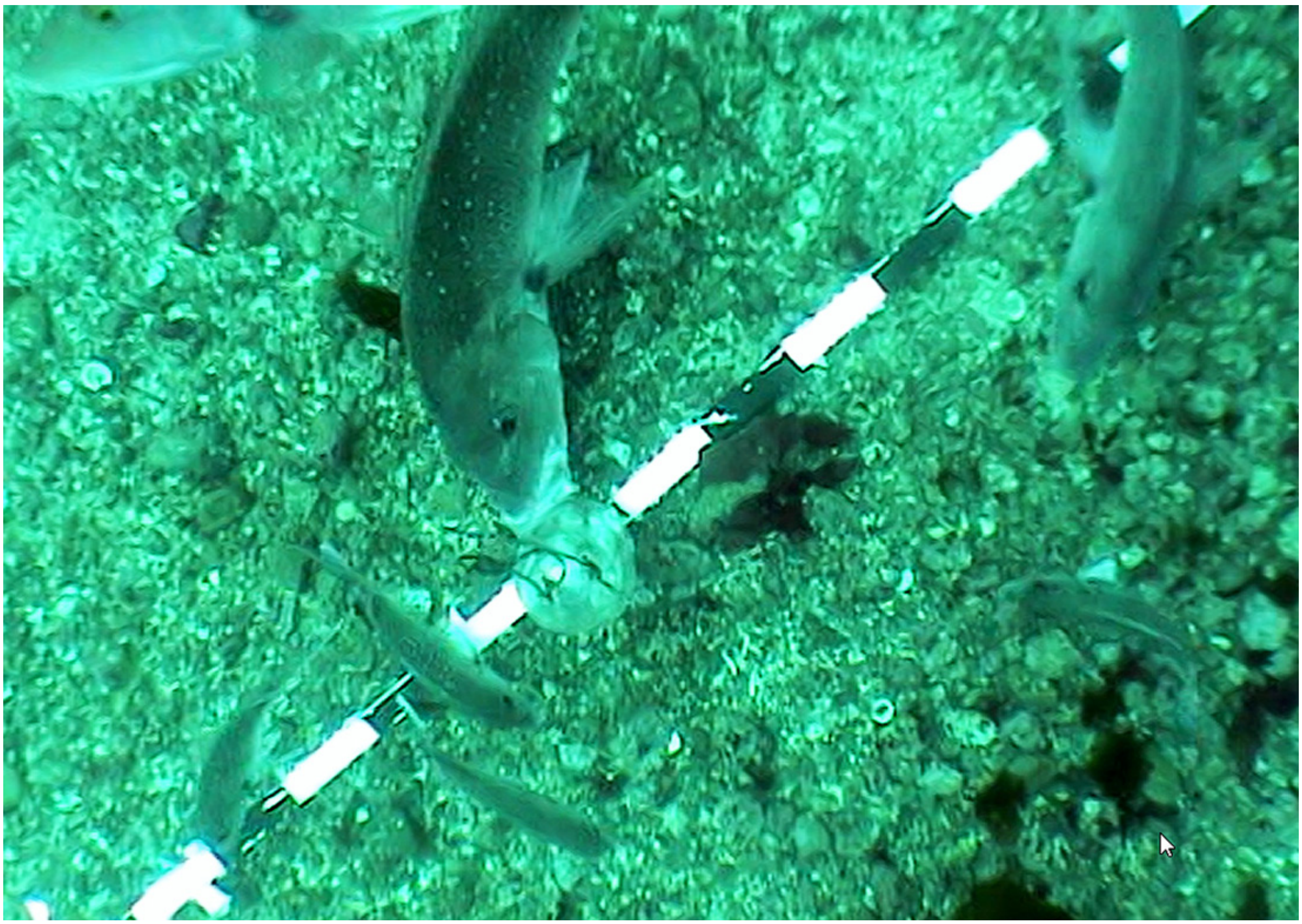
Baited underwater video survey of fishes – Maunganui Bay and Cape Brett, Bay of Islands, New Zealand.

Vince Kerr, November, 2016



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Cover Photo: Snapper attracted to the bait canister of the BUV apparatus

For: Fish Forever, Bay of Islands Maritime Park Inc.

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Kerr and Associates, Whangarei

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1 Abstract

Baited underwater fish surveys (BUV) involve lowering a camera and frame with bait attached to the seabed to record the relative abundance and size of fishes attracted. Surveys were undertaken at 30 locations on the north side of the Cape Brett Peninsula and in Maunganui Bay. The monitoring method targets carnivorous fish species on or near shallow rocky reefs. Where possible, the same locations were surveyed from previous studies conducted by the Department of Conservation and the Bay of Islands Maritime Park group, Fish Forever. Results showed that the abundances of carnivorous species were comparable to previous monitoring in the area and with a typical abundance for this region in areas regularly fished. The main species recorded was snapper (*Pagrus auratus*) which occurred in modest numbers, mostly within the 20-25cm length range. We compared results from sites in three distinct areas: the proposed marine reserve on the northern Cape Brett coast; the exposed coast on either side of the proposed marine reserve; and Maunganui Bay, itself part of the propose marine reserve. There were no statistical differences in the abundance of snapper between these areas. Comparisons with past surveys in this area and at other comparable areas open to fishing on the northeast coast–including North Cape, Cape Karikari, the Mokihinau Islands and Mimiwhangata–showed similar results. However, all of these results contrast starkly with the higher abundances and larger size of snapper in the Poor Knights Marine Reserve. The mean length of snapper within the Poor Knights Marine Reserve was more than a third larger at 35cm, and a calculated relative biomass per BUV site was 25kg compared to the 3-4kg for the fished sites and the current study at Cape Brett. This level of difference in the abundance and size structure of a key shallow reef predator between fully protected and fished reefs is significant and likely to have far-reaching ecological effects.

2 Introduction

In May 2014, Bay of Islands community group, Fish Forever, released a public consultation document proposing two marine reserves in the Eastern Bay of Islands (Fish Forever, 2014). This proposal was supported by a study of the proposed boundaries for the marine reserves (Kerr, 2014). Based on the strength of the proposal and the significant community support documented in a separate consultation study (Kerr et al., 2014), Fish Forever is continuing this work with more detailed habitat and biodiversity research at the proposed marine reserve areas.

In early 2016, Fish Forever commissioned this study to assess reef fish populations on the northern coast of the Cape Brett Peninsula and Maunganui Bay. The aim of the study was to establish baseline data for reef fish abundance and size that would allow future comparisons to be made between the proposed Maunganui Marine Reserve area and adjacent unprotected areas. A further aim was to add to the existing monitoring information tracking the progress of the Rahui established under Section 186 of the *Fisheries Act 1996.* The Maunganui Bay dataset will also support future monitoring options associated with any new arrangement for long-term protection.

A simple baited underwater video (BUV) system has been used to monitor reef fish populations in northeastern New Zealand for the last fifteen years (Willis and Babcock 2000a). As a result of this BUV system, valuable information has been collected on the abundance and size distribution of the snapper *Pagrus auratus* inside and outside marine reserves in this region, including: the Poor Knights Islands; Cape Brett, Cape Karikari; North Cape; Mimiwhangata Marine Park; and the Mokihinau Islands (Buisson 2009). Other coastal marine reserves also have important BUV datasets: Cape Rodney to Okakakari Point, Tawharanui and Hahei Marine Reserves (Willis et al. 2003) and Motukaroro Island as part of the Whangarei Harbour Marine Reserve (Kerr & Grace 2007). These datasets and the standard BUV methods provide a valuable background against which to compare relative reef fish abundance across the region in various coastal areas, with varying management regimes, fishing intensity and varying levels of marine protection.

The Cape Brett area has had three previous BUV surveys, which provide background for current and future surveys. The Department of Conservation (DOC) Northland Conservancy reef fish monitoring program was active in the years between 2001 and 2009. From the DOC program, BUV data is reported for the Cape Brett area in 2009 (Buisson) and 2004 (Denny & Babcock). Fish Forever reported on its survey for Maunganui Bay and the northern side of Cape Brett in 2012 (Booth).

This report presents the information collected in a current round of BUV survey of thirty sites on the north side of the Cape Brett penninsula and in Maunganui Bay. The field work was completed on 24 February and 6 March, 2016.

3 Methods

3.1.1 Baited Underwater Video (BUV)

Baited underwater video has been successfully used in New Zealand for monitoring the abundance of carnivorous fish species in and around New Zealand for over ten years. The methods and BUV apparatus used in the study are identical to that used in the DOC monitoring program for the Poor Knights Marine Reserve and surrounding mainland control sites (Buisson, 2009). These methods and statistical analyses are described by Willis and Babcock, (2000 a,b).

Baited underwater video sampling involves dropping a video camera attached to a frame (Figure 1) into the water and filming fish as they are attracted to a bait pot. At each sampling location the BUV apparatus is submerged for a thirty-minute sampling period. Bait pots are filled with approximately 100g of chopped thawed pilchards.

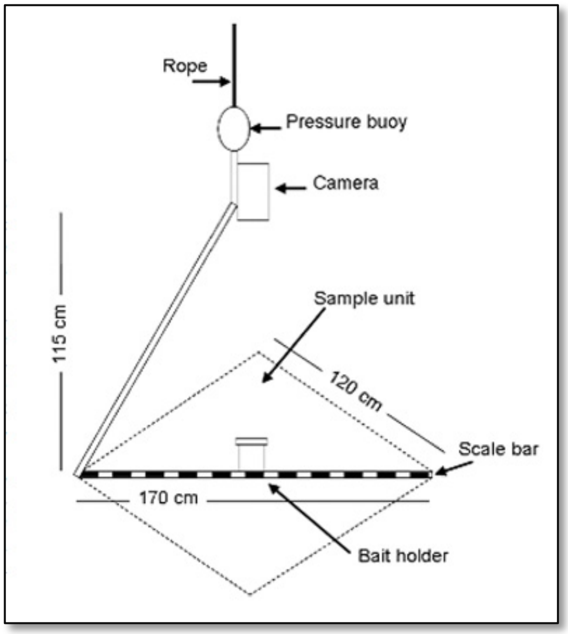

Figure 1 Diagram of the baited underwater video (BUV) apparatus used (taken from Buisson, 2009).

Data from thirty BUV sample locations indicated on the map in Figure 2 below were analysed for the maximum count of each fish species appearing during the 30 minutes the BUV was deployed. Summaries of species diversity, and mean length data and biomass for snapper are presented in this report. The 30 sites sampled were divided for analysis purposes into three zones. The zone 1 group of sites was located within Maunganui Bay (10 sites). In this group one site (408) was rejected from the analysis process once it was discovered that moray eels had attacked the bait canister removing it from the frame and eating all the bait at the 3 min mark of the BUV period. It was judged that this compromised the BUV to an extent that the data could not be used, thus for analysis purposes the number of sample units (n) of this group was reduced to nine. The second zone was on the open coast of the Cape Brett Peninsula within the proposed marine reserve area (9 sites). Zone 3 had eleven sites on the exposed coast of the Cape Brett peninsula. Sites in zone 3 were outside the proposed marine reserve located to the east of the proposed marine reserve area (4 sites) and to the south of the proposed marine reserve area extending along the exposed coast towards Oke Bay (7 sites).

3.1.2 Selection of sample sites

Thirty sampling locations were selected for this survey (see Figure 2) representing three zones, to allow for long-term comparisons in and outside of Maunganui Bay, and in and outside of the proposed marine reserve area on the north side of Cape Brett peninsula. Where possible, sample locations from the previous BUV studies conducted by DOC (2002, 2009) and Fish Forever (2012) were repeated. Of the thirty sites covered by this study, twenty of the sample locations were derived from the DOC studies or Fish Forever or both. The new sampling locations were created mainly on the coast between Maunganui Bay and Oke Bay, which had not previously been monitored. The other new sampling locations were created to better balance the number of sites between the proposed marine reserve and the adjacent coast. Reference sites were haphazardly located in areas with similar current, bottom substrate and depth within each zone. Typically the sites selected are areas of soft sediment adjacent to rocky reefs. A location map of the BUV sites appears in Figure 2 below. GPS coordinates and descriptions of the BUV sites are included in Appendix 1.

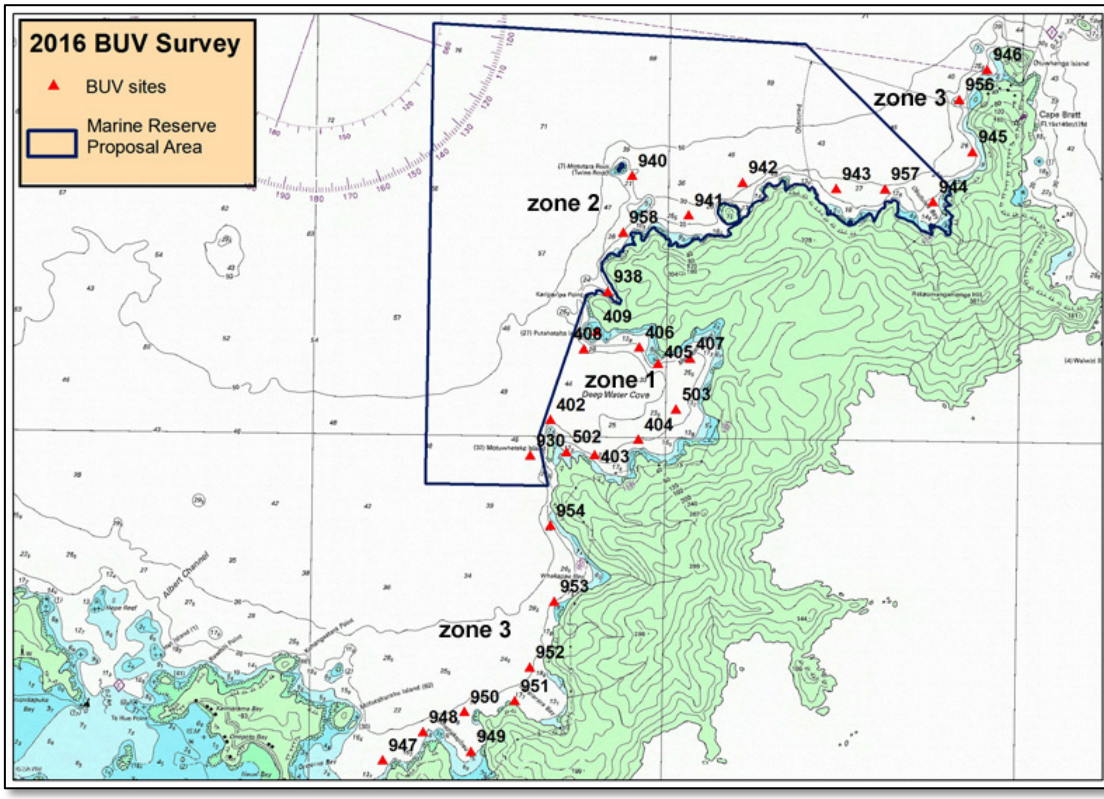

Figure 2 Map of the sample locations for this BUV study.

3.1.3 Analysis of BUV video footage

Each sample location generated a minimum of 30 minutes of video. The analysis protocol used is described in Willis and Babcock (1998). For each sample location, the video was examined for the maximum number of each fish species recorded in a frame over the 30-minute period. The frames containing the maximum number for each fish species was analysed further. Individual fish lengths were measured in still frames of the video sequence and calibrated against a scale bar of known length and a bait container of known length within the baited video's field of view (Figure 1). Because the camera is not bi-focal, care was taken to accurately measure fish length. Fish were measured using three-point calibration and were only measured when they were at the same level as a calibration point of known length, usually the bait container. Snapper length from the video frame with the maximum number of snapper was converted to wet weight biomass using the equation from (Taylor & Willis 1998):

$$W = aL^b,$$

where *W* is weight (g), *L* is length (mm). *a* and *b* are coefficients fitted to actual length/weight data for each species. For snapper, a = 7.194^{-5} and b = 2.793.

4 Results

4.1 Number of fish counted

Figure 3 shows the mean maximum counts (+/- 95% confidence interval) of all videoed fishes for the three zones. The values vary from 18 to 23.1, but are not statistically different, as reflected by the error bars. The highest count was in the proposed reserve area at site 943, with 45 fish being counted. The second highest site was on the exposed coast outside the proposed marine reserve to the south–site 953–with a total of 43 fish counted. The lowest count was site 503, which had zero fish counted. Site 503 was in Maunganui Bay.

Count data for all species and sites are listed in Appendix 2.

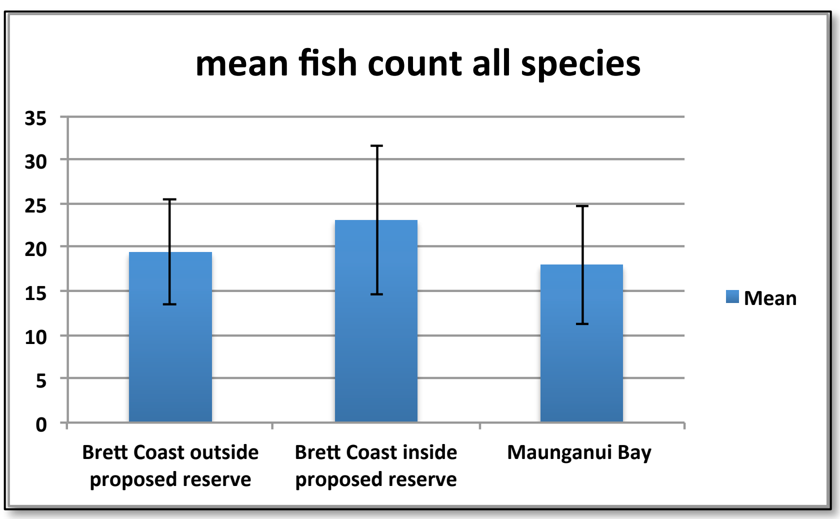

Figure 3 Means (+/- 95% confidence interval) of maximum counts for all fish species in the three zones of the baited underwater video survey, 2016.

4.2 Species diversity

Figure 4 shows the mean number of species recorded per BUV site for the three zones. The northeastern exposed coast areas (zone 2 and part of zone 3) had slightly higher mean fish species richness and the difference was greater than the confidence interval. Across the entire survey, there was a relatively high number fish species attracted to the BUV with a total of 30 species counted. The common and Latin names for these species are listed in Appendix 3 and individual counts for all species are including in Appendix 2.

The site with the highest number of fish species was site 940–at the Twins on the exposed coast in the proposed marine reserve area–where 13 species were recorded. The next highest site was site 957, also in the proposed marine reserve area, with nine species recorded. The areas of exposed coast outside the proposed marine reserve, as well as in Maunganui Bay, had sites with a high of eight species recorded. The three zones also included sites with low species counts ranging from three for the exposed coast outside the proposed reserve to two species in the proposed marine reserve area and 0 species at one site in Maunganui Bay.

Snapper were the most abundant fish species counted across all of the BUV sites. This is expected as this method specifically targets their carnivorous feeding habits. Across the whole survey 302 snapper were recorded. The next most abundant species were: demoiselle (72), a schooling planktivorous species, leatherjacket (49), trevally (44), red pigfish (29), grey moray (15) and blue maomao (11). The remaining 23 species as listed in Appendix 3 were recorded in very low numbers across the 29 sites analysed.

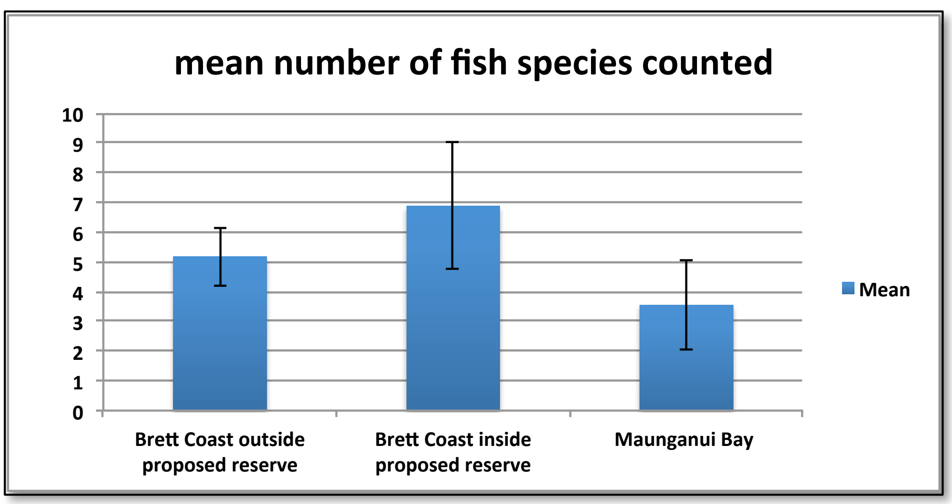

Figure 4 The mean of species counts at each BUV site for the three areas in the survey. Error bars show the 95% confidence level.

4.3 Maximum snapper counts (MAXsna)

Mean values (+/-95% confidence interval) of the maximum number of snapper visible on a video frame (MAXsna) for the three zones are shown in Figure 5.

The mean MAXsna values for the three zones range between 9.6 for zone 3, the exposed coast inside the proposed marine reserve to 11.2 for zone 1 inside Maunganui Bay and the intermediate value of 10.5 for the zone 3 exposed coast sites outside the proposed marine reserve. The means are not statistically different.

The larger error bars within the proposed marine reserve (zone 2) were mainly due to one site (site 943), where 42 small snapper were counted in one frame of the video. This high count contrasts with two other sites within this zone that had MAXsna counts of only one.

The zone 1 Maunganui Bay sites had MAXsna maximum and minimum counts of 22 and 0 respectively. The maximum and minimum MAXsna counts for zone 3–the exposed coast outside the proposed marine reserve area–were 20 and 2.0 respectively.

The minimum and maximum MAXsna values demonstrate the considerable variation in the counts among sites. This degree of variation existed in all three zones, with each having several sites with very low counts.

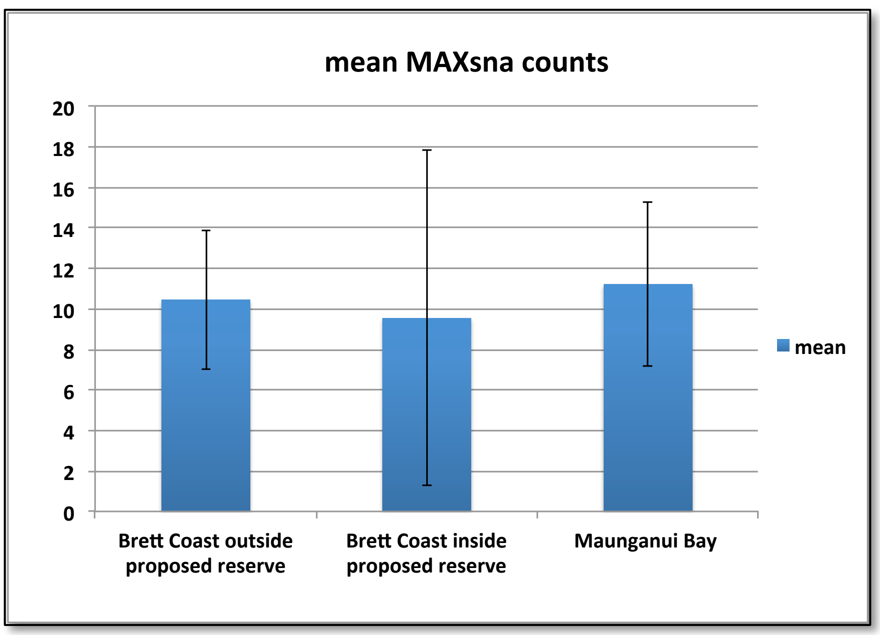

Figure 5 The mean of MAXsna counts at each BUV site for the three areas in the survey. Error bars show the 95% confidence level.

4.4 Snapper length and biomass calculations

The mean length data for snapper shows a range of 23–26cm for estimated nose-to-fork length, with no significant difference among the three zones. The mean size of snapper was quite uniform around the 25cm value. Very few large snapper were recorded and only one location–site 941, in the proposed marine reserve area–had snapper over 40cm in length (two fish, 55cm and 70cm in length).

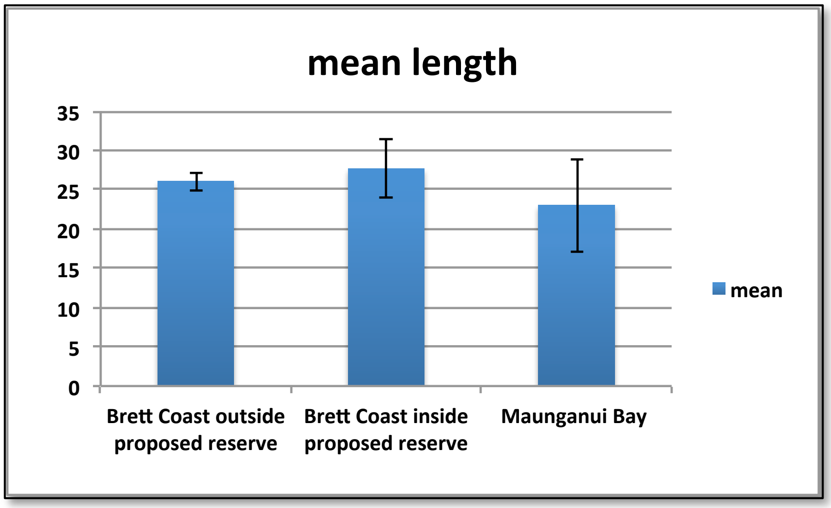

Figure 6 The mean of snapper length estimates in centimetres for each of the three zones. Error bars show the 95% confidence level.

Figure 7 below shows the calculated mean wet weight (relative biomass value) for all recorded snapper in each of the three zones. The value is low reflecting the small, evenly-sized sample of fishes recorded. A 400g fish equates to a snapper with a length of 26cm. This size class describes most of the fish recorded in this survey.

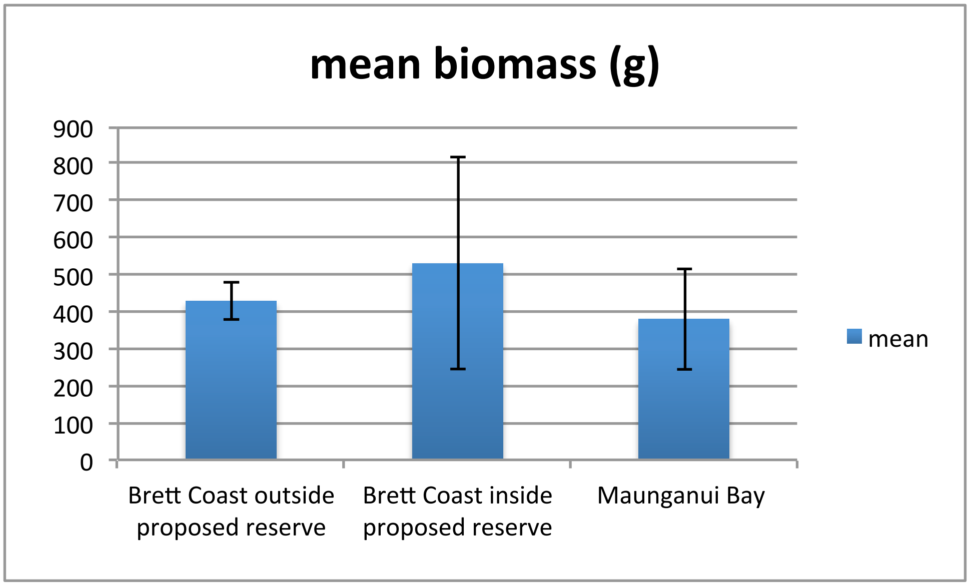

Figure 7 The mean biomass value in grams for individual fish shown for each of the three zones. Error bars show the 95% confidence level.

Figure 8 below shows the mean total snapper biomass per BUV site for each of the three zones. The variation between the three zones is within the sampling variation with the values ranging from 4.3kg to 5.8kg. The difference seen in the larger value for sites in the proposed marine reserve area zone also falls within the sampling error range. The larger mean value of the proposed marine reserve area zone count is skewed to a degree by the presence of the two large fish at site 942. The two large fish are estimated to have weighed 3.2kg and 6.4kg respectively, with the total biomass of 16.4kg recorded at this site. This relative biomass estimate for site 942 is approximately four times larger than the mean value for the area.

It should be noted that the *n* value for zones one and two was nine, and for zone 3 it was eleven. This difference in *n* values is taken into account in all mean and confidence level calculations, but not in total relative biomass for each zone.

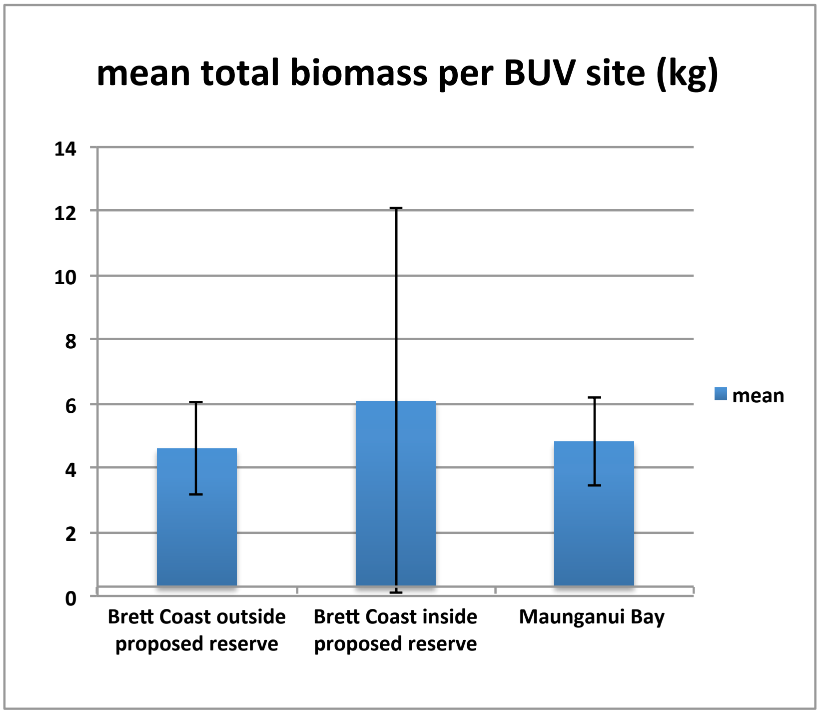

Figure 8 The mean value for total snapper biomass in kilograms for BUV sites in the three zones. Error bars show the 95% confidence level.

5 Discussion

A standard measure used in all BUV monitoring in New Zealand is the MAXsna value for snapper and the resultant mean values of counts from a number of replicate sites in any given area of interest. The BUV MAXsna values are considered to be a reliable relative abundance measure. Snapper, as a predominant reef-associated predator, is well suited as an indicator species and is reliably assessed with this method (Willis, 2000 a,b).

It is a useful practice to look at biomass of fish monitored in addition to abundance. As fish grow, their weight increases exponentially in relation to increase in length. A natural population of fish with a representation of large fish will have a much larger biomass than a population of young fish. However, both could have the same or similar MAXsna count.

In this survey only two large fish were recorded and they were both at the same site (942) resulting in the biomass for this site being four times greater than the mean value of zone. This example illustrates how dramatically biomass increases when fish size increases to the larger, mature snapper size.

5.1 Comparison with previous surveys

One of the distinct advantages of using a standardized method like BUV monitoring is the ability to compare results with other locations and management regimes over time. Table 1 below summarizes data from this current survey alongside previous surveys of the Cape Brett area and similar areas surveyed as part of the DOC Northland BUV monitoring program which ran from 2001 until 2009 (Buisson). Values for the 2012 Fish Forever BUV survey of the Cape Brett and Maunganui Bay area are also shown (Booth 2012). Table 1 is summarized for the purpose of allowing a high order comparison of long term, large-scale changes resulting from different management regimes.

When the BUV data are reviewed over several years and a number of locations, there are clear trends in the results. Firstly, in marine reserves on the northeast coast of New Zealand, the abundance and size of heavily exploited species like snapper undergoes significant change after full protection is put in place in the form of a marine reserve. This trend in recovery is well documented in the literature for the Poor Knights Marine Reserve (Buisson 2009), in other New Zealand marine reserves (Willis et al, 2003) and overseas (Halpern & Warner, 2002).

Comparing an established marine reserve to a fished coast like Cape Brett highlights significant differences in the mean values of MAXsna, mean length and total observed biomass per site. In a marine reserve there are more fish. On average they are considerably larger and they represent a standing biomass that is an order of magnitude larger than the typical situation of a fished coast, where there are very few resident large fish. The mean total biomass observed per BUV site in a marine reserve has been measured in the range of 24kg compared to values for fished areas of around 4kg or less. The difference is clearly significant and is likely to have far-reaching ecological effects on the whole system.

The other aspect of this historic comparison is the uniformity in age or size structure of populations of snapper for fished coasts across wide areas and many years. To summarise, for fished areas in all BUV surveys the MAXsna, the mean body length and the total biomass per BUV site are comparable and, in most cases, in a range that lies within the sampling error of the method. What we are seeing for fished coasts is a population of young fish in the 20-25cm range in modest numbers, which is the norm across all these sites and several years where there are no protection measures in place. This is evidence of localized heavy fishing pressure associated with shallow reefs and the resulting absence of medium- and large-sized reef resident snapper. As such, a primary shallow reef predator is functionally absent from the shallow reef environment.

The current survey results from the Cape Brett and Maunganui Bay area falls within this ‘normal’ range for a fished coast in Northeast New Zealand.

Area	year(s) of sampling (summer)	?mean MAXsna	?mean of snapper length (cm)	? mean total snapper biomas per BUV site (kgs)
Fish Forever Cape Brett BUV (current study)	2016	10	23	4
Fish Forever Cape Brett BUV	2012	10	20-30	n/a
Poor Knights Marine Reserve DOC BUV	2001-2009?	17	35	24
Cape Brett DOC BUV	2001-2009?	7	21	3
Mokohinau Islands DOC BUV	2001-2009?	6	23	2
North Cape DOC BUV	2009	9	19	2
Cape Karikari DOC BUV	2009	17	23	3
Mimiwhangata DOC BUV	2002 2002 2009?	4-7	25	3

Table 1 Summarised data from historic BUV monitoring at Cape Brett and other areas open to fishing at Mimiwhangata, Mokohinau Islands, Cape Karikari, and North Cape, the Poor Knights Marine Reserve, (Buisson 2009) and 2012 Cape Brett data (Booth 2012). Note: historic data is summarized based on year-to-year running mean counts and relative biomass calculations of sampled years. For detailed comparisons and statistical treatment of these data please consult original papers.

In 2009 a two-year ban on fishing was placed on Maunganui Bay via a rahui supported by a Sec 186 Fisheries Act fishing regulation. The rahui has been rolled over and is still in place at the time of writing this report. There is great local interest in this rahui and how effective it has been in restoring marine ecology and fish stocks in Maunganui Bay. The results of this year's BUV monitoring in Maunganui Bay are inconclusive in terms of demonstrating a recovery effect for the carnivorous species monitored by BUV, namely snapper and trevally.

However anecdotal reports from local divers describe the fish life as increasing, with an increase in larger fish and resident fish being reported. Local reports describe an increase in numbers and size of crayfish. Confounding this picture is the uncertainty around the effectiveness of enforcement of the no fishing rule. There is evidence of illegal fishing reported by dive tourism operators who regularly approach fishers unofficially to inform them of the rules and ask offenders to honour the rahui. One such incident was observed while the BUV drops were being done. A group of divers were hunting crayfish inside the rahui area and were approached by one of the local dive operators when they surfaced.

It is unclear why the BUV results aren't showing more recovery in Maunganui Bay, but clearly there are a number of factors at play. It could be that it will take more time for the changes to be large enough to measure with the BUV monitoring method. Also changes may be concentrated at key locations in Maunganui Bay, such as the Canterbury wreck and the highest quality reef areas where divers tend to go. Recovery may take longer for this site because of the relatively small area in rahui and location of boundaries relative to adjoining open coast and deep reef systems. All these considerations are worthy of further study.

6 Acknowledgement

The ongoing support and dedication of the Fish Forever group - and its leadership in particular - to this work at Cape Brett is impressive and appreciated. Financial assistance from the Department of Conservation has also been a significant help to make this project happen. Thanks goes to Marie Jordon, DOC marine ranger, Whangarei for support and loan of BUV cameras and gear. Diane Kerr volunteered her experience and time to complete the BUV video analysis and also helped with editing. Chris Moretti ably assisted skippering our boat. Dr Daniel Breen provided peer review and many worthwhile suggestions for improving this report.

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8 Appendix 1 GPS coordinates for BUV sites

wpt	Longitude	Latitude	Depth	Year Established	Origin	Zone
930	174.28723	-35.2016	41	2009	DOC	inside
938	174.29437	-35.1888	15	2009	DOC	inside
940	174.29652	-35.1798	30	2009	DOC	inside
941	174.3019	-35.1828	28	2009	DOC	inside
942	174.30697	-35.1802	32	2009	DOC	inside
943	174.31583	-35.1806	26	2009	DOC	inside
944	174.325	-35.1815	21	2009	DOC	inside
945	174.32866	-35.1776	21	2009	DOC	outside
946	174.32992	-35.1712	20	2009	DOC	outside
402	174.28913	-35.1988	26	2009	DOC	DWC
403	174.29333	-35.20147	21	2012	FF	DWC
404	174.29744	-35.20025	14	2012	FF	DWC
405	174.29923	-35.19434	25	2012	FF	DWC
406	174.2974	-35.1931	23	2012	FF	DWC
407	174.30223	-35.19392	12	2012	FF	DWC
408	174.29218	-35.19328	16	2012	FF	DWC
409	174.2934	-35.1919	9	2012	FF	DWC
503	174.30096	-35.19787	25	2009	DOC	DWC
502	174.29065	-35.20128	14	2009	DOC	DWC
947	174.273669	-35.225368	18	2016	FF	outside
948	174.277429	-35.223138	16	2016	FF	outside
949	174.281989	-35.224608	15	2016	FF	outside
950	174.281329	-35.221528	22	2016	FF	outside
951	174.286069	-35.220638	19	2016	FF	outside
952	174.287459	-35.218028	24	2016	FF	outside
953	174.289669	-35.212898	25	2016	FF	outside
954	174.289249	-35.207008	24	2016	FF	outside
956	174.327348	-35.173568	24	2016	FF	outside
957	174.320448	-35.180578	27	2016	FF	inside
958	174.295749	-35.184198	22	2016	FF	inside

9 Appendix 2 BUV count data for three analysis areas

Count data for zone 3, the proposed marine reserve area on exposed Cape Brett Coast, sites to east of proposed reserve and sites to the south of Maunganui Bay.

Fish Species	946	956	945	954	953	952	951	950	949	948	947
Spotty										**1**	
Snapper	2	6	17	15	15	4	20	6	8	13	9
Trevally				6		1	3	1	1		4
Goatfish			1		1			1	1		
Leatherjacket	1	2	1	2	2	1	1	8	2	2	2
Blue cod											
Red Pig fish	2	2	2	2	1				1		
Blue Maomao					11						
Demoiselle		1			10		1				1
Porae		1			1						
Red Moki					2						1
John Dory											
Grey Moray	2	5									
Yellow Moray		1	1								
Black-spot goatfish											
Sweep											
Triplefin											
Sandagers Wrasse		1	1	1							
Hiwihiwi										1	
Kingfish											2
Tarakihi											
Northern Scorpionfish											
Orange Wrasse											
Pink Maomao											
Drummer											
Butterfly perch											
Mosaic Moray											
Scarlet Wrasse											
Mottled Moray											
Banded wrasse											
totals	7	19	23	26	43	6	25	16	13	17	19
species count	4	8	6	5	8	3	4	4	5	4	6

Count data for zone 2, the proposed marine reserve area on open Cape Brett Coast

Fish Species	**944**	**957**	**943**	**942**	**941**	**940**	**958**	**938**	**930**
Spotty							1	1	
Snapper	9	3	42	9	10	1	7	4	1
Trevally	1		3	2	1				
Goatfish						2			
Leatherjacket		7		1		4	1	1	2
Blue cod						1			
Red Pig fish		2			2	3	1	1	2
Blue Maomao									
Demoiselle		20				15		6	
Porae				1	1			1	1
Red Moki		1					2		
John Dory									1
Grey Moray		1				3	2	1	1
Yellow Moray				1		1	1	2	
Black-spot goatfish									1
Sweep		4			1				
Triplefin									
Sandagers Wrasse									
Hiwihiwi									
Kingfish									
Tarakihi	1								
Northern Scorpionfish		1				2			
Orange Wrasse		2							
Pink Maomao				1					
Drummer					3				
Butterfly perch						1			
Mosaic Moray						1			
Scarlet Wrasse						1			
Mottled Moray						1			
Banded wrasse								1	
totals	11	41	45	15	18	36	15	18	9
species count	3	9	2	6	6	13	7	9	7

Count data for zone 1, Maunganui Bay area

Fish Species	408	409	406	405	407	503	404	403	502	402
Spotty									1	
Snapper		17	10	10	9		22	15	8	10
Trevally		3	10	1			5	2		
Goatfish										
Leatherjacket		2	1				2	1	1	2
Blue cod										
Red Pig fish	1	1	1	2			1		1	1
Blue Maomao										
Demoiselle	1			1					16	
Porae										
Red Moki										
John Dory										
Grey Moray										
Yellow Moray									2	
Black-spot goatfish										
Sweep									2	
Triplefin									1	
Sandagers Wrasse										
Hiwihiwi										
Kingfish							1			
Tarakihi										
Northern Scorpionfish										
Orange Wrasse										
Pink Maomao										
Drummer										
Butterfly perch										
Mosaic Moray										
Scarlet Wrasse										
Mottled Moray	1									
Banded wrasse										
totals	3	23	22	14	9	0	31	18	32	13
species count	3	4	4	4	1	0	5	3	8	3

10 Appendix 3 Fish species names

Common name	Latin name
Spotty	*Notolabrus celidotus*
Snapper	*Pagrus auratus*
Trevally	*Caranx lutescens*
Goatfish	*Upeneichthys porosus*
Leatherjacket	*Parika scaber*
Blue cod	*Parapercis colias*
Red Pig fish	*Bodianus unimaculatus*
Blue Maomao	*Scorpis violaceus*
Demoiselle	*Chromis dispilis*
Porae	*Cheilodactylus douglasi*
Kingfish	*Seriola lalandi*
Red Moki	*Cheilodactylus spectabilis*
John Dory	*Zeus japonicus*
Grey Moray	*Gymnothorax nubilus*
Yellow Moray	*Gymnothorax prasinus*
Black-spot goatfish	*Parupeneus fraterculus*
Sweep	*Scorpis lineolatus*
Triplefin	*Fosterygion sp.*
Sandagers Wrasse	*Coris sandageri*
Hiwihiwi	*Chironemus marmoratus*
Tarakihi	*Nemadactylus macropterus*
Northern Scorpionfish	*Scorpaena cardinalis*
Orange Wrasse	*Pseudolabrus luculentus*
Pink Maomao	*Caprodon longimanus*
Siver drummer	*Kyphosus sydneyanus*
Butterfly perch	*Caesioperca lepidoptera*
Mosaic moray	*Enchelycore ramosa*
Scarlet wrasse	*Pseudolabrus miles*
Mottled moray	*Gymnothorax prionodon*
Banded wrasse	*Notolabrus fucicola*