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Feasibility and design for a CRA 2 recreational harvest monitoring survey

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Hartill, B. (2019). Feasibility and design for a CRA 2 recreational harvest monitoring survey.

***New Zealand Fisheries Assessment Report 2019/31.* 14 p.**

This report provides a characterisation of the recreational CRA 2 rock lobster fishery, which has then been used to inform a proposed sampling design that could be used to monitor trends in recreational harvesting from this fish stock. Two data sources were used to inform this characterisation: catch/effort data reported by participants in the 2011–12 and 2017–18 National Panel Surveys; and fisher interview data collected during creel surveys conducted in the Hauraki Gulf and Bay of Plenty over the past decade. While the scope and resolution of these two data sources differs, they have collectively provided enough insight to inform key aspects of the proposed survey design, such as the spatial and temporal dynamics of the fishery and the likely level of sampling required to achieve a given target measure of estimated precision.

The core of the recreational CRA 2 fishery occurs along definable stretches of coast in the Hauraki Gulf and Bay of Plenty. Almost all of the recreational rock lobster catch is taken over a five-month period from October to February, and there would be little merit in monitoring this fishery's landings at other times of the year. Recreational landings should be monitored on both weekend/public holiday days and on midweek days, which should be treated as separate temporal strata.

A creel survey monitoring design is proposed. Eleven boat ramps have been identified where appreciable rock lobster landings might be expected, which are geographically spread along those stretches of the coast where most of the catch is taken. Creel survey data collected over a relatively intensely surveyed 24-month period between 1 October 2010 and 30 September 2012 has been used to determine how many days landings at the selected ramps should be surveyed, and when and for how many hours on each day. There is considerable potential for collaborative sampling alongside other creel surveys that are routinely conducted in this area, and a consistent interview format across all programmes is recommended.

1. INTRODUCTION

A recent stock assessment suggests that there is a high probability that the CRA 2 stock has been overfished (Webber et al. 2018), which has led to a substantial reduction of the Total Allowable Catch (TAC) from 416.5 t to 173 t. The Total Allowable Commercial catch (TACC) has been reduced by 60%, from 200 t to 80 t, and the recreational allowance from 140 t to 34 t. Regular monitoring of all sources of harvesting from CRA 2 is required to assess whether the intended rebuilding of this stock is being achieved.

Commercial fishers are routinely required to submit statutory catch effort returns, and customary harvests can only be taken by individuals holding a customary fishing permit issued by a Kaitiaki, who are required to regularly provide Fisheries New Zealand with a summary of any customary catch authorisations that they have issued. There is no compulsion for recreational fishers to report their catch, however, and some form of survey would therefore be required to quantify this source of removals.

The only CRA 2 stock-wide estimates of recreational harvesting that are considered to be reasonably accurate are those provided by the 2011–12 and 2017–18 National Panel Surveys (Wynne-Jones et al. 2014, Wynne-Jones et al. 2019). While these estimates can be used to gauge levels of recreational fishing pressure at the time of the survey, they give very little indication of the level of recreational rock lobster harvesting in this area in other years, and especially into the future, given the recent reduction of the CRA 2 recreational daily bag limit, from six to three fish per fisher per day.

This report describes an analysis of the available survey data collected from the recreational CRA 2 fishery over the past decade, which has been used to inform the design of a proposed creel survey approach that could be used to monitor relative trends in recreational harvesting from this stock.

2. DATA USED TO INFORM ANALYSES

Two primary data sources have been used to characterise the CRA 2 recreation fishery and to inform the design of a creel survey to monitor harvest trends: catch and effort data reported by panellists participating in the 2011–12 and 2017–18 National Panel Survey (NPS; Wynne-Jones et al 2014, Wynne-Jones 2019); and creel survey data collected from fishers interviewed at boat ramps in the Hauraki Gulf and Bay of Plenty for a variety of purposes over the past decade.

The data provided by the NPS surveys provides a broad overview of all forms of recreational rock lobster harvesting throughout mainland New Zealand, but the intensity of this coverage is low given the relatively small number of panellists who reported harvests of rock lobster. There was a five-year gap between the two NPS surveys, which also limits how much can be inferred about spatial trends in catch and effort over time.

Conversely, creel surveys of recreational fishers have been conducted in the CRA 2 area every summer over the past decade, and throughout the year in some years, but these surveys have been oriented towards trailer boat fishers, who have been interviewed as they return to boat ramps, giving little insight into other forms of fishing effort, such as from the shore or from a launch.

The characterisation derived from these two data sources is used to determine when and where a survey of recreational rock lobster fishers could be conducted as part of an ongoing and cost-effective creel survey, and to provide an indication of how much of the fishery is potentially assessable by this survey approach. While comprehensive coverage of the entire CRA 2 recreational fishery would not be possible given this creel survey approach, the assumption is made that it should provide a reasonable indication of relative changes in overall recreational catch over time.

3. PANELLIST DATA CHARACTERISATION

A summary of the data available from panellists participating in the 2011–12 and 2017–18 NPS surveys who reported catches of rock lobster from CRA 2 is given in Table 1. While over 7000 panellists participated in each of these national surveys, the number of individuals who reported trips where rock lobster was harvested is relatively low, with only a small number of panellists reporting fishing activity within the CRA 2 area (Figure 1). Any inferences drawn from these data should therefore be considered to be indicative only, as the chance selection of any single panellist who subsequently reported catches of rock lobster in any area could have a marked influence on the characterisation of activity in that area, given the small number of panellists overall. The selection of an atypically avid shore-based fisher in an area could for example, lead to an over-estimate of the importance of that type of fishing in that area. The consistency in patterns between the two surveys is therefore an important consideration.

Table 1: Summary of catch and effort data reported by panellists participating in the 2011–12 and 2017–18 National Panel Surveys.

NPS survey	Panellists catching CRA	Trips where CRA caught	Panellist catch (n)	Scaled panellist catch (n)	Panellist catch as % of scaled catch	NPS harvest estimate (t)
2011–12	62	164	527	59 028	0.9%	40.7
2017–18	33	87	225	19 832	1.1%	14.7

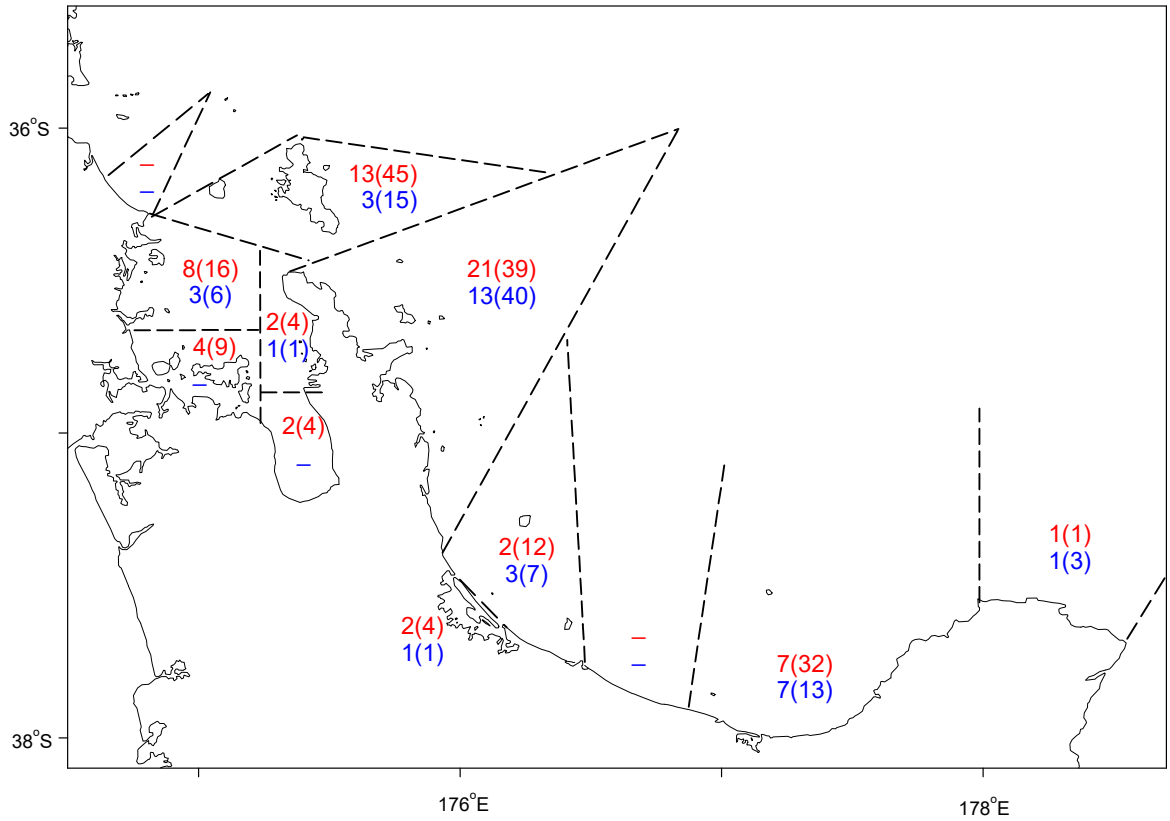


Figure 1: Number of panellists reporting trips where rock lobster were harvested, and number of reported trips (in brackets), by NPS reporting area (delineated by dashed lines) in CRA 2. The upper numbers in red in each area are those reported during the 2011–12 NPS survey and the lower numbers in blue are those reported during the 2017–18 NPS survey.

The relative spatial intensity of fishing effort (Figure 2) and catch (Figure 3) appears to be broadly consistent across time, despite the small number of panellists reporting catches of rock lobster in either survey year. About 89% of the panellist catch in 2011–12 and 96% of the catch in 2017–18 was taken from only five of the twelve NPS reporting areas occurring within CRA 2. These were: the north-western Hauraki Gulf (10% of trips in 2011–12 as seen in Figure 2), off Little and Great Barrier Island (26%), the eastern Coromandel coast (24%), the coast and islands off Tauranga (7%), and the eastern Bay of Plenty that is west of Cape Runaway (20%). These areas coincide with areas of suitable rock lobster habitat.

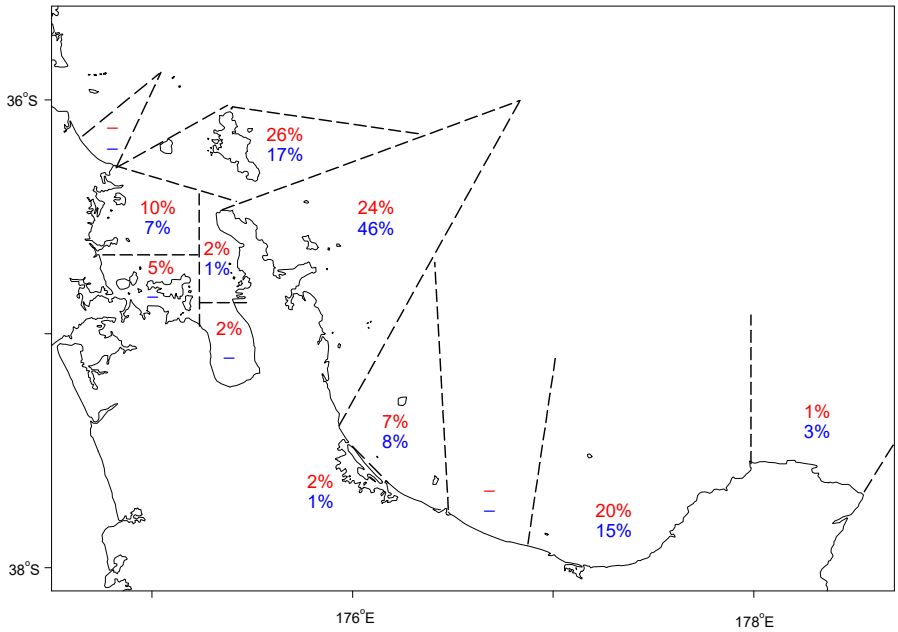


Figure 2: Spatial distribution of panellist trips where catches of rock lobster were reported, from the 2011–12 (upper percentages in red) and 2017–18 (lower percentages in blue) National Panel Surveys.

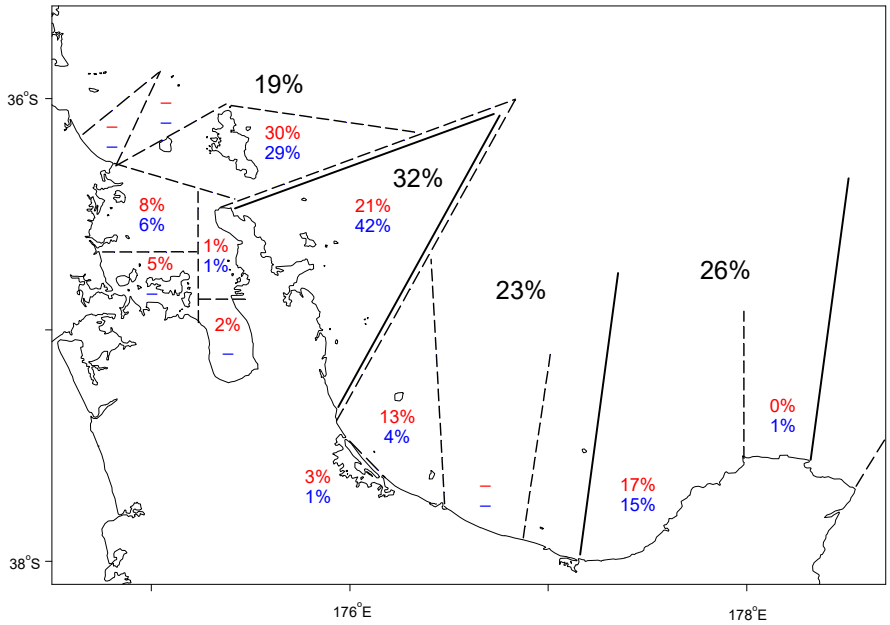


Figure 3: Spatial distribution of panellist catches of rock lobster reported, for the 2011–12 (upper percentages in red) and 2017–18 (lower percentages in blue) National Panel Surveys. The spatial distribution of commercial catches of rock lobster is given as percentages in black text. Solid lines denote boundaries between commercial rock lobster statistical reporting areas.

The majority of the rock lobster catch reported in both surveys was taken by panellists fishing from trailer boats, with the catch from launches being greater in some locations in one or other of the survey years (Figure 4). These data suggest that only a small proportion of the CRA 2 recreational catch is taken from the shore. While trailer boat fishing predominates overall, some of these trips originated from locations that panellists did not consider to be boat ramps, and a hence a lower proportion of the reported catch will have been landed by trailer boat fishers returning to boat ramps (Figure 5). Consequently, a creel survey of boat ramps will potentially monitor a significant, but only partial, component of the CRA 2 recreational fishery.

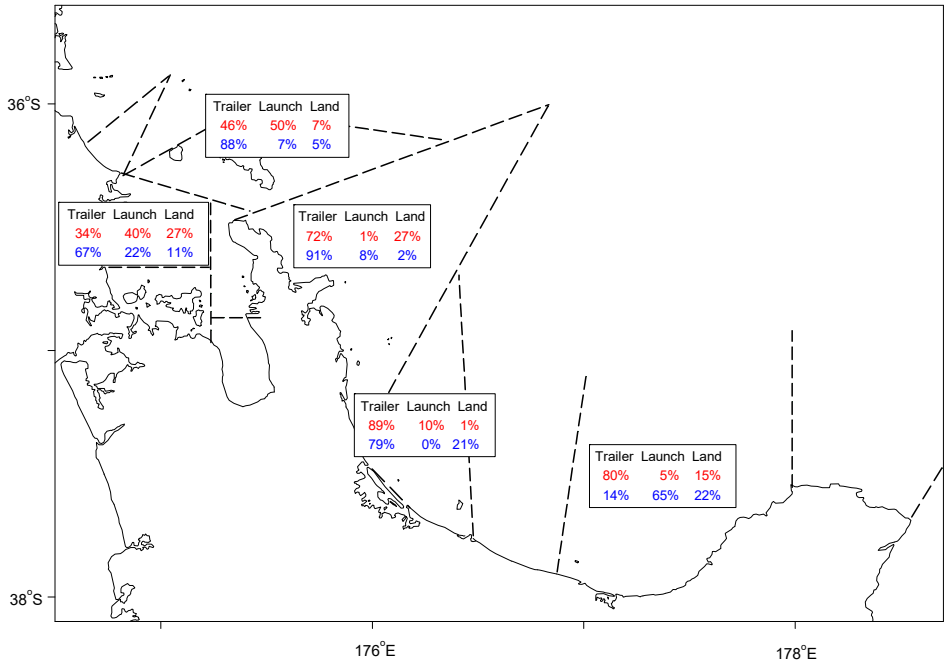


Figure 4: Percentage of the reported rock lobster catch taken via fishing platform, by NPS survey (for 2011–12 in red and 2017–18 in blue). Percentages have only been calculated for those areas where most of the reported catch was taken from, as indicated in Figure 3.

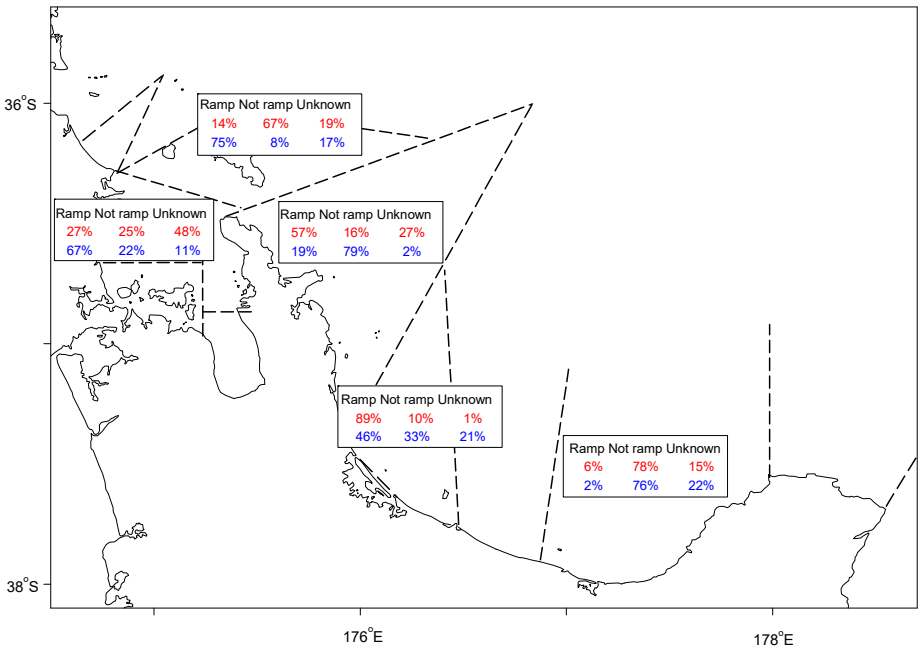


Figure 5: Percentage of the reported rock lobster catch landed at boat ramps and elsewhere, by NPS survey (for 2011–12 in red and 2017–18 in blue). Percentages have only been calculated for those areas where most of the reported catch was taken from, as indicated in Figure 3.

Almost all of the recreational rock lobster taken in CRA 2 is caught by divers or snorkelers, with only a small proportion of the catch taken by rock lobster pot (Figure 6). As a general rule, most of the recreational catch of rock lobster taken off northern New Zealand is caught by divers and snorkelers, compared to a higher incidence of pot caught fish in southern areas (Hartill & Davey 2015).

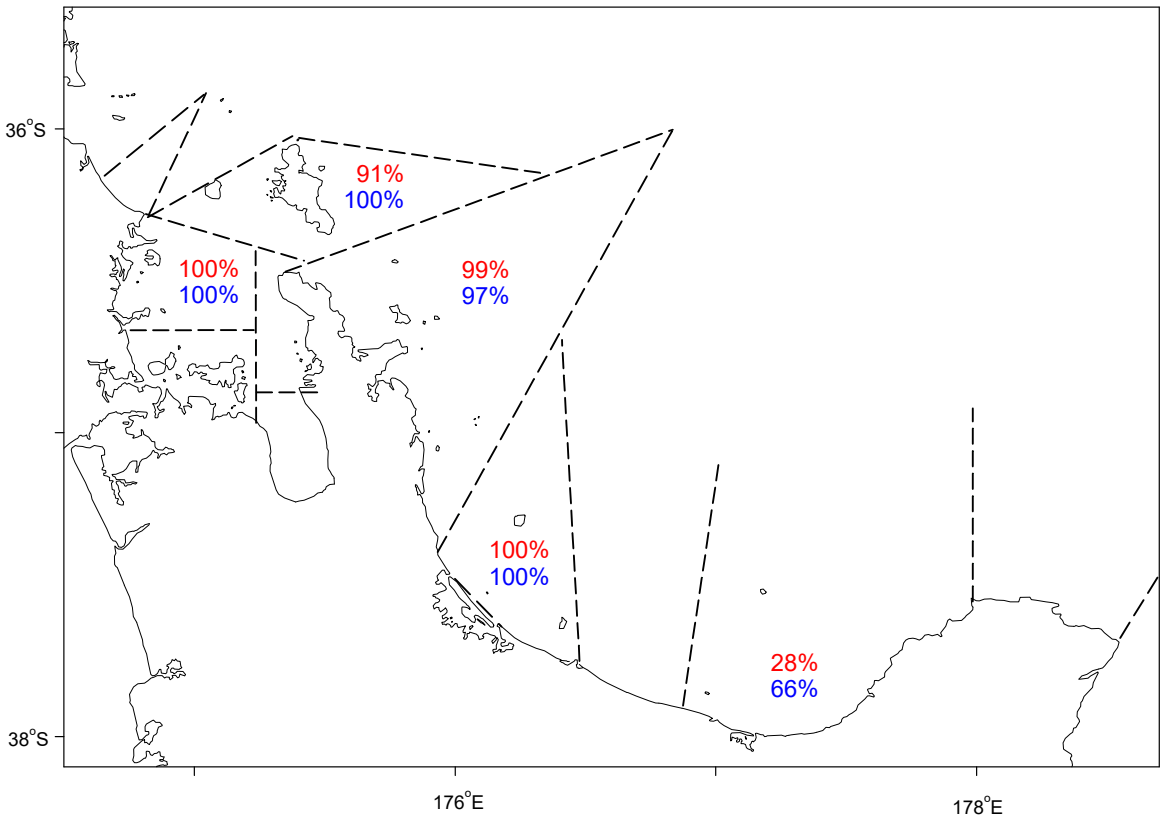


Figure 6: Percentage of the reported rock lobster catch taken by divers and snorkelers, by NPS survey. Percentages have only been calculated for those areas where most of the reported catch was taken from, as indicated in Figure 3.

While rock lobster were taken by recreational fishers throughout the year during both surveys, 76% of the reported panellist catch in 2011–12 was taken between October and February, with 81% of the catch in 2017–18 being taken over the same five-month period (Table 2). Most of this peak season catch was taken between November and January, but it would be prudent to survey a broader five-month period as a greater proportion of the peak season catch could be taken during the shoulder months in October and February in some years if there was a higher than normal incidence of stormy weather from November to January.

Table 2: Percentage of the rock lobster harvest from CRA 2 reported by panellists during the 2011–12 and 2017–18 National panel Surveys, by month and day type.

Survey	Day type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2011–12	Midweek	3%	5%	11%	5%	3%	2%	1%	1%	0%	1%	0%	0%
	Weekends & holidays	9%	4%	16%	13%	7%	4%	5%	3%	2%	1%	1%	3%
2017–18	Midweek	5%	10%	5%	10%	2%	2%	1%	0%	1%	0%	0%	2%
	Weekends & holidays	8%	7%	18%	13%	3%	3%	2%	0%	1%	1%	2%	2%

4. CREEL SURVEY DATA CHARACTERISATION

An extract of creel survey data from Fisheries New Zealand's Rec_data database has identified 5037 creel survey sessions that have taken place in either the Hauraki Gulf or Bay of Plenty during the five summer months highlighted in Table 2 over the past decade. Interviews with fishers were conducted over 21,854 hours during these sessions, with 3145 landed rock lobster found in inspected catches. Summary statistics are given for the 40 access points where most of the interviewing took place (Table 3).

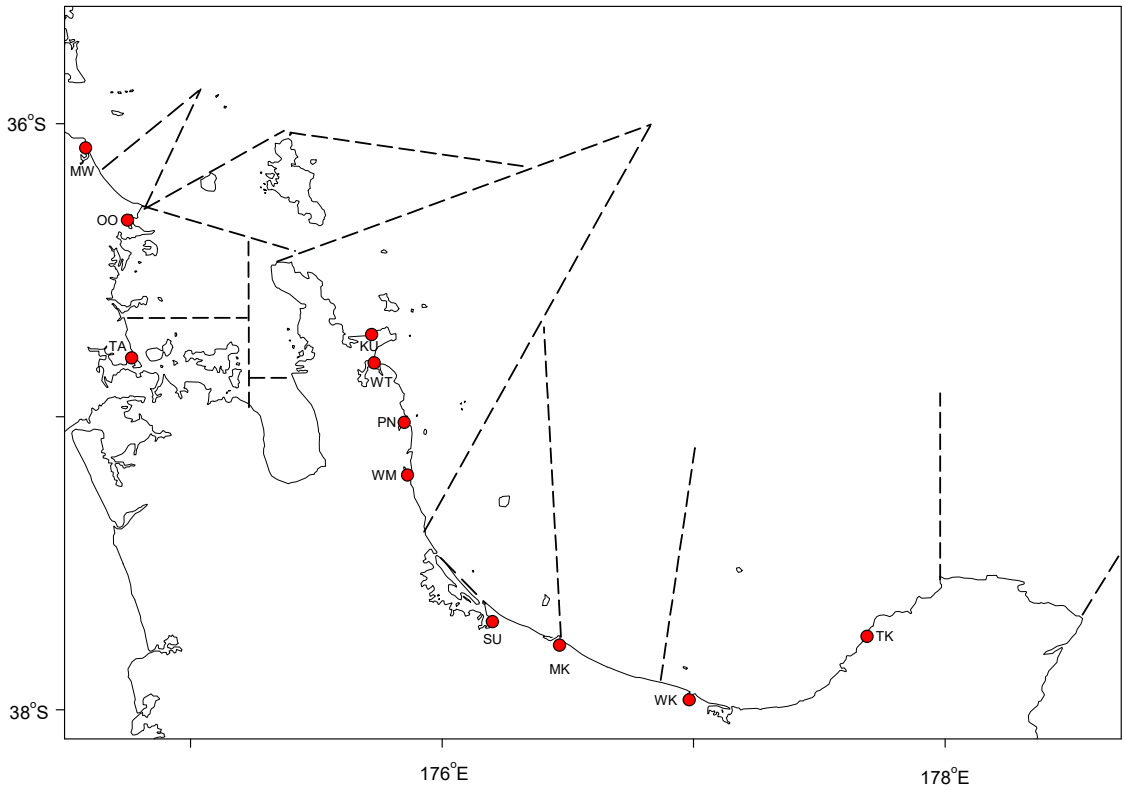
Table 3: Summary statistics for the 40 access points that have been surveyed in CRA 2 the most since 1 October 2007. Access points with an asterisk are those selected for a proposed monitoring survey.

Ramp	Ramp code	Years surveyed	Hours surveyed	CRA landed	CRA/hour
Te Kaha*	TK	1	25	29	1.145
Kuaotunu*	KU	2	526	332	0.632
Pauanui*	PN	2	297	164	0.553
Tairua	TR	2	549	251	0.457
Whangamata Marina ramp	WMR	2	561	261	0.465
Whangamata*	WM	6	700	252	0.360
Whitianga Marina	WTM	2	218	78	0.358
Whakatane*	WK	5	676	216	0.319
Kennedy Bay	KN	2	13	4	0.313
Tairua Boat Club	TR2	2	51	16	0.311
Omaha*	OO	5	670	195	0.291
Tauranga Bridge marina	TRM	2	285	78	0.274
Whitianga*	WT	5	1 163	312	0.268
Hahei	HAH	2	237	57	0.240
Maketu*	MK	3	294	68	0.231
Port Charles	PCS	2	21	4	0.195
Sulphur Point*	SU	8	2142	395	0.184
Pauanui Pleasant Point	PNP	2	55	9	0.163
Sandy Bay S of Port Charles	SND	2	160	26	0.163
Cooks Beach	CKB	2	340	52	0.153
Whitianga Marina pontoon	WTN	2	221	32	0.145
Matarangi	MTR	2	180	24	0.133
Opito Bay Beach	OPB	2	220	23	0.105
Cooks Beach Marine Parade	CKM	1	10	1	0.103
Whangamata Marina	WGM	2	273	26	0.095
Kaituna River	KR1	2	127	12	0.094
Sulphur Point Marina	SUM	2	292	22	0.075
Sulphur Point South	SUS	2	74	5	0.068
Bowentown	BO	6	1 234	53	0.043
Takapuna*	TA	9	1 604	59	0.037
Whangapoua Wharf	WGP	2	161	5	0.031
Kawakawa Bay	KA	2	301	8	0.027
Kawakawa (club)	KC	2	325	7	0.022
Gulf Harbour	GU	6	770	15	0.019
Kawakawa (public)	KM	5	696	13	0.019
Bethlehem	BEL	2	116	2	0.017
Hobson Bay	HB	1	18	0	0.000
Half Moon Bay	HA	9	2 440	25	0.010
Waikawau	WW	5	717	7	0.010
Westhaven	WE	6	1 029	4	0.004
Te Kouma	TM	5	740	3	0.004

The survey sessions summarised in Table 3 have been conducted for a variety of purposes, and consequently, the number of hours surveyed at each ramp differs considerably. While the average number of rock lobster observed per survey hour gives some indication of which ramps should be surveyed to best monitor recreational harvesting from CRA 2, the location of these access points should also be considered, to ensure a representative spatial coverage for any proposed creel survey.

These data suggest that the best ramps to survey to monitor the rock lobster harvest in each area would be at: Takapuna and Omaha for north-western Hauraki Gulf; Omaha again for Little and Great Barrier Island; Kauotunu, Pauanui, Whitianga and Whanagamata for the eastern Coromandel coast; Sulphur Point and Maketu for the coast and islands off Tauranga; and at Whakatane and Te Kaha for the eastern Bay of Plenty which is west of Cape Runaway (Figure 7). Interview sessions at these ten access points accounted for 64% of the observed rock lobster catch, but only 37% of the hours surveyed over the past decade, during the five months October to February.

While no data were available from the boat ramp at Mangawai, additional surveying at this ramp outside of the Hauraki Gulf is considered advisable as many fishers set out from this access point to fish the waters around Little and Great Barrier Islands, despite the fact that it is north of the CRA 2 management area.



Gulf and Barrier Is		Coromandel		Eastern Bay of Plenty	
MW	Mangawai	KU	Kauotunu	SU	Sulphur point
OO	Omaha	WT	Whitianga	MK	Maketu
TA	Takapuna	PN	Pauanui	WK	Whakatane
		WM	Whangamata	TK	Te Kaha

Figure 7: Location of boat ramps where recreational landings of rock lobster could be monitored, based on the rate at which rock lobster landings have been encountered across a wider range of ramps that have been surveyed intermittently since the summer of 2007–08.

The creel survey data extract described above was also used to determine the optimal time to conduct four, or alternatively, six-hour interview sessions. Because rock lobster abundance and hence harvesting levels will have changed over time, this analysis was restricted to the 2010–11 and 2011–12 fishing years, as these were the two consecutive summers (October to February) for which most data are available from nine of the eleven access points shown in Figure 7 (suitable data were not available for Mangawai and Te Kaha). Interviewers were present at these boat ramps throughout the day on every surveyed day, at seven of the selected ramps in 2010–11, and at all nine ramps in 2011–12. The interviewers were required to be present at each access point regardless of the prevailing weather conditions, so these data should give a reasonable indication of the peak time at which rock lobster landings are likely to occur irrespective of environmental conditions. The average hourly rate at which rock lobster were encountered during both weekend/public holiday days and midweek days, in 2010–11 and in 2011–12, is shown in Figure 8.

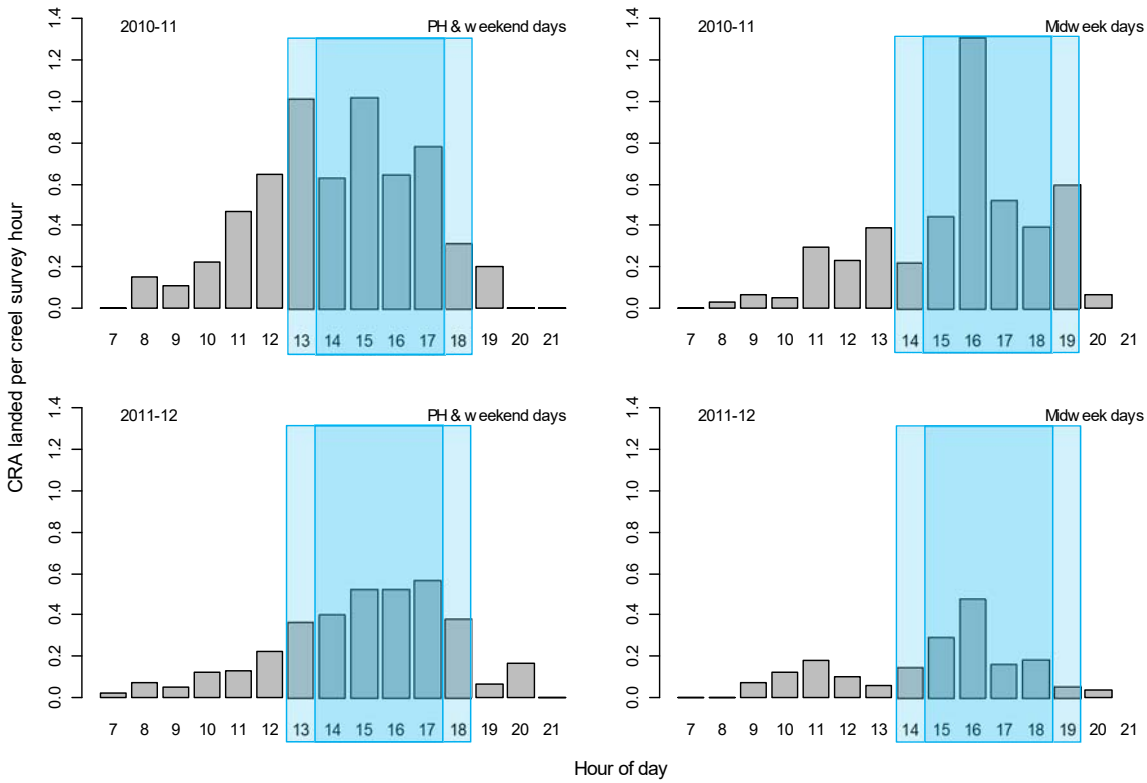


Figure 8: Summertime diurnal distribution of the average rate at which rock lobster were landed per survey hour, based on creel survey data collected throughout the day at 9 key access points surveyed during both weekend/public holiday days and midweek days in 2010–11 and 2011–12. The shaded rectangles indicate the optimal four and six-hour periods when most of the rock lobster catches were encountered on surveyed days, as also identified in Table 4.

The average number of rock lobster encountered during four and six hourly periods starting at different times of the day is given in Table 4. These statistics suggest that the optimal time of day to survey and monitor recreational landings of rock lobster at boat ramps in CRA 2 differs slightly by day type and survey year, but about 70% of the catch during those summers was landed during six-hour sessions starting at 13:00 in the afternoon, and over half the day's catch would have been encountered if only a four hour period starting at 14:00 had been surveyed.

Table 4: Average number of rock lobster encountered during a four and six-hour interview sessions starting at different times of the day, by day type, based on creel survey data collected at key boat ramps surveyed in 2010–11 and 2011–12. The percentage of the average daily catch landed during sessions starting at different times of day is also given. The optimal session start time for each session length in each year is indicated by blue shading.

Weekend or holiday days

	6 hour session			4 hour session	
Session start time	CRA per session	% of day's catch	Session start time	CRA per session	% of day's catch
10:00	2.48	56%	10:00	1.31	29%
11:00	2.90	65%	11:00	1.64	37%
12:00	3.32	75%	12:00	2.11	48%
13:00	3.32	75%	13:00	2.32	52%
14:00	2.84	64%	14:00	2.38	53%
15:00	2.50	56%	15:00	2.26	51%
16:00	1.80	40%	16:00	1.67	37%
17:00	1.23	28%	17:00	1.23	28%

Midweek days

	6 hour session			4 hour session	
Session start time	CRA per session	% of day's catch	Session start time	CRA per session	% of day's catch
10:00	1.12	43%	10:00	0.61	23%
11:00	1.71	65%	11:00	0.68	26%
12:00	1.76	67%	12:00	0.80	30%
13:00	1.87	71%	13:00	1.36	52%
14:00	1.89	72%	14:00	1.46	56%
15:00	1.76	67%	15:00	1.54	59%
16:00	1.43	54%	16:00	1.38	53%
17:00	0.73	28%	17:00	0.73	28%

Based on the analyses so far, summary daily harvest statistics were calculated to estimate the improvement in the precision of a harvest estimate that might be achieved as the number of days surveyed is increased (Table 5, Figure 9). The data used to inform this optimisation analysis were restricted to creel survey data collected during the October-February months of 2010–11 and 2011–12, during the four and six-hour periods of the day when rock lobster landings were expected to peak, as indicated in Figure 8. No more than six of the eleven ramps of interest were actually surveyed on any given day in 2010–11 and 2011–12, with as few as one ramp being surveyed on some days. Daily harvest summary statistics were therefore only calculated from those days when at least five of the selected ramps were surveyed throughout the selected survey period for each day type. The improvement in estimate precision achieved when five to six of the eleven ramps are surveyed on an increasing number of days therefore gives a conservative indication of the improvement in estimate precision that would be achieved, as surveying across a wider network of eleven ramps has already been proposed to ensure adequate spatial coverage. Separate optimisation curves were calculated for where both day-type strata were selected, and where just the weekend/ public holiday stratum was surveyed, for both four and six-hour session lengths.

Table 5: Summary statistics of the number of rock lobster encountered by survey day during the four and six-hour period of the day when landings of rock lobster are expected to peak, as indicated in Figure 8. The data used were collected during the months October to February, in 2010–11 and 2011–12. No more than six of the eleven boat ramps indicated in Figure 7 were surveyed on any given day during these years, and data collected on days when fewer than five ramps were surveyed were not used when calculating daily catch statistics.

Session length	Day type	Number of days	Mean	Standard deviation
4 hours	Weekends/Public hols	56	13.00	14.26
	Midweek	96	5.16	10.89
6 hours	Weekends/Public hols	56	17.86	19.50
	Midweek	96	6.60	12.01

The expected overall variance $S^2{}_{(y)}$ at any given level of sampling intensity was calculated as:

$$S^2{}_{(y)} = \sum N_i{}^2 . S_i{}^2 . \sqrt{\frac{N_i - n_i}{N_i - 1}}$$

Where N_i is the total number of days occurring within each day type stratum i, $S_i{}^2$ is the sample variance calculated for day type stratum i, and n_i is the number of days surveyed in stratum i.

The last component of the above is a finite population correction term which reduces the estimated uncertainty associated with a harvest estimate as the number of days surveyed is increased, as an increasing proportion of the summer harvest has been measured, and not estimated from data collected on other surveyed days.

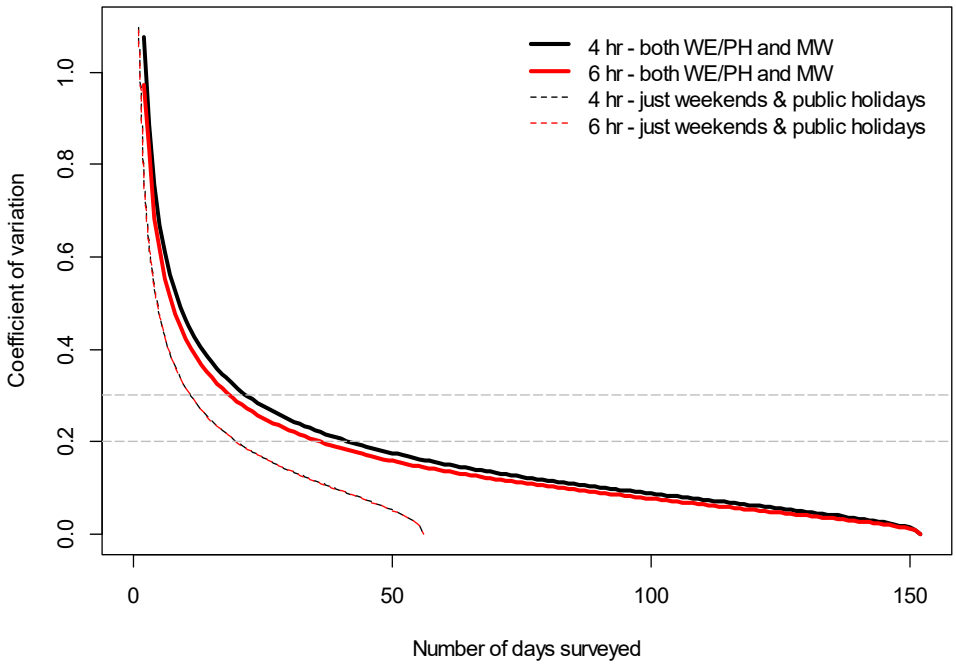


Figure 9: Improvement in the precision of estimates of the number of rock lobster landed across a network of five to six access points achieved when the number of days surveyed in each temporal stratum is progressively increased. Separate optimisation curves are calculated for four and six-hour sessions, when just weekend/public holiday days are surveyed, and when both day type strata are surveyed. The righthand downward inflection of each optimisation curve indicates the increasing influence of the finite population correction term applied to each temporal stratum variance estimate.

The harvest estimate precision curves given in Figure 9 can be used to predict the number of survey days and hours that would be required to achieve target coefficients of variation given different sampling designs (Table 6). These predictions suggest that the most economical survey designs would be those based on a four-hour session length, which only require a modest increase in the number of survey days to achieve a similar level of precision when the session length is increased to six hours per day. We recommend that both day type strata should be surveyed, despite the higher number of survey days required overall when both day types are surveyed, to achieve a given level of estimate precision. This is because monitoring of recreational landings on weekend and public holidays alone may give a misleading indication of changes in harvesting levels over the long term, given the number of fishers who also take rock lobster during the working week.

Table 6: Predicted total number of hours of boat ramp interviewing that would be required across eleven boat ramps to achieve a predicted target harvest estimate coefficient of variation (CV) given the session length and whether weekend/public holidays only (WE/PH) are surveyed, or both day types are surveyed (WE/PH and MW). The number of days that should be surveyed in each day-type stratum under each scenario based on the predictions shown in Figure 9.

Target CV	Session length (hrs)	Days surveyed WE/PH	Days surveyed MW	Ramps	Total hrs
20%	4	20	–	11	836
20%	4	18	23	11	1 804
20%	6	20	–	11	1 320
20%	6	18	18	11	2 376
25%	4	15	–	11	660
25%	4	13	17	11	1 320
25%	6	15	–	11	990
25%	6	13	13	11	1 716
30%	4	11	–	11	484
30%	4	10	12	11	968
30%	6	11	–	11	726
30%	6	9	10	11	1 254

5. PROPOSED CREEL SURVEY DESIGN

While a creel survey approach is proposed to monitor trends in recreational harvesting from CRA 2, there has been no precedent of a rock lobster monitoring programme, following this or any other survey design, in New Zealand. The analyses presented here are based on interpretations of data collected for other purposes and are therefore indicative but based on some direct observation of the fishery. These analyses suggest that a creel survey approach could be used to broadly monitor trends in recreational rock lobster harvesting from CRA 2 long term, if the survey design is implemented in a consistent fashion.

Key components of the proposed survey design are:

- That fishers are interviewed when they return to a fixed selection of eleven boat ramps located throughout the Hauraki Gulf and Bay of Plenty (including one just north of CRA 2). The boat

ramps that have been selected for this purpose are located along those stretches of coast where most of the recreational fishing for rock lobster occurs.

- That it would only be necessary to survey the fishery between October and February each year, as the majority of the recreational rock lobster catch from CRA 2 is landed over this five-month period.
- That days falling on both weekends/public holidays and midweek should be surveyed, as the balance between levels of harvesting across these two temporal strata may trend over time and will vary in any given year in response to differing prevailing weather conditions. While the sample design optimisation described here would suggest that a higher level of estimate precision would be achieved if fishers were interviewed on weekends and public holidays only, surveying on midweek should also be considered. The need for representative sampling to ensure consistent monitoring of the fishery over the long term outweighs any cost efficiencies that would accrue from surveying weekend/public activity only.
- That the degree of improvement in harvest estimate precision achieved by increasing the length of survey sessions from four hours to six hours does not justify the additional sampling effort required to survey two additional hours each day, which would be better directed towards surveying additional days.
- That all ramps are surveyed on the same random pre-selection of survey days regardless of prevailing weather conditions, to get an unbiased estimate of the average daily harvest landed at those ramps each year. While it is likely that prevailing weather conditions on some pre-selected days may preclude recreational fishing for rock lobster, interviewers should still be required to be present at all selected ramps on these days, to ensure the consistent implementation of the survey design. While it may be tempting to increase the intended number of survey days to allow for subsequent cancellations on days when high wind speeds eventuate, there is no way of knowing the likely incidence and timing of unfishable weather far in advance, which will also vary from year to year. Some interviewers may be tempted to make their own judgement calls on whether they should be present for any interview session given their interpretation of the weather forecasted, which would undermine the integrity and spatial consistency of the survey design, and our ability to appropriately scale up the observed catch to account for that landed at other times. From an employment standpoint, a rigidly enforced temporal sampling design is also desirable given the certainty of expectation it provides for both managers and employees, both in terms of data collection and remuneration. Finally, any *ad hoc* reselection of survey days in response to prevailing weather conditions should be avoided, as this would lead to an over estimation of the harvest in that year, because some sampling effort will have been directed towards days when a higher level of fishing effort and catch would be expected, on average.
- Creel surveys are routinely conducted in the CRA 2 management area for a variety of other purposes, providing some clear synergies with the survey design proposed here. Integration of the survey design proposed here with other concurrent surveys would therefore help ensure the cost effectiveness of any work undertaken across multiple work programmes. In order to take advantage of these synergistic benefits, however, it would be necessary for all interviews to follow a consistent format, so that the objectives of all surveys are met. Another advantage with a consistent survey format approach is that the data collected could be used for a variety of other purposes in the future, such as characterising and designing surveys of other fisheries, in a similar manner to that described in this report. The one disadvantage with a consistent survey format for the survey proposed here is the risk of missing rock lobster landings when an interviewer is following an unnecessarily protracted interview with another party of fishers. The incidence of rock lobster landings is far lower than for other species such as snapper, and the time spent measuring species other than rock lobster would increase the likelihood of a rock lobster landing passing undetected, and unmeasured. The most expedient approach would be to ask interviewers to just count and not measure landings of other species when rock lobster landings are being monitored, if other boats are return to the ramp when another group of fishers are being interviewed.

- If a CRA 2 recreational catch monitoring programme is instigated following a survey design based on the analyses described here, then the survey design should be reviewed regularly to ensure that the objectives of that programme have been met. By necessity, the analyses presented here are based on data that have been collected for other purposes, and it is possible that different conclusions would have been drawn if data were already available from another rock lobster catch monitoring survey, such as that described here. The recent decline in rock lobster abundance in CRA 2 may have also fundamentally changed the nature of the recreational fishery in a way that is not apparent from the data available for this study.

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