information from any week was also automatically put into the CATI. Other priorities were also assigned, from time to time, where we needed to contact participants more urgently (e.g., if we had not contacted them for longer than a week period). Time preferences for phoning given by the participants were also managed by the CATI Manager software.

Each telephone interviewer worked through the common sample pool for the week, trying each number in succession. Call outcomes were recorded and any non-contacts were re-queued for contact at later

times or days. Where the participant could be contacted, interviews were conducted at that time, or appointments made if this was more suitable to the participant.

12.2 INTERVIEWER TRAINING

All CATI interviewers were provided with initial training of approximately one day duration (usually split into two halves). Training topics covered:

- Survey background
- Familiarisation with participant's survey materials
- Nautical terms
- Fishing areas and map use
- Interviewer manner
- CATI operation
- Questionnaire administration

A comprehensive 'Interviewer Manual' was provided to each interviewer. After several days experience with the CATI, interviewers were called back for a review of the processes, supplemental hints and a chance to ask any questions about the process. Extensive on-going communication by phone and email was continued with all interviewers throughout the project.

12.3 QUESTIONNAIRE DESIGN

NRB and members of MPI's Marine Amateur Fisheries Working Group devised the questionnaire. Improvements and developments of the instrument were conducted by NRB during and after the pilot survey.

The purpose of the Blaise questionnaire was to find out from each respondent whether they had been fishing at all (using any method) in a defined period (usually a week or weeks), and if so, details about fishing effort and any catch or harvest on a day-by-day basis.

The routing (branching, skips etc.) was conducted by the computer and depended on the answers given by the respondent. An overview of the major routing paths is as follows:

- For each **week** the program asked whether there was fishing on any day.
- For each **day**, the program asked about fishing trips.
- For each **trip** the program asked details of each platform.
- For each **platform** the program asked about areas fished.
- For each **area** fished the program asked about fishing method.
- For each **method** the program asked if:
 - Nothing was caught or gathered
 - Caught and all released or discarded
 - Fish or other species were caught and not discarded or released
- For each method where something was caught the program asked details on **species** caught.
- For each species caught by a group catch method (i.e., not rod/line, or spear fishing), there were further questions about any shared effort in catching them.

Note that for each **bolded** parameter above where there was more than one path that the interview could follow, the system considered each junction in turn. It asked all the questions about that parameter then

moved to the next. More complete routing and piping (sentence modification based on answers given) information is shown in the written form of the questionnaire (Appendix 13).

One improvement of the full survey questionnaire over that used in the pilot survey was that every week of the survey (i.e., potential fishing week) was shown on the interviewer's screen, so that the respondent could be quizzed about any past unresolved week. For each week where there was some fishing, the rest of the fishing questions were asked. Using this method, there was less need for 'recovery interviewing'.

Some features of the Blaise questionnaire in terms of its user interface are:

- Black text indicates text to be read by the interviewer.
- Blue text indicates information, help and hints for the interviewer (not read out).
- Not shown were answer options that could be called in. These included: refused, don't know and a remark field for selected questions (to capture qualitative comment).
- All routing (skips/branching) was automatic based on answers made.
- Various questions included 'piping', i.e., wording dropped into questions based on answers previously made.
- The program contained internal logic checks e.g. 'hard error' checking (the program does not progress without remedying the fault) or 'soft error' checking (where the interviewer must verify the answer to progress) some of which are indicated by notations in the written version of the questionnaire (Appendix 13).

In addition to the questionnaire, interviewers also referred to a comprehensive set of A3 maps to help locate the fishers' area.

13. DROP-IN SURVEY

To address the potential bias of drop-in fishers (Section 3.18) a drop-in survey was conducted. The screening and questionnaire forms are given in Appendix 14.

13.1 Sample

A random sample of 3000 'A avidity fishers' (claimed non-fishers) was drawn from all sampled homes where there was at least one declared non-fisher.

2621 from non-fishing homes
379 from fishing homes (at least one B, C or D fisher)

13.2 Method

A survey of the non-fishers (the Drop-In Fisher Survey) was conducted at the six month mark (close to the most likely summertime fishing) and again at the end of the main survey as a final check.

The method was telephone interview using paper-based sampling sheets onto which outcomes were recorded. Up to six calls were made to every respondent, for whom a valid phone number was available, and call outcomes recorded for each attempt.

Eleven interviewers were used. These were the same interviewers as used for the CATI operation since they were already fully trained and conversant with the question stream, maps, species etc.

The first wave of the drop-in fisher survey was put into the field in the beginning of April 2012, and fieldwork completed by the end of May. The final wave of the survey commenced in October 2012 and was completed early November.

Where contact was made, the respondents were asked if they had marine fished at all (any method) in the last six months. Questionnaires were only used where there was some fishing, whether there was a harvest or not. Otherwise the outcome was recorded on the sampling sheet. One questionnaire per fishing day was used. The run of questions emulated that of the CATI questionnaire used to monitor the enrolled fishers.

14. DATA TREATMENT

14.1 CODING CHECK

A coding check was conducted concurrently for the correctness of the interviewer's assignment of the fisher's report of area fished to the area code. Specifically the question stream asked for the nearest town/city and nearest land point as a means of checking where the fisher had fished. Since interviewers have little time during the interview to ensure that the correct area code is entered, an expert coder confirmed this step once the data was received at the data processing step. This work was carried out week-to-week as the data was received from the CATI system.

14.2 COHERENCE CHECKING

Although the CATI driven questionnaire protected against many illogical or aberrant answer options – whether respondent or interviewer originated – by concurrent hard and soft error checks, it is generally prudent to carry out additional range and logic checks on the captured data. The LSMS data was checked and cleaned in this way, from week to week.

Where a suggestion of respondent misreporting or interviewer mis-entry on the keyboard was discovered and not able to be resolved, a callback to the respondent was used to resolve the issues.

14.3 AUDITING FISHERS

One of the issues with an on-going monitoring style of survey is respondent burden. The design of this survey was intended to minimise this as much as possible, via the use of texting, non-requirement to keep a fishing diary and brisk and controlled CATI surveying. In keeping to this minimal intrusion ideal, auditing of fishers reported catch was as limited as possible.

Some auditing was conducted (around 70 calls) where there was data recorded that seemed worthy of verification. Examples of data that might be verified are: unusually high catches, missing species information, insufficient location information. The bulk of calls were regarding high catch counts.

15. DISCUSSION

The design and implementation of the NPS 2011–12 reflects to a large extent the selection of methods and the adaptation of technology to enable us to interact more effectively with fishers as people.

People are losing attachment to landline phones and in any case may dislike or distrust or fail to be motivated by enrolment in research on the phone. We have recognised this and accommodated it by selecting face-to-face enrolment, achieving over 80% co-operation.

Even if they are interested in recreational fishing, most fishers are not sufficiently motivated to record the details of the recreational fishing for a full year for statistical purposes. The task of recording may even reduce the enjoyment that they have from recreational fishing. We removed this task from the participants, placing the load of questioning and recording fully with the research interviewer.

People tend to respond negatively when subjected to research steps that reflect the researcher's plan and needs with little sensitivity to their own experience. We responded to this by building in adaptivity both in how frequently we contacted them (to minimise intrusion) and in the way we took them through the reporting of their fishing harvest (greater self relevance), using sophisticated branching and skips in the CATI interview.

People experience or perceive remembering and recalling as requiring at least some effort. With no reward for accuracy, recall becomes prone to warp from recall bias (e.g., telescoping) and reporting bias (e.g., satisficing) and is inclined to slip in accuracy. We adapted to these effects by placing the recall closer to the harvest event, and partitioning the recall with questions likely to trigger memory of the event relatively precisely.

Both electronic (online, smartphone apps) and paper diaries rely on one or more prompt calls or postcards to nudge participants into entering their information. Participants experience this as "push" rather than "pull". The NPS design utilises elicitations rather than prompts. People are drawn out to talk through their fishing at times close to that fishing. We see elicitation as more agreeable than prompts as a way to get participants to provide information.

Two new technologies were employed to good effect in this survey. Both technologies have evolved over the last decade or more and were applied in novel ways in the NPS. These are the cellphone based SMS two-way texting, and the software articulated and driven interviews. Both of these technologies are a good fit to human nature and behaviours. On the other hand smartphone and online based technologies as used in surveys appear to place economy ahead of data quality, by turning the survey back to the self-completion model and reintroducing the shortcomings and participant resistance associated with their paper based predecessors.

It may be possible with further innovation to improve the sample's coverage of niche fishers and niche fisheries, for example where high value species are harvested from a limited number of areas by a relatively small proportion of fishers.

16. ACKNOWLEDGEMENTS

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18. APPENDICES

APPENDIX 1: FIELD INTERVIEWER INSTRUCTIONS

10-091

FISHING SURVEY INTERVIEWER INSTRUCTIONS

BACKGROUND

NRB has been commissioned by the Ministry of Fisheries to conduct a large-scale research project on their behalf. The chief aim of this research is to establish the marine fish harvest in NZ from recreational fishing. To do this we draw a random sample of New Zealanders to measure how many people do marine recreational fishing, and what they catch.

This data will provide statistics on the state of our fisheries and help in the sustainable management of these fisheries.

Your role:

1. "Screen" all your households (i.e., collect demographic information on all adults in the house).
2. "Enrol" fishers on to a panel.

(Beginning in October, these fishers will be contacted throughout the following year by phone or text, to ask about their fishing activity).

FIELD DATES Saturday 16 July – Sunday 18 September.

Please return completed meshblocks to your Supervisor as soon as they are done. Work must be returned in the original plastic bag, complete with all documents relating to that meshblock.

As we need regular returns throughout the fieldwork period, please work consistently and keep up the pace. Work meshblocks simultaneously, and map out your route around all your meshblocks so they are worked in the most productive and economical way.

HOURS OF WORK

Weekends: 10.00am – 5.00pm

Weekdays: 3.30pm – 5.00pm (NB: this finish time may extend as evenings become longer)

You may work outside these hours if you have an appointment, or in meshblocks where there are many people home during weekday hours.

BRIEFING

As well as being briefed on all the procedures relating to this survey, your Supervisor will go through "doorstep technique" with you. This is useful information in minimising refusals and you will find it helpful in building your confidence, especially if you are new.

In addition, there are some practice screeners for you to do at the briefing, to test your skills on accurate respondent selection.

REVIEW

After the briefing and before you start fieldwork, you need to take the time to review and practise. Read through the notes again and thoroughly familiarise yourself with all procedures, including the correct application of outcome codes on sampling sheets. Also read through the brochures, etc, that are handed to respondents; you should be very familiar with these forms as you will be explaining them to fishers.

IDENTIFICATION

Please ensure you wear your ID badge at all times when you are in the field.

YOUR KITS

- Interviewer kits include standard documents such as showcards and wagesheets.
- Meshblock kits contain all the paperwork that you need to work in individual meshblocks, e.g., sampling sheets and screeners.

You must always have these kits with you in the field.

ENUMERATING

The usual map and street list is provided to identify the location and boundaries of each meshblock. As always, all fieldwork must be conducted within the boundary of each meshblock, as defined by the bold lines on the map. Any contact or screening done outside this boundary is unusable and will be deleted.

Your first task is to enumerate. This means counting every residential dwelling in your meshblock. Do not count businesses, shops, industrial premises, etc, unless there is a permanent dwelling attached. (For example, dairies sometimes have a flat above the shop).

Count each flat, apartment, or unit as a separate dwelling. Granny flats are also included as a separate dwelling if they are self-contained (i.e., have kitchen and bathroom facilities).

Record the number of dwellings counted in the top right hand corner of the sampling sheet, in the “enumeration count” box. Also record the “census count”, which you will find on the meshblock kit label under “dwellings”. This is the number of private dwellings present in the meshblock as at the last census. The number may have increased or decreased since then.

DRAWING YOUR SAMPLE

Having counted all residential dwellings, you now go back to the startpoint, marked as a red asterisk on your map. You may start door knocking at this house. From there you contact the first 32 households. There is no ‘N’ factor so you contact 32 consecutive dwellings. If your meshblock contains less than 32 households, contact ALL the dwellings in the meshblock and then stop, regardless of number (i.e., do NOT go outside your meshblock to make up the numbers).

CALLBACKS

Make up to 5 calls to each household, recording date, time and outcome code/s for each call.

Try to spread your calls out over weekend and evening times, so as to maximise your chances of finding someone at home. For example, 11am Saturday, 3pm Sunday, 4pm Tuesday, 5pm Wednesday, etc. Please make each call to the field as productive as possible.

SAMPLING SHEETS

Sampling sheets are important forms that provide a significant amount of data in terms of our fieldwork methodology and response rates. It is therefore important that you use these forms carefully and accurately.

Before you leave home you should fill in the 4-digit PSU number (Primary Sampling Unit). Take this number from the meshblock kit label. As you start door knocking, record the address. Names and phone numbers can be added as and when you have them.

You will note that there are two possible categories in each household, a 'screened' outcome and an 'enrolled' outcome. (More on this later). The yellow 'outcome codes' form needs to be studied carefully so that you know exactly which code to use. Along with the usual codes such as U, NA and NR, there is an 'S' for screening, i.e., where we have details of adult household members recorded on the screener. Note the examples on the back of the yellow page. At each call you will have one or two outcome codes to record for the household.

Where possible, specify which ethnicity in the case of a refusal (even if it is a guess) and likewise with language difficulty. "Other" should always specify the reason. Please do not use any codes other than the ones specified. If you are unsure, record 'other' and write in the reason.

MAKING CONTACT

There are several things you can do to improve your hit rate, and this starts with a thorough briefing, plus your own review and practice, so that you are thoroughly familiar with all paperwork and procedures before you start door knocking. In addition, your own personal presentation and attitude are very important: a confident and friendly approach, a smile, and good eye contact will help achieve a good response at the door.

A letter has been provided by the client, which introduces the survey and explains the purposes and benefits of participating in the study. You should have a copy of this letter in your hand as you approach the door. Have your clipboard organised so that all the paperwork is arranged in the order needed; it does not inspire confidence if you appear ill-prepared or disorganised.

SCREENING: GENERAL

One of the most important aspects of this whole survey is that we screen as many of our 30,000 households as possible. From this data we can determine how many people in NZ do marine recreational fishing. Screening is therefore a vital part of your role as an interviewer, and every effort needs to be made to screen as many of your households as possible. Please make it your personal aim to achieve an excellent hit rate with your screening.

Screening is the procedure in which we take demographic details of all the adults in the house, including whether they are fishers or not. We do NOT just screen in households where there are fishers, and it is very important that you go through the screening procedure thoroughly at every house where possible.

You must not just assume that there will be no fishers at any given house – you need to go through the screening procedure. Even if the 'door opener' says there is no fisher there, we still need the demographic details of all adults in the house.

You will therefore have a screener for MOST households, except where you have not made contact at any of your calls (NR).

AD, HR, L, V, and U may also mean no screener, but depending on the circumstances, you may be able to get some screening information in some cases: Try to get as much information as possible before 'abandoning' any of these 'closed' households.

THE SCREENER

Firstly you need to record location details for each household at the top of the screener:

- PSU number from the meshblock kit label.
 - “Sampled home number” from the sampling sheet. This is the number in bold given to each household: **1 to 32**. NB: It is NOT the street number of the household (although in some cases it might be the same by chance). Please take care with recording the correct S/H number.
- a. Introduce yourself and the reason for your call as per the introductory paragraph. Hopefully most people will be prepared to continue at this point, if so tick the “yes” box and go to b. If they say “no”, we ask for their name and telephone number. However, please do your best to get past first base! Here are some suggestions:

IF THEY SAY: “Not interested in fishing. Don’t fish, or, I only fish in lake or stream, etc.”

- REPLY: “We would like to talk both to people who do fish, dive or gather marine species and to those who don’t. That way we can get a balanced picture of both throughout the country.”

IF THEY SAY: “Too busy, no time, etc.”

- REPLY: “It’s only about 5 minutes, but I’m happy to come around another time. I’ll fit in with you ...”
- OR: “We’re in the area for a week or two. I’m happy to come at a time when you’re less busy. When would suit you?”

IF THEY SAY: “Why should I do the survey?” OR “What’s the point of the survey?”

- REPLY: “We all have the right to fish for a meal or for recreation in NZ’s seas and estuaries. The Ministry tries to ensure that there will be a variety of fish for this generation and future ones to enjoy. If you don’t fish that’s also useful for the statistics.”

IF ASKED: “NRB is a privately-owned independent research company and the Ministry of Fisheries is sponsoring this research.”

- b. Record the number of adults (15 years or older) in the household, and note that this only means people who live there usually (not visitors).
- c. Record the NAME of each adult, oldest to youngest, in the grid below. Please try where possible to get a name, although we realise this can sometimes be tricky at this early contact stage. If you feel you might ‘lose’ this person, you may ask for initials instead. Record gender for each.
- d. Using the showcard, you now record 3 things for each adult in the house; age, ethnicity and “avidity”. Avidity means how much they do or don’t fish: codes A, B, C, or D. **You must always use this showcard when screening.**
- e. Check the avidity column in the grid above. If all “A’s”, there are no fishers. Tick the box, and read out the following paragraph. We will later follow-up on a very small sample of non-fishers, therefore we need to tell them about that possibility. Record their name and phone number overleaf at j. Please be careful to record names and contact details carefully and legibly. Once that is done, you’re finished. This then is a ‘screened only’ household, i.e., there are no fishers in the household so no enrolment is necessary. All you need to do now is record this address as an **S/NE** outcome on the sampling sheet.

- f. If there are ANY fishers in the house (i.e., B, C or D codes above), you must now **number** them. Just number then 1, 2, 3 and so on, **but leaving any “A’s” out of the count**. (Refer to the example screener).

Now turn over the page to the ‘fisher selection table’. This is where we select the eligible respondent. Write the avidity code for the household in alphabetical order (refer to example). Note that you must list as many letters as you have fishers, even if they have the same code: for example, if you have two “B” fishers, you list ‘B’ twice in this box.

Next, locate the exact code in the table below and circle that code. **Note the number alongside that code; this is the eligible respondent**. Turn back to the grid overleaf, and circle that number in the grid (again refer to the example).

If that person is not available, ask for a good time to call back. If they refuse, please try for a phone number for audit purposes.

RANDOMISATION

Respondent selection has been designed to include B, C and D fishers in equal parts. This means that you will have ‘B’ fishers selected (i.e., occasional fishers) as often as more regular fishers. This is deliberate! Please do not target people who fish more often – just take the number specified next to the avidity code.

ENROLMENT

You now begin the enrolment procedure, using the blue laminated enrolment card. At this stage it would be great if you could sit down with the fishers, as we want you to talk through the enrolment procedure so that they understand what is involved.

There are 3 things (plus the letter) that will help you explain the study:

- Coloured brochure.
- Memory jogger.
- Participant guide card.

Please do NOT just hand over the brochures, etc, and leave them to it. You must go through the brochure, the memory jogger and the card with them. Use the information on the enrolment card to answer their questions. If they agree to participate, write their name and cell phone number (address not necessary) on the guide card.

Next, check the ‘avidity’ of this fisher as that determines how often they will be called or texted over the next year or so.

D: Weekly
C: Fortnightly
B: Monthly

Circle the appropriate time period on page 2 of the guide card before handing to the fisher. Note that participants go into a draw for prizes throughout the year. **VERY IMPORTANT:** We encourage fishers to use the text option as it is quicker and easier for all concerned.

Once recruited, go back to K on the screener and tick the appropriate box: please don’t forget this step.

CONTACT DETAILS

Detailed contact details are required, as the next stage in this research is to contact fishers by phone or text to ask whether they have done any fishing and if so, what (if anything), they caught.

So this is where you need to be very careful to record details fully and legibly! (On the pilot, there were many screeners that were missing some details and/or were illegible). Please complete ALL details, including first AND second names, 2 or 3 phone numbers where available, a full home address (including postcodes). And finally the name and number of a contact person should we lose touch with the respondent (over a full year this does happen!). Note that this should preferably not be someone living at the same address.

LANDLINES/CELL PHONES

Please note, fishers do not have to have cell phones to participate in this study. In fact our preference is to call them on their landlines, so please encourage them to give their **landline number**. Also (although we prefer the texting option) they do not have to be able to text; we can phone them instead.

CHECKING

At the end of each day in the field, please check your paperwork thoroughly. We can't emphasise too strongly how important it is to make sure every applicable box and line has been completed on both sides of screeners. The amount of information on screeners obviously depends on the outcome of the call, however at the very least you should have ticked a box above 'a', and a name and phone number overleaf if the door opener is willing to give it.

Your check must also include confirming you have given all your screeners the correct PSU and S/H numbers. Check sampling sheets as well; especially that the correct outcome codes have been used for screening/enrolling.

AUDITS

As part of our quality control procedures, your Supervisor will audit at least 10% of your screened households. This involves confirming the household information recorded in the screener grid is correct.

For enrolled households, additional questions will be asked around how well the study was explained, and if the brochures etc, were shown and discussed.

Thank you. All the best with your interviewing.

Kind regards

Glenys Lawrence
Field Manager
NATIONAL RESEARCH BUREAU

APPENDIX 2: MESHBLOCK MAP



MB 0089800 - WHAU VALLEY - WHANGAREI DISTRICT

Date Created : 22/07/11

Figure 5: Illustrating Statistics NZ meshblock map.

APPENDIX 3: MESHBLOCK DESCRIPTION

PSU	Meshblock Number	Area Unit Name	Urban Area Name	Local Authority Name	Dwellings
542	0089800	Whau Valley	Whangarei	Whangarei District	42

	Start No.	End No.	Additional Information
Burling Avenue	00001	00011	
Burling Avenue	00002	00018	
Kamo Road	00160	00162	(SH1)
McClintock Lane	00000	00000	nsd
McClintock Lane	00000	00000	ssd McClintock St-50m e Burling Av
McClintock Street	00027	00033	
McClintock Street	00030	00036	
State Highway 1	00160	00162	(Kamo Rd)
Weaver Street	00068	00068	

APPENDIX 4: DWELLING SAMPLING SHEET



10-091 PSU:

**MARINE FISHERS AND NON-FISHERS SURVEY
SAMPLING SHEET**

Census Count:

Enumeration Count:

INTERVIEWER NAME: _____

	Address	01	02	03	04	05	06	07	08
Address									
Phone Number									
Respondent's Name									
SAMPLED HOME >									
Date									
Time									
Screened Outcome									
Enrolled Outcome									
Date									
Time									
Screened Outcome									
Enrolled Outcome									
Date									
Time									
Screened Outcome									
Enrolled Outcome									
Date									
Time									
Screened Outcome									
Enrolled Outcome									
Date									
Time									
Screened Outcome									
Enrolled Outcome									
Date									
Time									
Screened Outcome									
Enrolled Outcome									

Figure 6: Sampling sheet.

APPENDIX 5: OUTCOME CODES

10-091



FISHING SURVEY

OUTCOME CODES

Please use only these outcome codes. NB: A “screened” household is one where you have completed the grid on the screener.

<u>SCREENING HOUSEHOLDS</u>	Code Description
S	Screening completed
HR	Household refusal (estimate ethnicity)
NR	No reply
NA	Not available at this call
U	Unavailable during survey period
APT	Appointment
INC	Infirm/incapable/ill
L	Language difficulty (specify)
V	Vacant or holiday home
AD	Access denied
OTH	Other (specify)

<u>ENROLLING FISHERS</u>	Code Description
NE	No eligible occupants
E	Enrolled fisher (ie, B, C or D)
RR	Respondent refusal (specify ethnicity)
NR	No reply
NA	Not available at this call
U	Unavailable during survey period
APT	Appointment
INC	Infirm/incapable/ill
L	Language difficulty (specify)
OTH	Other (specify)

APPENDIX 6: HOUSEHOLD LETTER OF INTRODUCTION



HOUSEHOLDER LETTER OF INTRODUCTION

MARINE FISHER AND NON-FISHER SURVEY

Dear Householder,

Thank you for talking to us about the 2011/2012 Marine Fisher and Non-Fisher Survey.

Marine fishing is a recreation that many New Zealanders take part in at some time in their lives. This survey is being done to see how many homes have people who fish in seawater, how often they fish and what they catch.

Because marine fishing is a recreation that some people take part in regularly, while others do so only occasionally or as opportunity arises, we need to include all households in the survey.

If no person in your household is a marine fisher, we would like to check back once or twice by phone over the year to see if anyone has taken the opportunity to fish since we last called. We ask for a phone number and a person to call back.

If one or more persons in your household does marine fish, we select just one and arrange to contact them periodically to hear about where they fished, and whether they caught or gathered anything. The information is purely for survey purposes. The answers that households and fishers give are confidential and are used only in anonymous statistical reports.

The survey reports will be used to inform the Ministry of Fisheries in managing the long-term sustainability of fisheries, for the enjoyment of future generations. Results will be published on the Ministry of Fisheries website.

Yours sincerely

The Research Team
National Research Bureau

July-September 2011

National Research Bureau Ph: 09 630 0655 or 0800 672 476
110 Mt Eden Road, Mt Eden, Auckland 1024
PO Box 10-118, Dominion Road, Auckland 1446
Email: fish@nrb.co.nz Web: www.nrb.co.nz/fishingsurvey.php

APPENDIX 7: HOUSEHOLD SELECTION SHEET



10-091 Screener 5-7-11

MARINE FISHER AND NON-FISHER SURVEY

PSU (from meshblock kit label):

Sampled home number (from sampling sheet):

CONTACT AN ADULT

"Good morning/afternoon/evening. My name is Xxx from the research firm NRB. We're visiting homes all over New Zealand as part of a marine fishing survey we are conducting for the Ministry of Fisheries. May I have just a few minutes of your time to see how many people do or don't go fishing? It's just a few questions." TICK

YES → GO TO 'b'

NO (LAST RESORT!) → GO TO 'a'

- a. "That's OK I know people are very busy nowadays. Would I be able to get your first name and phone number just in case my Supervisor needs to check my work?" IF POSSIBLE, RECORD NAME AND PHONE NUMBER OF DOOR-OPENER OVERLEAF AT 'j' --- THEN THANK & CLOSE
- b. "Thank you. Can I ask... including yourself, how many people aged 15 years and over usually live in your home? That excludes short term visitors but includes longer term boarders." →
- c. "May I please have the first name of each person aged 15 or over who usually lives here, from oldest to youngest." IF ABSOLUTELY NECESSARY "An initial is also fine".
"That's so I can check each person as a fisher or non-fisher against their gender, age group and so on." LIST NAMES IN FIRST COLUMN IN GRID (6 OLDEST ONLY) & RECORD GENDER.
- d. SHOWCARD. "Using this card, can you please tell me these 3 things for **each** of these people: age, ethnic group and how much they fish. I'll read the names [initials] one at a time." RECORD DETAILS BELOW.

ASK:		USING THE SHOWCARD			FISHER SELECTION
"Usually resident" aged 15 + (First name /initials)	Gender (M/F)	Age group	Ethnic group(s) (multiple)	Marine fishing Avidity Code (A,B,C or D)	Number ONLY B,C or D fishers. Circle one according to table P.T.O
Oldest					
Youngest					

- e. **NO FISHERS?** IF 'A's' ONLY, TICK & READ: "Thanks very much for that. Twice in the next year we are following up a small proportion of non-fishers just in case they actually did go fishing. **Would it be all right if we got a name and telephone details of someone in your house** in case we need to do that?
It's not very likely we will ring, but it would help us in case we need to."
RECORD NAME AND PHONE NUMBER OVERLEAF AT 'j' --- THEN THANK & CLOSE
- f. **ANY FISHERS (IE. B, C, or Ds)?** NUMBER THE FISHERS (1, 2, 3...) IN RIGHT HAND COLUMN ABOVE. GO TO FISHER SELECTION TABLE OVERLEAF AND FOLLOW INSTRUCTIONS.

CONTACT SELECTED FISHER

- g. WHERE FISHER CIRCLED: "Thanks very much for that. We are conducting a large fishing study with randomly selected people. For your home the selected person is xxxx. We hope you/he/she will agree to participate in this important study. IF DIFFERENT PERSON: May I speak to him/her?"
YES: → GO TO 'k' NO → GO TO 'h' NOT AT HOME → GO TO 'i'
- h. "That's OK. Would I be able to get your first name and phone number just in case my Supervisor needs to check my work?" RECORD NAME & PHONE NUMBER OVERLEAF AT 'j' THANK & CLOSE

- i. IF NOT AT HOME: "When is a good time to catch xxx at home? We are in the area for a couple of weeks so I'm happy to come back. MAKE APPOINTMENT TO REVISIT. ENROL AT 'k'.
- j. DOOR OPENER / NON-FISHER / REFUSED CONTACT DETAILS --- THANK & CLOSE

PHONE NUMBER/S INCLUDING PREFIX

FIRST & SECOND NAME IF POSSIBLE

ENROL SELECTED FISHER

- k. USE THE 'ENROLMENT CARD' AND ENROL FISHER ONTO PANEL. ALSO ENCOURAGE TO ENROL AS A TEXTER! DID THE SELECTED PERSON AGREE TO PARTICIPATE?

YES, PLUS TEXTING YES, PHONE ONLY NO → THANK & CLOSE

- L. "Can I get your contact details please? These are strictly confidential and are only used for this survey."
PLEASE ENCOURAGE TO GIVE BOTH CELL PHONE AND HOME NUMBER (WITH PREFIX)

HOME PH: _____ CELL PH: _____ WORK PH: _____
(OPTIONAL)

FIRST NAME: _____ SURNAME: _____

HOME ADDRESS: _____
STREET SUBURB CITY/TOWN POSTCODE

"We find that people move quite often so we lose track of them. Could you give me a friend's name and number so we can re-contact you if we can't get hold of you?" PREF SOMEONE AT DIFFERENT ADDRESS

FAMILY/FRIEND: _____ TELEPHONE: _____

"Thanks so much. We appreciate your taking part. We will be in contact as soon as the survey starts."
RECORD OUTCOME ON SAMPLING SHEET.

FISHER SELECTION TABLE

1. Write the avidity code for the house, **in alphabetical order** (eg BBCD):
2. Locate and circle that EXACT code below. Note the number alongside!
3. Go back to right hand column of grid on page 1 and circle the same number (then go to 'g').

APPENDIX 8: SHOWCARD



SHOWCARD

PLEASE CALL OUT THE LETTER OR NUMBER FOR AGE, ETHNIC GROUPS AND MARINE FISHING GROUP.

AGE GROUP

Which age group do you/does he/she fall into?

- 15 to 19 years ----- 1
- 20 to 24 years ----- 2
- 25 to 34 years ----- 3
- 35 to 44 years ----- 4
- 45 to 54 years ----- 5
- 55 to 64 years ----- 6
- 65 to 74 years ----- 7
- 75 years or over ----- 8

CULTURAL OR ETHNIC GROUP

Which cultural or ethnic group or groups do you/he/she identify as?
(You can choose more than one.)

- New Zealand European ----- 1
- Māori ----- 2
- Samoan ----- 3
- Cook Island Māori ----- 4
- Tongan ----- 5
- Niuean ----- 6
- Chinese ----- 7
- Indian ----- 8
- Other (please specify) ----- 9

MARINE FISHING GROUP

Which group describes your/his/her fishing for food or recreation in the **sea or salt** water?
(‘Fishing’ includes rod, line, net, dredge, dive and hand gathering).

Never. ----- A1

Used to, gave it up, retired from it now. ----- A2

Occasionally, but no more than 3 times a year. ----- B

Several times a year, mostly over spring and summer, mostly in the holidays or on long weekends. About 4-9 times a year. ----- C

Regularly: Almost every week or fortnight over spring and summer, 10 times a year and more. ----- D

APPENDIX 9: OUTBOUND TEXT REQUEST

Outbound text request format – 7.30pm Sunday (delivered over 1 hour)

Did u fish/gather/dive in week Mar28-April3? Pls reply NO or YES.

Use YES for any fishing done, even if no catch. Thanks :-) NZ Marine Fishing Survey.

Did u fish/gather/dive in week Mar28-April3? Pls reply NO or YES. Yr txt reply is FREE. Use YES for any fishing done, even if no catch. Thanks :-) NZ Marine Fishing Survey.

Did u fish/gather/dive in week Mar28-April3? Pls reply NO or YES. Yr txt reply is FREE.

Use YES for any fishing attempts. Thanks :-) NZ Marine Fishing Survey.

Fishers reply options

YES

NO

Thank you texts - automated

Thanks for that! We will call you in the next few days to get your catch or non catch fishing :-) NZ Marine Fishing Survey.

Thanks for that! Till next time :-) NZ Marine Fishing Survey.

'Over time limit' message

Hi. This is an auto response from the Marine Fishing Survey. If yr txt is in regards to the survey, someone will contact u within the next few days :-)

Reminders – 9.30am following Monday

Hi. Just wondering if you missed our last message? See previous txt for details. Thanks. NZ Marine Fishing Survey.

OR

Did u miss our last message? If u cant reply pls SEND yr YES or NO to 3117. Txts r FREE. Thanks :-) NZ Marine Fishing Survey.

Figure 7: Outbound text request format.

APPENDIX 10: NPS WEBSITE, SELECTED PAGES



Home | Company Profile | Site Plan | Contact us | Job Opportunities

MARINE FISHER AND NON-FISHER SURVEY Information For Participants

- Nationwide Surveys
- Central Government Research
- Local Government Research
- Customer Satisfaction
- Brand & Positioning Research
- Advertising Research
- Focus Group Research
- Fieldwork Services
- Fishing Survey
- ISAS Information
- iPad prize draw

THIS SURVEY HAS NOW FINISHED. Thank you so much for participating in the 2011/2012 Marine Fisher and Non-Fisher Survey. Your efforts in replying to our survey over the last year are very appreciated!! After mid October 2012 we will not be contacting you again for this survey. Survey results will be published on the Ministry for Primary Industries website later this year. Winners of the final prizes will be notified and updated on this website. Thanks again. *Marine Fishing Survey Team.*

Surveying recreational fishers catch (in addition to commercial fishers) is vital to the assessment of the stock of fish and other marine life in New Zealand. The information is used to better understand the situation of different species in our waters, and to help in the sustainable management of our fisheries.



The survey is all about the general public's recreational fishing in New Zealand's coastal waters and runs from October 2011 to the end of September 2012. As a survey participant, we are most interested to find out if you went fishing (any method at all) in any given week, and if you did, what was caught. We are also interested to hear if you didn't go fishing, because this is how we build a statistical picture of our fisheries. We are surveying very avid fishers, people who fish infrequently and some who usually don't fish at all. Everyone's answers are equally important to us.

About Prizes
We hope those invited into this survey will stay in it because they realize it is a much needed piece of research for the benefit of recreational marine fishers! However there are also random spot prizes to encourage you and thank you for your ongoing participation. This includes weekly draws (wine case or iPad Shuffle) and several major prizes for iPad 2s. We notify all winners and also post their names here: [FishingSurveySpotPrizes](#)

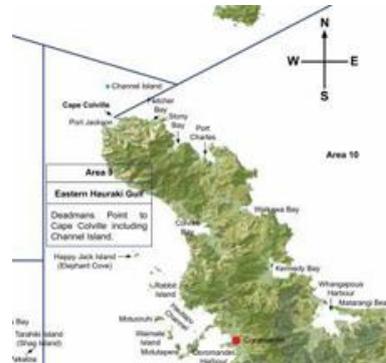
How often we contact you
How often we contact you, whether by text or by phone, depends on how frequently you go fishing. If you are a regular fisher, we plan to contact you

<http://www.nrb.co.nz/fishingsurvey.php>

alalunga

Fishing Areas

Actually you don't need to know too much about the areas you have fished in. Our interviewers will talk through it with you when/if they ring. We just need to place you in general areas. We don't need to find out your exact fishing spots and certainly won't tell others about them! If you are interested to find out more about the areas we use for this survey click **Download Fishing Survey Area Maps**.



Further Information

Please feel free to contact us at fish@nrb.co.nz or ring 0800 672 476.

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Phone: 64 - 9-6300655 :: Fax 64-9-6387846 :: E-mail: great-research@nrb.co.nz

P.O. Box 10-118 Dominion Road | 110 Mt Eden Road, Mt Eden, Auckland, New Zealand

you take the trouble to allow us to catch up with you - we promise to be as quick as possible! If you have any preferred times you would like us to call, please let our interviewers know. They will log this and adjust our calling time to suit.

Memory Jogger

Some people like to write down their fishing to help them remember. Click **Download Memory Jogger** if you would like a handy form to print off. However it is not essential. We will contact you frequently so your memory of recent fishing or not is fresh. If you would like us to post you the form, just email fish@nrb.co.nz or ring 0800 672 476.

Identifying Species You Have Caught

Some people will catch species they do not recognise, or they may just want to check. When we first contacted you we will have given you a pamphlet with a few images of marine species to help you (it also has a map of the general fishing areas). For an online copy click **Download Fishing Survey Pamphlet**. You can also email or ring as for another copy if you wish.



If you wish to find out more about fish species, the web is pretty useful. Here are two sites which are particularly good.

Ministry of Fisheries - Fish Identification

<http://www.fish.govt.nz/en-nz/Recreational/Most+Popular+Species/Fish+Identification/default.htm>

United Fisheries (has over 60 species)

<http://www.unitedfisheries.co.nz/content/albacore-tuna-thunnus->

<http://www.nrb.co.nz/fishingsurvey.php>
<http://www.nrb.co.nz/fishingsurvey.php>

Page 3 of 3
Page 2 of 3

APPENDIX 11: MEMORY JOGGER



**RECREATIONAL MARINE FISHING
DAYS FISHED - NOTES (OPTIONAL)**

You may find it helpful to jot down a few details for days you fished. This could help you remember that fishing when we phone or text to ask you about it.

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

PTO



**RECREATIONAL MARINE FISHING
MEMORY JOGGER**

You may find it helpful to jot down a few details for days you fished. This could help you remember that fishing when we phone or text to ask you about it.

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

Date: _____ / _____ / _____

Area(s) Tried: _____

Method(s) Tried: _____

Nil Catch (tick)

Species _____ No. _____

Species _____ No. _____

Species _____ No. _____

PTO

APPENDIX 12: INFORMATION BROCHURE

INFORMATION ABOUT THE MARINE FISHER AND NON-FISHER SURVEY

What's The Purpose Of The Survey?

The survey aims to establish the recreational marine fish and shellfish harvest in New Zealand. To do this, we need to measure how many people do (and don't) fish for recreation or food in the sea or saltwater estuaries, and what they catch.

What Kind Of Fishing?

Any saltwater (marine) fishing for finfish, shellfish, crayfish or any other marine species. It includes any method of fishing like rod, line, hand gathering, spearing, netting or diving. It is about recreational fishing only, not commercial.

What If I Never Fish Or Have Given It Up?

We need a balance of people who don't fish at all, or only fish once in a while, as well as people who fish often.

What Do I Have To Do?

It's very easy. We just phone or text you to ask if you have been fishing. You just need to reply YES or NO to the text messages. All texts to us are **FREE**. Any phone interview about your fishing is very short - usually less than 6 minutes.

What Do You Ask Me If I Have Fished?

Only basic information about your fishing. We ask how often you fished, whether or not you caught anything, what species, and what method was used. We need to establish what you **'personally caught'** for our calculations. Please exclude the catch of others in your boat or group.

Will You Ask About My Best Fishing Spots?

No. The survey asks only for very big areas. For example, "Bay of Islands" or "Marlborough Sounds".

What If I Didn't Catch Anything?

It's very important for you to let us know this as it helps us get a true picture of fishing in New Zealand.

Will It Help The Survey If I Fish More Often, Or Less Often?

Please just do what is natural and usual for you.

Who Is Behind This Survey?

The Marine Fisher and Non-Fisher Survey is initiated and sponsored by the Ministry of Fisheries. It is being conducted by an independent research agency (NRB Ltd) over 2011 and 2012.

Is My Privacy Protected?

Yes. Your name and contact details are used only for the survey. They are not passed on to any other party nor used for any other purpose. The survey conforms to the 1993 New Zealand Privacy Act.

How Do I Find Out More About This Survey?

If you have web access and wish to find out more about this survey, how to identify marine species, or detail of the fishing areas used in the survey go to www.nrb.co.nz/fishingsurvey.php. Otherwise please email fish@nrb.co.nz. Or phone 9am-5pm weekdays on 09 630 0655 or 0800 672 476.



FISH IDENTIFICATION CHART
Popular Marine Species

Blue Cod



© NIWA P. McMillan

Blue Maomao



Blue Moki



© NIWA

Butterfish (Greenbone)



© NIWA

Elephant Fish



© NIWA

Garfish (Piper)



© NIWA

Hapuku (Groper)



© NIWA M. Francis

John Dory



© NIWA

Kahawai



© NIWA M. Francis

Kingfish



© NIWA M. Francis

Koheru



© M. Francis

Lemon Sole



© NIWA M. Francis

Red Cod



© NIWA M. Francis

Red Gurnard



© NIWA N. Bagley

Red Moki



© NIWA

Sand Flounder



© NIWA

Sea Perch (Jock Stewart, Scarpie)



© NIWA

Snapper



© NIWA A. Blacklock

Trevally



© NIWA M. Francis

Trumpeter



© NIWA

FISH IDENTIFICATION CHART
Sometimes Confusing Species

Bluenose



Warehou



Barracouta



Gemfish



Blue Mackerel (Slimy/English)



Jack Mackerel



Yellow Eyed Mullet (herring)



Grey Mullet



Albacore Tuna



Skipjack Tuna (Bonito)



Tarakihi



Porae



School Shark (Tope, Flake)



Rig (Spotted Dogfish)



Spiny Dogfish (Bruno)



Red Rock Lobster (Crayfish, Spiny Lobster)



Packhorse Lobster (Green)



Spanish Lobster



Ordinary Paua / Yellow Foot Paua / Virgin Paua



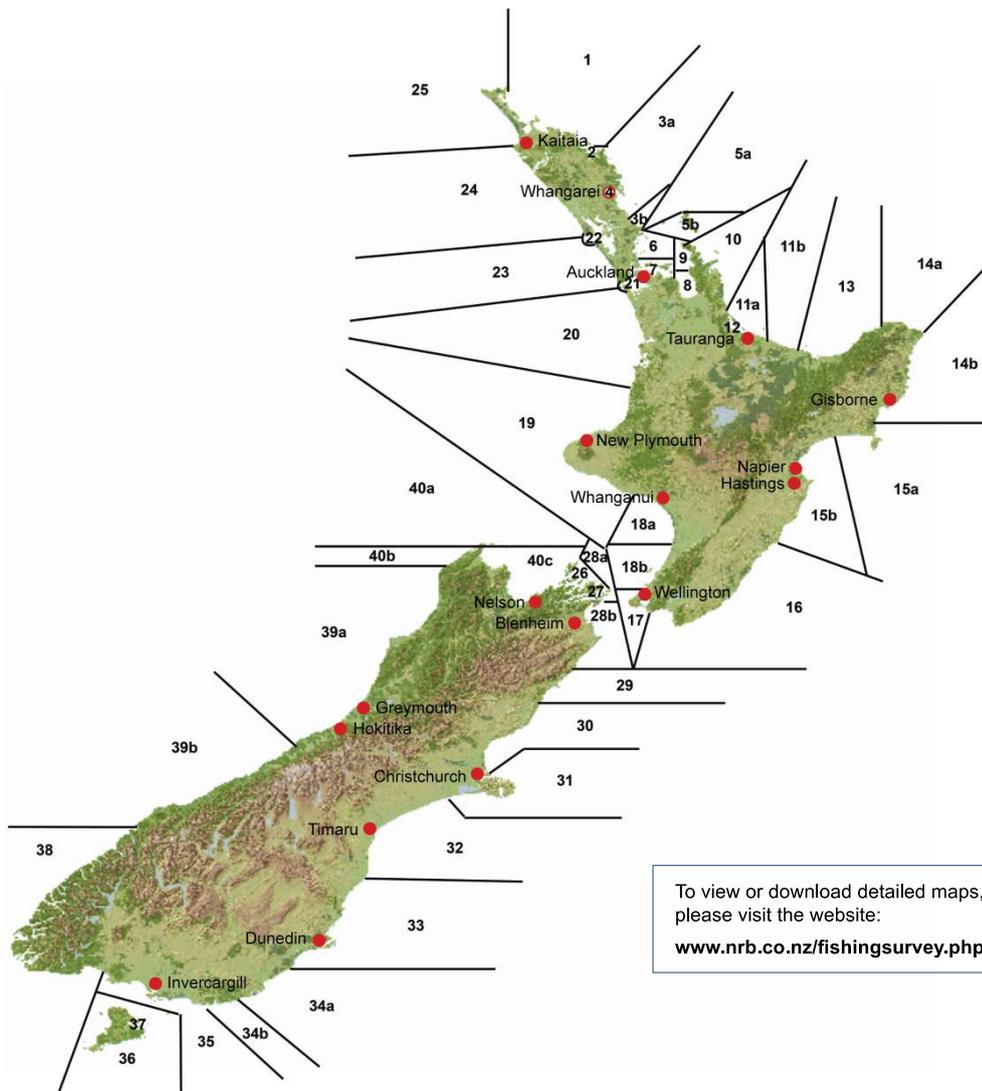
Pipi



Tuatua



RECREATIONAL FISHING AREAS



To view or download detailed maps,
please visit the website:
www.nrb.co.nz/fishingsurvey.php

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APPENDIX 13: QUESTIONNAIRE

REVISED EDITION 29-6-11

RECREATIONAL FISHING SURVEY QUESTIONS (Word version of CATI)

ID

Respondent ID [6 digits: 4* PSU digits and 2 house number digits - done automatically by CATI system]

WhichTelNo

Which telephone number did you use?

① If you have clicked the wrong button to come here, enter <Ctrl-Shift-Home> to return to the Respondent screen.

- 1. Home phone
- 2. Work phone
- 3. The mobile number

Intro1 [This intro used for those who have texted YES last week and those from non-texting groups]

Hello <INSERT RESPONDENTS NAME>. It's <INTERVIEWER'S NAME> from the Recreational Marine Fishing Survey.

<IF A YES TEXT RECEIVED>Thanks for your text saying you'd been fishing.

I'm calling to log your fishing activities into the study database.

- 1. Continue

[Go to FishYN]

Intro2 [This intro used for those who were supposed to text – but nothing received on time last week] Hello <INSERT RESPONDENTS NAME>. It's <INTERVIEWER'S NAME> from the Recreational Marine Fishing Survey. I'm calling to log your fishing activities into the study database.

We didn't seem to get a text from you. Can I ask if you have changed your cell phone number, or if there is anything else you need to know about the texting procedure?

- ① If respondent says all ok, then select option 4.
- ① If respondent wants to opt out of the survey, then click on the 'refused' tab above.
- ① If respondent is unsure of the texting procedure say "When you get our text asking if you have been fishing for a period, what you need to do is text a YES if you have been fishing, even if you didn't catch anything, or you text NO if you haven't been fishing in that period. You need to text before 10am on the Monday so we can get the text on time."

- 1. Changed number
- 2. Said they did not receive the text from NRB
- 3. Don't wish to receive any more texts from NRB
- 4. Number not changed

[If 1 go to NewCellPhone, If 2 go to ConfirmCellPhone, If 3 go to NoMoreTexts. If 4 go to FishYN],

ConfirmCellPhone [If answered 2 at Intro2]

Can I confirm your cell phone number is <INSERT CELL PHONE NUMBER>?

- 1. Yes
- 5. No [note Using 1 and 5 for yes/no answers is a protocol to reduce key stroke error]

[If 1 go to Go to FishYN. If 5 go to NewCellPhone]

NewCellPhone [If answered 1 at Intro2]

What is your cell phone number?

[Go to FishYN]

NoMoreTexts [If answered 3 at Intro2]

That's fine, I'll just set it up so that you don't get any more texts and we phone you each time instead.

① If they change their mind and still want to text, go back to previous question and change answer.

① If respondent wants to opt out of the survey click on the 'refused' tab above.

- 1. Continue

FishYN

[If only last weeks fishing outstanding go to SingleWeekYN. If multiple periods to record go to MultiWeekYN]

SingleWeekYN [If only last weeks fishing outstanding]

Can I <INSERT 'confirm' IF YES TEXT RECEIVED OR 'ask if' IF OTHERWISE> you went fishing during the period Monday <INSERT DATE> to Sunday <INSERT DATE>? We are interested in any method of fishing including rod fishing, diving, gathering or trapping any marine species – and regardless of whether anything was caught or not. Remember, its salt water fishing only, whether recreational or customary – but no commercial! ① DO NOT include any fresh water fishing but DO include estuary fishing.

- 1. Yes
- 5. No

[If 1 go to D1. If 5 terminate]

MultiWeekYN [If multiple periods to record] [Programmer: Only show periods yet to be resolved]

We've got a few periods where we don't know about your fishing. I wonder if you could help us with that.

We are interested in any method of fishing including rod fishing, diving, gathering or trapping any marine species – and regardless of whether anything was caught or not. Remember, its salt water fishing only, whether recreational or customary – but no commercial!

READ OUT EACH PERIOD IN TURN AND ASK IF THEY FISHED AT ALL FOR THAT PERIOD. ANSWER YES OR NO FOR EACH PERIOD

① Please take enough time for the respondent to consider and answer for each period. It is fine if they need to consult a calendar or wish to discuss with you what they did at the time to help with memory.

① DO NOT include any fresh water fishing but DO include estuary fishing.

Week 1. Monday 26 th September to Sunday 2 nd October 2011	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 2. Monday 3 rd October to Sunday 9 th	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 3. Monday 10 th October to Sunday 16 th October	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 4. Monday 17 th October to Sunday 23 rd October	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 5. Monday 24 th October to Sunday 30 th October	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 6. Monday 31 st October to Sunday 6 th November	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 7. Monday 7 th November to Sunday 13 th November	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 8. Monday 14 th November to Sunday 20 th November	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 9. Monday 21 st November to Sunday 27 th November	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 10. Monday 28 th November to Sunday 4 th December	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 11. Monday 5 th December to Sunday 11 th December	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 12. Monday 12 th December to Sunday 18 th December	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 13. Monday 19 th December to Sunday 25 th December	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 14. Monday 26 th December to Sunday 1 st January 2012	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 15. Monday 2 nd January to Sunday 8 th January	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 16. Monday 9 th January to Sunday 15 th January	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 17. Monday 16 th January to Sunday 22 nd January	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 18. Monday 23 rd January to Sunday 29 th January	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 19. Monday 30 th January to Sunday 5 th February	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 20. Monday 6 th February to Sunday 12 th February	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 21. Monday 13 th February to Sunday 19 th February	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 22. Monday 20 th February to Sunday 26 th February	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 23. Monday 27 th February to Sunday 4 th March	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 24. Monday 5 th March to Sunday 11 th March	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 25. Monday 12 th March to Sunday 18 th March	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 26. Monday 19 th March to Sunday 25 th March	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 27. Monday 26 th March to Sunday 1 st April	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 28. Monday 2 nd April to Sunday 8 th April	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 29. Monday 9 th April to Sunday 15 th April	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 30. Monday 16 th April to Sunday 22 nd April	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 31. Monday 23 rd April to Sunday 29 th April	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 32. Monday 30 th April to Sunday 6 th May	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 33. Monday 7 th May to Sunday 13 th May	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 34. Monday 14 th May to Sunday 20 th May	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 35. Monday 21 st May to Sunday 27 th May	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 36. Monday 28 th May to Sunday 3 rd June	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 37. Monday 4 th June to Sunday 10 th June	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 38. Monday 11 th June to Sunday 17 th June	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 39. Monday 18 th June to Sunday 24 th June	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 40. Monday 25 th June to Sunday 1 st July	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 41. Monday 2 nd July to Sunday 8 th July	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 42. Monday 9 th July to Sunday 15 th July	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 43. Monday 16 th July to Sunday 22 nd July	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 44. Monday 23 rd July to Sunday 29 th July	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 45. Monday 30 th July to Sunday 5 th August	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 46. Monday 6 th August to Sunday 12 th August	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K
Week 47. Monday 13 th August to Sunday 19 th August	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> D/K

- | | |
|--|--|
| Week 48. Monday 20 th August to Sunday 26 th August | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> D/K |
| Week 49. Monday 27 th August to Sunday 2 nd September | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> D/K |
| Week 50. Monday 3 rd September to Sunday 9 th September | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> D/K |
| Week 51. Monday 10 th September to Sunday 16 th September | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> D/K |
| Week 52. Monday 17 th September to Sunday 23 rd September | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> D/K |
| Week 53. Monday 24 th September to Sunday 30 th September | <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> D/K |

[Programmer note: Open 'FISHING DETAILS INTERVIEW' for each week in which fishing was done]

FISHING DETAILS INTERVIEW

D1

Considering only the period from Monday <INSERT DATE> to Sunday <INSERT DATE>, on which of these days did you fish, dive, gather or trap marine species – regardless of whether you caught anything or not?

① If only laying out pots or nets, do not count as a day – its only the harvesting day that counts

① Multiple answers permitted

- 1. Monday <DATE> [Up to 7 days allowed]
- 2. Tuesday <DATE>
- 3. Wednesday <DATE>
- 4. Thursday <DATE>
- 5. Friday <DATE>
- 6. Saturday <DATE>
- 7. Sunday <DATE> etc.

D2

Did any of your fishing activities include: a paid trip with a skipper of a charter boat?

① If a boat is hired or chartered without a hired skipper then select 'no'.

- 1. Yes
- 5. No

[If 'No', no further questions are asked about charter fishing]

D3

Did any of your fishing activities include: fishing with a customary permit or authorisation?

- 1. Yes
- 5. No

[If 'No', no further questions are asked about customary fishing]

D4

Did any of your fishing catch include: a personal allowance from a commercial catch?

- 1. Yes
- 5. No

[If 'No', no further questions are asked about personal allowance from a commercial catch]

T1

Thinking of <INSERT FIRST DAY AND DATE>. If we say a 'trip' is **each time you went out and fished** – how many separate trips did you make on that day? [Up to 5 trips allowed]

==> <day and date> [Note: running reminders help the interviewer follow which period etc. that is being asked about]

P1

Thinking of your first trip. Which of these did you fish from?

① Read out answer options

① If diving, it's the platform used to launch from

① Multiple answers permitted

==> <day and date> ==> Trip (1 of <number of trips>)...

- 1. Trailer motor boat
- 2. Larger motor boat or launch
- 3. Trailer yacht
- 4. Larger yacht or keeler
- 5. Kayak, canoe, or rowboat
- 6. Off land, including beach, rocks or jetty
- 7. Other

P1a [Only asked if answered 'Other' at P1]

Please describe what you did your fishing from?

==> <day and date> ==> Trip (1 of <number of trips>)...

P2 [Only asked if answered 'Yes' at D2]

Was that a paid trip with a charter operator and a skipper?

==> <day and date> ==> Trip (1 of x)...

- 1. Yes
- 5. No

P3[1] [Only asked if answered '1 to 5' at P1]

Which of these did you launch from when you were fishing from the <INSERT BOAT TYPE FROM P1>?

① Read out answer options

==> <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ...

- 1. Ramp
- 2. Marina
- 3. Mooring
- 4. Beach
- 5. Jetty or wharf
- 6. Anchorage
- 9. Other

P3b [Only asked if answered 1 at P3]

What was the name of that ramp?

P3a [Only asked if answered 'Other' at P3]

Please describe where you did your fishing from?

==> <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ...

L1

Thinking of when you were fishing from the <INSERT PLATFORM FROM P1>, What was the nearest city or township to where you were fishing?

① If necessary say "fishing includes diving, gathering or trapping any marine species."

① If multiple towns/cities type in up to three.

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==>

L2

And what was the nearest land point to where you were fishing?

① If you need to give guidance say "well some examples are Simpson Point or Karaka Island or Waihi Beach".

① If multiple land points type in up to three.

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==>

L3

I have to place your fishing in a specific area or areas. I have a map, but can you please help me work out which general area or areas you were fishing in? This is even if nothing was caught.

① USE YOUR MAPS!

① Interviewer to dialogue with respondents to identify the area/s fished.

① Multiple answers permitted

==> <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

- 1. North Cape to Cape Brett
- 2. Bay of Islands
- 3a. Cape Brett to Te Arai Point
- 3b. Te Arai Point to Cape Rodney
- 4. Whangarei Harbour & entrance
- 5a. North of Barrier Islands
- 5b. Barrier Islands
- 6. Western Hauraki Gulf
- 7. Inner Hauraki Gulf
- 8. Firth of Thames
- 9. Eastern Hauraki Gulf
- 10. Eastern Coromandel
- 11a. Northern Bay of Plenty
- 11b. Middle Bay of Plenty
- 12. Tauranga Harbour & entrance
- 13. Eastern Bay of Plenty
- 14a. East Cape – Northern
- 14b. East Cape – Southern
- 15a. Hawke Bay - Northern
- 15b. Hawke Bay - Southern
- 16. Cape Turnagain to Turakirae Head
- 17. Turakirae Head to Titahi Bay
- 18a. Waitotara River to Manawatu River
- 18b. Manawatu River to Titahi Bay
- 19. Waitotara River to Tirua Point
- 20. Tirua Point to entrance area of Manukau

- 21. Manukau Harbour and entrance
- 22. Kaipara Harbour and entrance
- 23. Manukau Entrance to the Kaipara Entrance
- 24. West of Northland
- 25. Reef Point to North Cape
- 26. Marlborough Sounds
- 27. Queen Charlotte Sound & Tory Channel
- 28a. Stephen Is Tory Channel excl. sounds
- 28b. Tory Channel to Clarence River
- 29. Clarence River to Conway Rivers
- 30. Conway River to Sumner Beach
- 31. Sumner Beach to Rakaia River
- 32. Rakaia River to Waitaki River
- 33. Waitaki River to Tokomirira River
- 34a. Tokomirira River to Long Point
- 34b. Long Point to Slope Point
- 35. Slope Point to Te Waewae Inlet
- 36. Stewart Island, Ruapuke Island & surrounds
- 37. Patterson Inlet on Stewart Island
- 38. South West of the South Island
- 39a. North West of the South Island
- 39b. West of the South Island
- 40a. North of the South Island
- 40b. Cape Farewell to Kahurangi Point
- 40c. Golden Bay and Tasman Bay
- 41. Unknown (Interviewer can't establish zone)

M1

Thinking of when you were fishing in <INSERT ZONE>, which fishing method or methods did you use?

- [① Read out answer options, as needed](#)
- [① Multiple answers permitted](#)

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

- 1. Rod or line (not long line)
- 2. Long-line including set line, contiki or kite
- 3. Net (not including landing net used if caught on line)
- 4. Pot (eg. for crayfish)
- 5. Dredge, grapple or rake
- 6. Hand gather or floundering from shore
- 7. Hand gather by diving
- 8. Spearfishing
- 9. Other

[Soft error check: If 2, 4 or 5 at M1 and 6 at P1 (land platform) say "Are you sure – platform was land/beach/rocks/jetty"]

M1a [Only asked if answered 'Other' at M1]

Can you please describe this 'other' method?

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

M1b [Only asked if answered '7' at M1]

When you were hand gathering by diving, was that...

① Read out answer options

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

- 1. Scuba diving
- 2. Snorkelling
- 3. Neither
- 4. Both

M1c [Only asked if answered '8' at M1]

When you were spearfishing, was that...

① Read out answer options

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

- 1. Scuba diving
- 2. Snorkelling
- 3. Neither
- 4. Both

M2 [Only asked if answered 'Yes' at D3]

Just to confirm, on that occasion were you recreational fishing, or fishing with a customary permit or authorisation?

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

- 1. Recreational / amateur
- 2. Customary permit or authorisation
- 3. Other

M3 [Only asked if answered '2' at M2]

Would you know what type? Would it be a customary authorisation under the kaimoana or South Island regulations... a customary permit... or something else?

① A customary permit is issued under Regulation 27 of the Fisheries Amateur Fishing Regs – hui, tangi.

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

- 1. Customary kaimoana or SI authorisation
- 2. Customary permit
- 3. Something else

M4 [Only asked if answered 'Other' at M2 or 'Something else' at M3]

Can you please tell me more about that?

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone>

C1a [ASKED OF ROD AND SPEAR FISHERS]

Thinking of when you were <INSERT FISHING METHOD>, including fish used for bait, which of these describes what happened with your **own** fishing?

① Read out all three answer options slowly!!

① If even one fish or other marine species was caught and kept by the fishing method, answer 3. This is even if others were discarded.

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method>

- 1. You yourself didn't catch or gather anything
- 2. You yourself caught something, but you released them all
- 3. You yourself caught something that you didn't release

C1b [ASKED FOR ALL OTHER METHODS]

Thinking of when you were <INSERT FISHING METHOD>, including fish used for bait, which of these describes your fishing?

① Read out all three answer options slowly!!

① If even one fish or other marine species was caught and kept by the fishing method, answer 3. This is even if others were discarded.

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method>

- 1. You didn't catch or gather anything
- 2. You caught or gathered something, but you released or discarded them all
- 3. You caught or gathered something that you didn't release or discard

C2

Including bait, what species did you [IF ROD OR SPEARFISHER: yourself] catch [If 2 AT C1: and release]. [IF ANSWERED 3 AT C1:] Please only include those species where at least one was kept.]

① If R says "Yellowtail" ask if they mean Kingfish, Koheru or Jack Mackerel ① Multiple answers permitted!

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method>

Fin Fish [Soft error check: if a named fin fish AND method = 'handgather

1. Barracouta by diving', then say "Are you sure, method = handgather by diving?]

2. Blue Maomao

3. Blue Moki (If red, put under 'Other fish)

4. Bluenose

5. Butterfish (Greenbone)

6. Cod – Blue (always check if red or blue cod)

7. Cod – Red (if not red/blue, put under 'Other fish')

8. Flounder, Sole or other flatfish

9. Garfish (Piper)

10. Gemfish

11. Groper (Hapuku/Bass)

12. Gurnard - Red

13. John Dory

14. Kahawai

15. Koheru

16. Kingfish (Yellowtail)

17. Mackerel – Blue/Slimy/English

18. Mackerel – Jack Mackerel

19. Mullet – Yellow Eyed/Herring

20. Mullet – Grey (if not yellow eyed/grey, put under 'Other Fish')

21. Porae (Big Lips) (not Parore! Check)

22. Pilchard (Sardine, Sprat)

23. Sea perch (Jock Stewart, Scarpie)

24. Shark – Spiny Dogfish (Bruno)

25. Shark – Rig (Spotted Dogfish)

26. Shark – School shark (Tope)

27. Snapper

28. Stingray - any kind incl. Skate

29. Tarakihi

30. Trevally

31. Trumpeter

32. Tuna – Skipjack (Bonito)

33. Tuna – Albacore

34. Other fish 1 (specify)

35. Other fish 2 (specify)

36. Other fish 3 (specify)

37. Other fish 4 (specify)

38. Other fish 5 (specify)

Other Marine Species

39. Cockles

40. Crayfish/Lobster – Spanish

41. Crayfish/Lobster – Spiny/Red (most common)

42. Crayfish/Lobster – Packhorse/Green

43. Kina

- 44. Mussel - any but not Horse Mussel
- 45. Oyster - any type
- 46. Paua – ordinary
- 47. Paua – Yellow Foot
- 48. Pipi
- 49. Scallops
- 50. Squid - any kind
- 51. Tuatua
- 52. Other marine species 1 (specify)
- 53. Other marine species 2 (specify)
- 54. Other marine species 3 (specify)
- 55. Other marine species 4 (specify)

C2a1 [Only asked if there is 'Other' fin fish]

Please specify the other fin fish

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method>

C2b1

Please specify the other marine species [Only asked if there is 'Other' marine species]

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method>

C4 [Asked for each species caught OR where fish released only]

[IF 3 AT C1 AND ROD OR SPEAR FISHING METHOD:] **Remembering that's only the ones you yourself caught – not the group catch.** [All:] How many did you catch? [IF 3 AT C1:] and not release?

① If other than rod or spear fishing and R is not sure of his personal total, then record the number for the group

① If R gives a round number eg. 10, 20, 30 ask "Is that the exact number caught, or just a rounded number" and probe for an exact number if necessary. [Round number checking]

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method> ==> fish <species>

[Note program allows '0!']

[Soft error check: If a Rod or spear fisher AND a named fin fish (1-36) AND C4>10 say: "Can I check again this was your own catch and not [IF BOAT (1-5 at P1):] the boat catch [OTHERWISE:] a group catch?"]

[Questions from C5 onwards are not asked for fish released]

C5 [Only asked if answered 'Yes' at D4]

Were these part of a personal allowance from a commercial catch?

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method> ==> fish <species>

- 1. Yes
- 5. No

C5b [Only asked if answered 'Yes' at C5]

Was that in accordance with a 'general approval' or a 'particular approval'?

① If it helps: "Those are the two different kinds of approval under section 111 of the Fisheries Act I believe. If you don't know which, just tell me that."

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method> ==> fish <species>

- 1. General
- 2. Particular
- 3. Other
- 4. Not sure / Don't know

DIVISION OF GROUP CATCH

C6 [Only asked for methods other than spear fishing & rod fishing]

Was anyone else, apart from you, active in catching the <INSERT NUMBER OF THAT SPECIES> <INSERT NAME OF THAT SPECIES>?

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method> ==> fish <species>

1. Yes
 5. No [Back to next fish/method/platform etc or finish if no more]

C7

How many people were active, in catching that including yourself? [Only asked if answered yes at C6]

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method> ==> fish <species>

C8

So, would it be correct to say your personal catch was <INSERT CALCULATED NUMBER OF SPECIES DIVIDED BY HOW MANY PEOPLE INVOLVED> [Note could be a fraction eg. 6 fish and 5 people = 1.2 fish personally caught]

1. Yes [Back to next fish/method/platform etc or finish if no more]
 5. No

C9

Could you please tell me how many of those <SPECIES> you see as your personal catch?

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method> ==> fish <species>

C10

Could you give a brief reason why your personal catch was different from the average?

==> <day <day and date> ==> Trip (1 of <number of trips>) ==> Platform: <boat type> ==> zone <zone> ==> <method> ==> fish <species>

OTHER ROUTING NOTES

This CATI programs routes according to answers given. It works in a 'tree' structure, progressing down each unresolved 'branch' in turn. Eg:

- For each day, the program asks details of each trip.
- For each trip the program asks details of each platform.

- For each platform the program asks details of each method.
- For each method the program asks if: 1) Nothing was caught or gathered 2) Caught and all released or discarded 3) Fish or other species were caught and not discarded or released
- For each method where something was caught, the program asks for details on species caught.

APPENDIX 14 NON-FISHER 'DROP-IN' SURVEY

CONTACT5

- A. **Hello it's xxxxx. Could I please speak to <named person>?** (from your sampling sheet).

- Named person available → Go to S1.
- What's it about? → Go to B.
- Named person not available → Go to C.
- They don't live here/wrong number → Go to D.

- B. [IF NECESSARY] I'm ringing for the Marine Recreational Fishing Survey. We just need to ask <Named person> a quick question about fishing in New Zealand. Mid last year your house was approached and we mentioned we might be calling back in future. It only takes a minute.

- C. [IF NAMED PERSON NOT AVAILABLE] When would be a good time to call for <named person>? Is this the best phone number? [NOTE TIME AND/OR NUMBER TO CALL BACK ON SAMPLING SHEET]

- D. [IF THEY SAY THEY ARE NOT AT THE ADDRESS] Do you happen to know a phone number for <named person>? Or perhaps a new address? [[RECORD ON SAMPLING SHEET]

[IF THEY DON'T KNOW A NUMBER] Is there anyone else we could contact who might know their number? Perhaps a family member or friend? [RECORD ON SAMPLING SHEET AND RING THEM TO TRY AND GET A NEW NUMBER FOR THE NAMED PERSON]

THANK AND CLOSE

SCREENING QUESTION FOR NAMED PERSON

- S1. [IF NEW PERSON TO FIRST PHONE ANSWERER] Hello my name is xxx and I'm ringing for the Marine Recreational Fishing Survey. We just need to ask you a very quick question about fishing in New Zealand. Mid last year your house was approached and we mentioned we might be calling again. It only takes a minute. The question is:

Have you personally been marine fishing at all in the last 6 months? By marine, we mean in any salt water place like the sea, an estuary, or river mouth which has salt water.

We mean 'fishing' in the widest sense and it includes rod fishing, diving, gathering or trapping any fish, shellfish or other marine species. However it doesn't include commercial fishing or fishing under a customary permit – only recreational fishing.

Have you done that at all in the last six months – that's from the 1st of October 2011 to now?

[IF NO] Thank you very much, that's all we need to know. CLOSE [RECORD 'NF' ON THE SAMPLING SHEET].

[IF YES, GO TO FISHING QUESTIONNAIRE]

FISHING QUESTIONNAIRE

Only filled out for respondents who went fishing – one questionnaire PER FISHING DAY.

Q1. WRITE IN THE RESPONDENTS ID NUMBER
FROM THE SAMPLING SHEET

DON'T READ OUT Q2 AND Q3 IF SECOND DAY OR MORE

Q2. Is it okay if I ask just a few more questions about your fishing? [CIRCLE]

Yes ----- 1

No ----- 2 → THANK AND CLOSE. GO TO PAGE 3 AND RECORD
RESPONDENT'S NAME AND PHONE NO.

Q3. On how many different days would you say you went marine fishing, by any method
at all, in the last 6 months? That's from the 1st of October last year till
now.

Now I'd like to ask some details for EACH day you went fishing. [IF MORE THAN
ONE DAY, YOU CAN DO IN ANY ORDER – SUGGEST MOST RECENT FIRST]

DAY _____ [1, 2, 3 etc] [USE MULTIPLE QUESTIONNAIRES IF MULTIPLE DAYS]

F1. What date did you go fishing, gathering or diving?

DATE OR DESCRIBE: _____

F2. And do you remember what day of the week that was? [WRITE IN MON, TUES...
ETC]

DAY DON'T REMEMBER

F3. Which of these did you fish from on that day? [READ OUT AND CIRCLE NUMBER]

Trailer motor boat ----- 1

Larger motor boat or launch ----- 2

Trailer yacht----- 3

Larger yacht or keeler ----- 4

Kayak, canoe or rowboat ----- 5

Off land, including beach/rocks/jetty----- 6

Something else ----- 7 SPECIFY _____

F4. Was that a paid trip with a charter operator and a skipper? [CIRCLE NUMBER]

Yes ----- 1

No ----- 2

F5. Which of these did you launch from on that occasion? [READ OUT AND CIRCLE NUMBER]

Ramp ----- 1

Marina ----- 2

Mooring ----- 3

Beach ----- 4

Jetty or wharf ----- 5

Anchorage ----- 6

Other ----- 7 SPECIFY _____

F6. [ONLY ASK IF ANSWERED '1' AT F5.] What was the name of that ramp?

F7. What was the nearest city or town to where you were fishing?

F8. And what was the nearest land point to where you were fishing?
[IF NECESSARY] Some examples are Simpson Point or Karaka Island or Waihi Beach”

AREA CODE
(from map book)

F9. Which fishing method or methods did you use on that occasion?
[READ OUT AND CIRCLE NUMBER]

Rod or line (not long line) ----- 1

Long line, including set line, contiki, kite --- 2

Net (not including landing net) ----- 3

Pot (eg, for crayfish) ----- 4

Dredge, grapple or lake ----- 5

Hand gather or floundering from shore ---- 6

Hand gather by diving ----- 7 *

Spearfishing ----- 8 *

Something else ----- 9 SPECIFY _____

F10. [ASK IF '7' OR '8' AT F9, OTHERWISE SKIP TO F11] Was that ...?

Scuba diving----- 1

Snorkeling----- 2

Neither ----- 3

Both----- 4

F11. And on that day, which of these describes your **personal** fishing...

You didn't catch anything----- 1

You caught or gathered something but released them all ----- 2

You caught something you didn't release ----- 3

IF **3** ABOVE, GO TO F12.

IF **1 OR 2** ABOVE, AND **MORE** FISHING DAYS, START A NEW QUESTIONNAIRE.

IF **1 OR 2** ABOVE, AND **NO** MORE FISHING DAYS, THANK AND CLOSE.

F12. What fish, shellfish or other marine animals did you catch and not release on that day? I need to know how many of each species you **personally** caught. If it was caught by a team effort, just your share of the catch.

SPECIES*	NUMBER CAUGHT AND KEPT

* [If they don't know HELP THEM. Ask them to describe the colour, shape and size]

"Thank you. I appreciate your time today."

RESPONDENT'S NAME: _____

RESPONDENT'S PHONE NO.: _____

INTERVIEWER SIGN: _____ DATE OF INTERVIEW: _____