

**ASSESSING NEW ZEALANDERS' WILLINGNESS-TO-PAY
TO PROTECT THE ENDANGERED NEW ZEALAND DOLPHIN
(*CEPHALORHYNCHUS HECTORI*):
A BENEFIT-COST ANALYSIS COMPARING THREE SCENARIOS**



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SUMMARY

The New Zealand (NZ) dolphin refers to a species of small dolphin, commonly known as Hector's dolphin, found only in waters around New Zealand. The population has declined from around 30,000 in the 1970s to approximately 7,200 today. The North Island subspecies, Maui's dolphin, has extremely low numbers, having declined from around 2,000 dolphins to fewer than 15 breeding females today (based on the decline since the 2011 estimate of 55 adults). The leading cause of decline is entanglement in set nets and capture by trawl fisheries.

Expanding the protected area for NZ dolphins is one solution to reduce dolphin mortality and has been proposed by Whale and Dolphin Conservation (WDC) and numerous others. From an economic perspective, if the benefits of a sanctuary or marine protected area (MPA) would exceed the costs, then it is economically efficient. This report seeks to explore this and other options using benefit-cost analysis.

We conducted a simplified benefit-cost analysis to compare the potential net benefits to New Zealand of three scenarios for the future of the NZ dolphin. Benefits were measured as the value added from the fishing sector. Costs were measured as the loss of consumer welfare as indicated through willingness-to-pay for dolphin conservation measures, as well as estimated cost of managing a new MPA. To gather data for the cost of reduced consumer welfare, we commissioned an independent survey to poll 1,000 New Zealand residents.

Survey results showed that 52 percent of respondents were willing to pay some annual amount as a 'dolphin protection tax' to help fund protection efforts. 63 percent of respondents were also willing to pay more for fish if dolphin protection measures led to increased consumer prices, further indicating a strong willingness-to-pay to reduce dolphin mortalities. At the same time, 57 percent support the establishment of a marine protected area covering most of the New Zealand coast out to the 100 metre depth contour, removing commercial set netting, trawl fishing and recreational set netting from this area.

The most salient outcome of our investigation is that 80 percent of respondents support strong further measures to protect the NZ dolphin. There is an overwhelming willingness to protect NZ dolphins, especially given that the fisheries values used were conservative (much higher than the true economic value).

Further research should focus on the regional impacts of fisheries on individual NZ dolphin subpopulations, options for alternate fishing methods, increased utilisation of the catch to reduce waste, and a benefit-cost analysis of the marine tourism industry relevant to the NZ dolphin. An immediate priority must be to find alternatives to set nets and trawling, such as changing to longlining and other safer methods to reduce NZ dolphin bycatch and to reverse the NZ dolphin's steep decline.



Figure 1: New Zealand dolphin mother and calf, Akaroa, Banks Peninsula (Photograph by Mike Bossley).

INTRODUCTION

Proposals to ensure a future for the New Zealand dolphin include changing fishing methods and the establishment of marine protected areas (MPAs) which would involve a transition from set netting and trawling to more selective, sustainable fishing methods. In addition to improving protection for dolphins, these measures are likely to increase the profitability of fishing operations and the number of jobs, and may influence the domestic market price of some fish. Reducing fisheries bycatch to zero will be the only effective way to achieve recovery of NZ dolphins, including rescuing the Maui's dolphin subspecies (Slooten *et al*, 2006; Society for Marine Mammalogy, 2013; Currey *et al*, 2012; IWC, 2012, 2013, 2014).

The New Zealand dolphin

The NZ dolphin (*Cephalorhynchus hectori*), also known as Hector's dolphin, (Figure 1) refers to a species of small dolphin found only in the waters around New Zealand. Most live around the South Island, but the Maui's dolphin subspecies (*Cephalorhynchus hectori maui*) is found off the west coast of the North Island. NZ dolphins inhabit coastal waters from the surf zone out to the 100m depth contour as seen in Figure 2.

Considered a *taonga*, a treasured species by Maori, the NZ dolphin has declined from around 30,000 in the early 1970s to approximately 7,200 today. Maui's dolphin in particular has an extremely low population, having declined from around 2000 dolphins to fewer than 15 breeding females today (based on the decline since the 2011 estimate of 55 adults), and without urgent protection further decline is expected. Several South Island subpopulations of Hector's dolphin are just as critically endangered having been reduced to less than 10 percent of recent population sizes. NZ dolphins have a maximum population growth rate of only 2 percent per year, making them highly sensitive to human-induced impacts.

The New Zealand fishing industry

Fisheries in New Zealand are managed under the Fisheries Act 1996. About 7,000 people work in the marine fishing and aquaculture sector – less than 1 percent of the total workforce (Maritime New Zealand, 2012).

Eight large fishing companies control a significant monopoly of quota shares and account for approximately 70 percent of national fish production which is from deep water fisheries. The remaining 30 percent is made up of medium and smaller, usually inshore operations, where there is overlap with NZ dolphin habitat.

Most of the jobs and profit from fishing in New Zealand are in deep water fisheries such as orange roughy, hoki and squid. The most economically productive inshore fisheries (e.g. crayfish, paua) use fishing methods that do not pose a threat to dolphins, including hand-gathering, cray pots and fish traps.

Fishing impacts on New Zealand dolphins

Inshore trawling (bottom and mid-water) and set netting are fishing methods which have impact on NZ dolphins at a rate exceeding their population growth. More than 60 percent of incidents with 'known cause of death' are attributed to nets. During the 1980s, bycatch of NZ dolphins was higher than today's level, due to a larger dolphin population. In 2008, two independent scientific studies conducted by the New Zealand government's National Institute for Water and Atmospheric Research (Davies *et al*, 2008) and Slooten and Dawson (2008) reached the same conclusion: 110-150 New Zealand dolphins die due to set nets each year. This estimate does not include trawling mortalities which are believed to be at a similar rate (Baird and Bradford, 2000; Slooten, 2013).

Since the protection measures of 2008, the number of deaths in set net fisheries may have declined in some subpopulations. For example, Slooten and Davies (2011) estimated that bycatch on the east coast South Island has declined from 46 per year to 23 per year, but they did not detect a decrease in bycatch level for any other area. Catch rates and fishing effort in fisheries that affect NZ dolphins remain at similar levels, indicating a higher concentration of fishing effort along protection boundaries where NZ dolphins are often seen, and where higher bycatch levels are occurring. Set nets and trawling are estimated to be responsible for 96 percent of Maui's dolphin deaths with approximately five Maui's dolphins killed each year. The Maui's subspecies and the other critically endangered subpopulations can only sustain one death caused by all human impacts every 10-23 years (Currey *et al*, 2012).

Harmful fishing methods

Set nets are made of nylon and are difficult for dolphins to detect. They are anchored to the bottom by weights and stretch to the surface via floats. When dolphins swim into nets, they quickly get trapped, stressed and usually die of suffocation. Trawling involves pulling a net through the water behind one or more boats. Dolphins can get caught along with the fish and suffer injuries and/or suffocate.

Set netters and trawlers often catch fish in the same area where dolphins are feeding. The NZ dolphin feeds on a variety of mid-water and bottom dwelling fish that range in length from 10-35cm. Some favourites include red cod, arrow squid, yellow-eyed mullet, stargazer, ahuru, sprat, sole and juvenile hake and hoki (Miller, 2013; Slooten & Dawson, 2012). Dolphins feed on juveniles and bycatch species of the fish the fishermen are targeting.

Methods of fishing which are safe for NZ dolphins include potting and long lining, both of which also provide higher quality fish and therefore higher profits. Additional, less harmful methods include beach seines, dip nets, Danish seines, handlines, lamparas, lobster pots, ring nets and trolls.

Set netting and trawling are indiscriminate fishing methods, catching a wide range of species, many of which are endangered, including other dolphin and whale species, sea birds, seals, sea lions and basking sharks.

Set net fishing methods are wasteful, with high levels of fish bycatch that often result in dumping to offset other more profitable quota. This has reduced the abundance and diversity of many species within inshore ecosystems and has had spillover impacts on estuarine habitats as well as offshore ecosystems.

The fish species

Commercial fish species that are caught by set netting and trawling are not caught exclusively by these methods. Fisheries which impact NZ dolphins entirely within the 100m depth contour include those targeting trevally, snapper, flatfish (flounder, sole) and, in particular areas, grey mullet, yellow-eyed mullet, blue moki and butterfish. Fisheries that overlap with NZ dolphin distribution across the 100m depth contour include rig, school shark, spiny dogfish, john dory, tarakihi, red cod, stargazer, red gurnard, baracoutta, elephantfish, blue warehou and jack mackerel.

Economic value of fish

The total value of commercial fisheries in waters off New Zealand per year ranges from \$1.2 to \$1.5 billion NZD (MPI, 2013a), representing around 1 percent of New Zealand's Gross Domestic Product (GDP). This economic benefit is very small compared to New Zealand's \$20 billion NZD tourism industry with its strong marine component.

Only a small portion of the fishing industry affects NZ dolphins. Most fish species caught with set net and inshore trawl methods have little or no export value (with the exception of snapper and jack mackerel) and are predominantly for the domestic market, such as fish and chip shops. Changing regulations to improve dolphin conservation would mainly affect small, inshore fishing operations. Many of these operations are already in decline and becoming financially unviable due to increasing fuel prices and debt levels.

MPAs

Since 2002, the Marine Reserves Bill has been before the government and despite support and submissions has yet to become law. It was formulated to help define and direct MPA policy and enhance the effectiveness of the Marine Reserves Act of 1971. The government had a clear goal to implement protection for 10 percent of the marine environment by 2012 (Ministry of Fisheries and Department of Conservation, 2005). Yet, in 2014, even with new MPAs announced off Kaikoura, New Zealand marine reserve protection amounts to less than 4 percent of the marine environment. More than 30 percent of New Zealand's terrestrial habitat is under protection.

Protection measures

In 2008, after a lengthy consultation process, the New Zealand government introduced a suite of regulations in an attempt to reduce the impact of fishing on NZ dolphins. These included restrictions on set nets out to 4 nautical miles from the coastline in most areas and restrictions on trawling out to 2 nautical miles from the coastline in most areas. The fishing industry took these decisions to court in a judicial review that resulted in various exemptions. The outcome

is a complicated set of regulations that differ from area to area and season to season. Although these measures appear to have reduced the risk of dolphins being captured, dolphins are still at risk and are still being captured outside protected areas throughout their range. These regulations are also hard to police and poorly monitored by the authorities. Reports of illegal fishing have raised concerns in Southland and Banks Peninsula waters and it is likely other areas also have illegal fishing.

The map (Figure 2) shows the extent of the NZ dolphin's range and shows which areas are currently protected (in green) or partly protected (in blue). Areas in red are unprotected dolphin habitat. Dolphin distribution generally extends to the 100m depth contour line.

Thus only a very small proportion of NZ dolphin habitat is protected from bycatch from set nets and trawling.

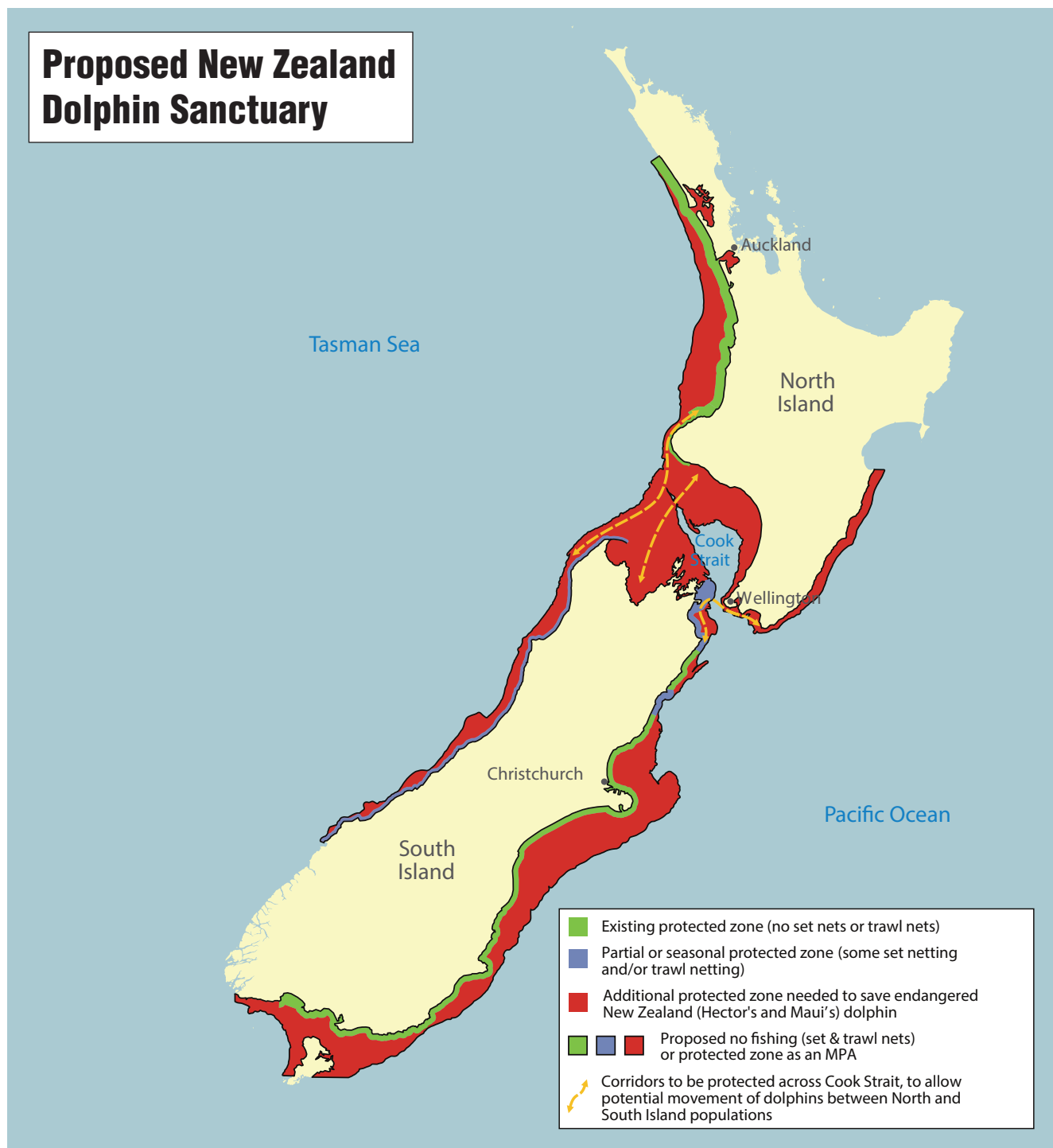


Figure 2: New Zealand dolphins are distributed inside the 100 metre depth contour in most areas around New Zealand (shown in red, green and blue). Protection of these dolphins throughout their range is critical for population recovery and to prevent extinction of Maui's dolphin and other critically endangered subpopulations. (Map by Lesley Frampton/ WDC.)

METHOD

We conducted a simple benefit-cost analysis to compare the potential costs and benefits to New Zealand of three scenarios for the future of the NZ dolphin, as shown in Table 1. Scenario 1 is the baseline, representing the continuation of existing practices. Under scenario 2, fishing methods would be altered out to the 100m depth contour (no set netting or inshore trawling). Scenario 3 proposes the establishment of an extensive marine protected area out to the 100m depth contour that would provide additional protection and more monitoring for NZ dolphins. For each scenario we assumed different impacts on fisheries and dolphin mortalities.

Our simple benefit-cost analysis focused on a single year. We used this method due to uncertainties about costs and benefits over a longer time frame which are normally required to calculate discounted cash flows and net present value. These include unforeseen changes to the fishing industry and to dolphin populations.

To obtain estimates for benefits ('value added' from fishing), we identified the fisheries with the potential to impact NZ dolphins based on their proximity to the coastline (within the 100m depth contour), the overlap with known NZ dolphin populations, and the fishing methods used. 'Value added' refers to profits plus wages paid and is used to measure contribution to GDP. Data for the contribution of fishing to GDP were obtained from Statistics New Zealand (2013a).

We looked at fisheries entirely within the 100m depth contour and fisheries which overlap, occurring both within and outside the 100m depth contour.

Fishing industry data used to estimate the value of production were obtained from the Economic Information and Analysis Team within the New Zealand Ministry for Primary Industries (MPI, 2013b). We were surprised to find that the estimates from MPI were higher across all years examined, some by more than 20 percent, compared to official data from Statistics New Zealand (in NZ Seafood Exports Reports from Seafood New Zealand for years 2006-2012). Fisheries information was also sourced from the latest Fisheries Assessment Plenary (MPI, 2013c) and Consumer Price Indices from Statistics New Zealand (2013b).

Due to the timing and scope of this study and the complexity of data, we have taken a conservative approach that favours the fishing industry. The total fishery values from MPI were used, regardless of fishing method or degree of overlap with NZ dolphin habitat. For example, we used a figure of \$111 million NZD for the year 2012, for inshore fisheries as a generous overestimate of the proportion of the actual fisheries that affect NZ dolphins. It includes all fishing areas in NZ less than 100m deep, yet not all of these areas have dolphins; and it includes all fishing methods used, despite there being a much smaller proportion of fish caught by set net and trawling in some fisheries. For example, taking the value of snapper caught along North Island east coast, where NZ dolphins are not found would take this value down to \$68 million. This figure would then be reduced further considering snapper is caught mainly by bottom long line. We also used a generous overestimate for the value of fisheries that overlap with NZ dolphin distribution amounting to \$452 million NZD without reference to fishing method or degree of overlap with NZ dolphin habitat. In reality the value of set net and trawl fisheries that overlap with dolphin habitat is approximately twenty times lower, less than \$28 million NZD. By using an overestimate of the value of fishing that might have an impact on dolphins (we wanted to make sure not to underestimate the value of fisheries), we found that our eventual survey results were strengthened.

For the purposes of this study, we used the 110-150 estimate as a conservative measure of all NZ dolphin deaths per year due to both set nets and trawls. We assumed a point estimate for annual NZ dolphin mortality of 130 dolphins. The actual number of dolphin deaths per year is likely to be higher as trawling appears to catch as many dolphins as set nets. (Please note that using this underestimate of bycatch makes the strong response in favour of dolphin protection, as revealed in our survey results, even more remarkable.)

To estimate the costs of dolphin mortalities (reduced 'consumer welfare'), we commissioned an online survey of a representative sample of 1,000 New Zealand residents which was conducted by an independent, professional survey company. The survey elicited values for willingness-to-pay (WTP) for dolphin conservation measures under scenarios 2 or 3. WTP was based on a hypothetical annual 'dolphin tax' for protection measures. Benefits were measured as the 'value added' from the fishing sector. The survey also elicited values for the willingness-to-accept (WTA) fishing activity that leads to dolphin deaths. WTA was based on the value of fish production that respondents felt would justify the death of a single dolphin. These values were both converted to a 'per dolphin value' which was used to estimate the costs of dolphin mortality under each scenario.

OPTIONS	DETAILS	IMPACT ON DOLPHINS	IMPACTS ON FISHERIES
SCENARIO 1			
No change	Existing policies maintained.	Between 100 and 150 mortalities annually Potential loss of species, particularly Maui's dolphin and certain sub-populations of Hector's dolphin. 15 years approx. to extinction.	Existing policies maintained.
SCENARIO 2			
Altered fishing methods required in areas of dolphin habitat out to 100m depth	Commercial set netting and trawling and recreational set netting banned in areas out to 100m deep.	Up to 10 mortalities annually. There would still be a few dolphins caught along the edges of the continental shelf. Population viability analysis indicates that the NZ dolphin (Hector's and Maui's dolphin) population would recover steadily if fisheries mortality is eliminated, approximately doubling to around 15,000 individuals by 2050.	Fisheries that exist entirely within the 100m depth contour region will be affected. Other fisheries that have some overlap with dolphin distribution will potentially be affected. The extent of the impact on fisheries will depend on their ability to adapt to alternative fishing methods which are less harmful to NZ dolphins. These adaptations will involve purchasing equipment and training fishers in alternative fishing techniques.
SCENARIO 3			
A marine protected area (MPA) established over areas with NZ dolphins out to 100m depth	Commercial set netting and trawling and recreational set netting banned in areas out to 100m deep, shown in map in Figure 2. Additional monitoring and enforcement resources and additional protection from other activities that might harm NZ dolphins.	Up to 5 mortalities annually A marine protected area would provide additional enforcement and monitoring resources, lowering the mortality estimate from scenario 2. NZ dolphins would also be more protected from other threats such as marine mining and farming, pollution and tourism impacts.	Same as for Scenario 2.

Table 1: Details of scenarios 1, 2 and 3.

RESULTS

Results include the responses to the survey questions as well as the subsequent placement of those results into various data tables to illustrate the benefit-cost scenarios. The complete survey data (answers to the questions) are provided in Appendix 1. The data table figures are presented as succinct summaries of the results.

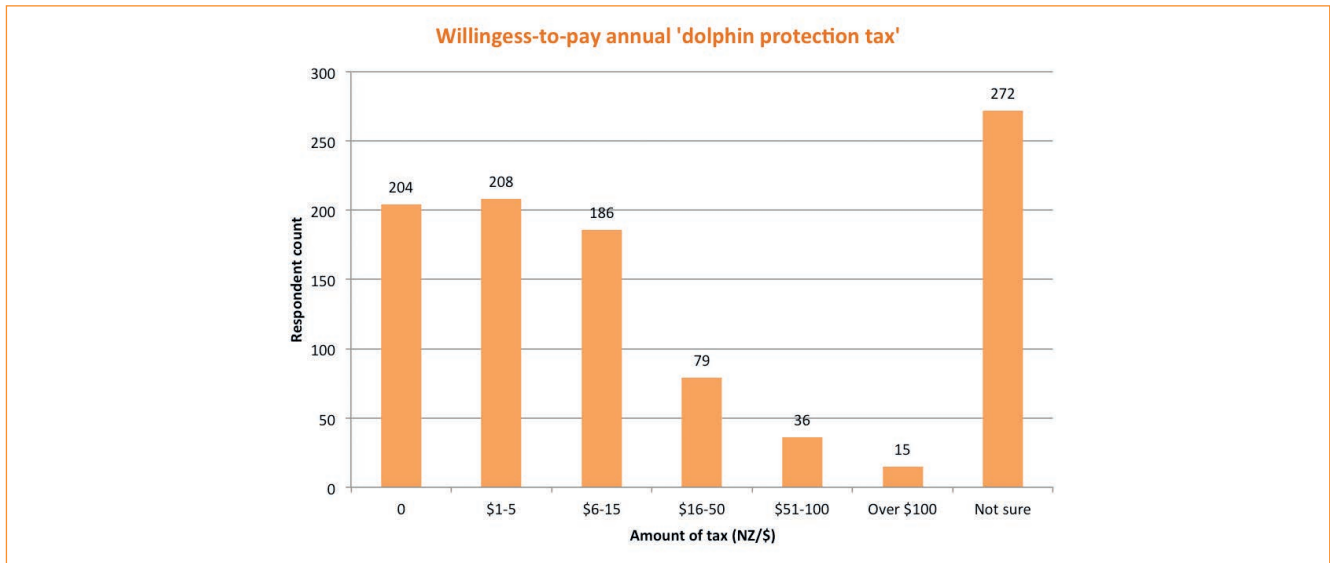


Figure 4: Willingness-to-pay (WTP) annual 'dolphin protection tax'

In Figure 4, 52 percent of respondents were willing to pay some annual amount as a 'dolphin protection tax'. The most common responses can be seen below in Figures 4 to 7. A large percentage, corresponding to respondents who had never heard of either Hector's or Maui's dolphin (20 percent) responded 'not sure'.

A per dolphin figure based on annual mortalities of 130 dolphins was estimated at WTP per dolphin at \$355,000 NZD for all of New Zealand. This works out at just 8 cents per person per dolphin.

Figure 5 shows that just over 40 percent of respondents answered 'no amount can compensate' which indicates a high value placed on dolphins and an unwillingness to accept dolphin mortalities. Some degree of willingness to accept is however already observed by the existence of ongoing fishing activities, suggesting that people don't believe, are unaware, or don't like to believe, that dolphin mortalities occur with current fishing methods.

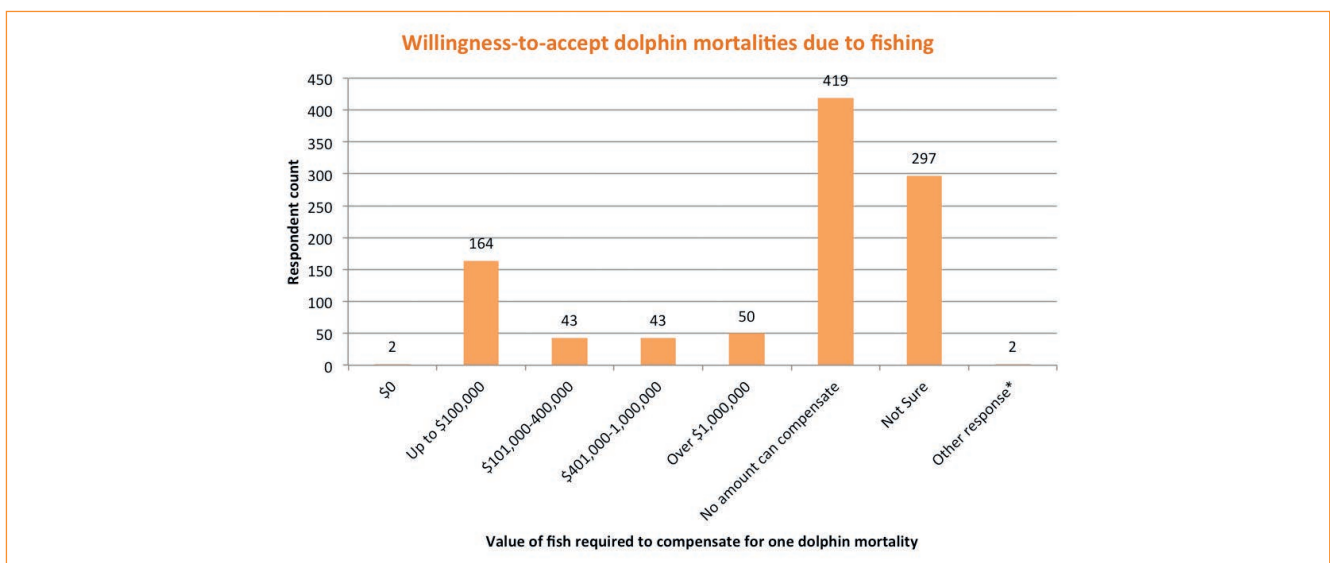


Figure 5: Willingness-to-accept (WTA) dolphin mortalities due to fishing

Converting stated WTA in terms of fishing revenue to value added from fishing, the WTA per dolphin mortality is \$337,000 NZD or 7.6 cents of value added per dolphin mortality.

As one of two WTP tests, we asked respondents about their willingness to pay higher prices for fish (per kg, Figure 6). Results showed that 62 percent of respondents were willing to pay a higher price per kilo for fish if scenario 2 or 3 increased the price of fish to consumers.

Approximately 24 percent of respondents answered 'not sure'. Of those who answered with an affirmative response, most stated a WTP between \$1.00-3.00 NZD. These findings support the earlier WTP and suggest that many New Zealand residents are willing to pay for measures to protect dolphins either through levies or through higher retail prices.

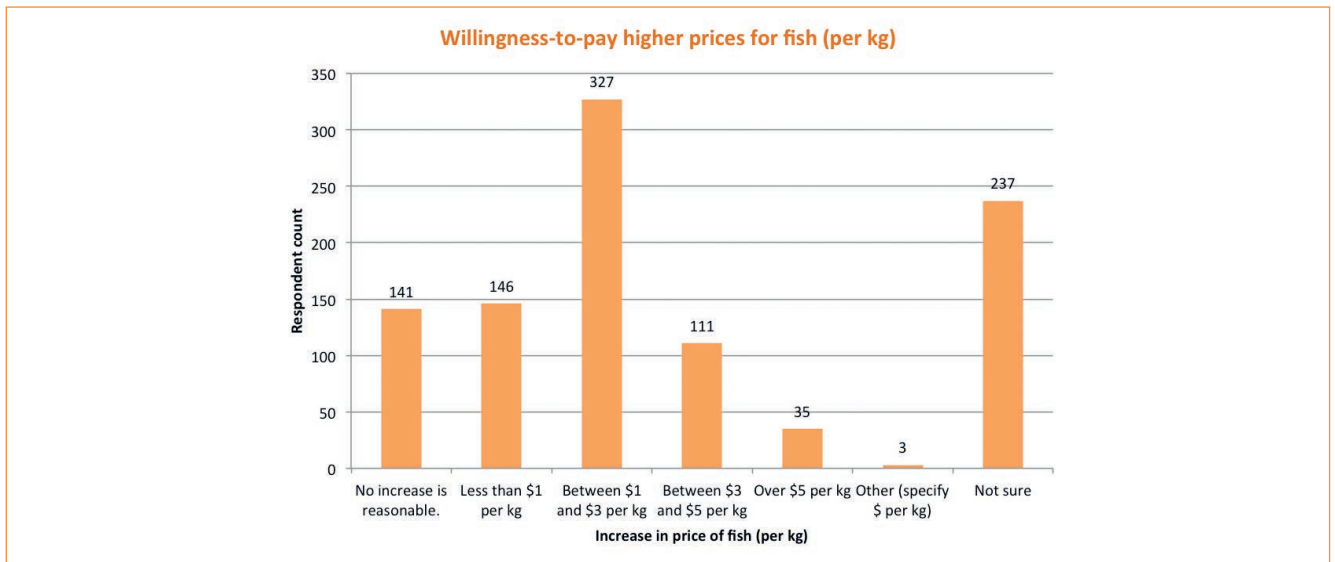


Figure 6: Willingness-to-pay higher prices for fish (per kg)

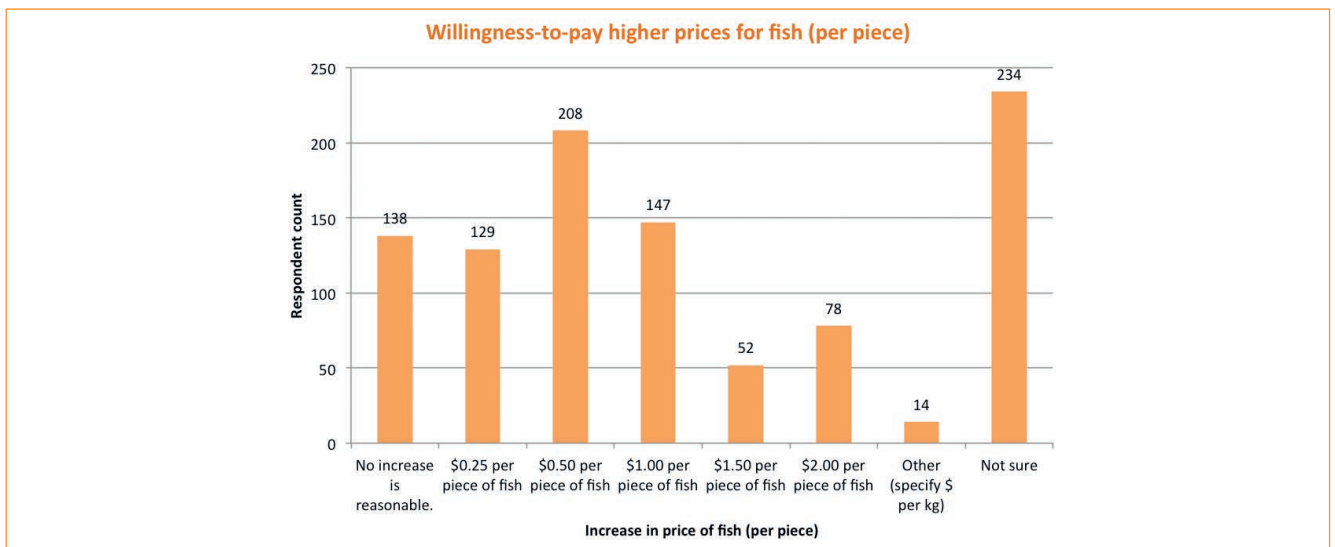


Figure 7: Willingness-to-pay higher prices for fish (per piece)

As another WTP test, we asked respondents about their willingness to pay higher prices for fish (per piece, Figure 7). Fish species likely to be affected include those commonly sold in take-away shops, which may provide more realistic results as these fish are generally sold per fillet.

Results showed that 63 percent of respondents were willing to pay a higher price per piece for fish if scenario 2 or 3 increased the price of fish to consumers.

Results for 'not sure' and 'no increase is reasonable' were similar to the 'per kg' response. Most respondents who were willing to pay fell between \$0.25-\$1.00 NZD. These findings support the earlier WTP and suggest that many New Zealand residents are willing to pay for measures to protect dolphins either through levies or higher retail prices.

BENEFIT-COST ANALYSIS

Comparing the three scenarios, scenario 1 assumes current levels of fishing output and current methods for fisheries within the 100m depth contour stay the same.

For the purposes of this study, it was assumed that scenario 2 would lead to a 50 percent reduction in output from fisheries entirely inside the 100m depth contour and a 10 percent reduction in fisheries that overlap with the 100m depth contour, regardless of fishing method used, or overlap with NZ dolphin distribution (i.e., the North Island east coast is included although NZ dolphins are not found there).

For scenario 3, again we take a conservative approach that favours the fishing industry and substitute a 100 percent loss of total fisheries entirely within the 100m depth contour and 25 percent loss for fisheries which overlap the 100m depth contour.

Costs under each scenario are the value of 'lost welfare' as elicited from the WTP survey we conducted. The value per dolphin mortality is \$355,000 NZD and this is multiplied by the expected number of mortalities. For scenario 1, expected mortalities are 130 individuals per year; scenario 2 assumes 10 mortalities per year; and scenario 3 assumes 5 mortalities per year. For scenario 3, an additional theoretical cost of \$300,000 NZD has been added in for creation and management of a new MPA.

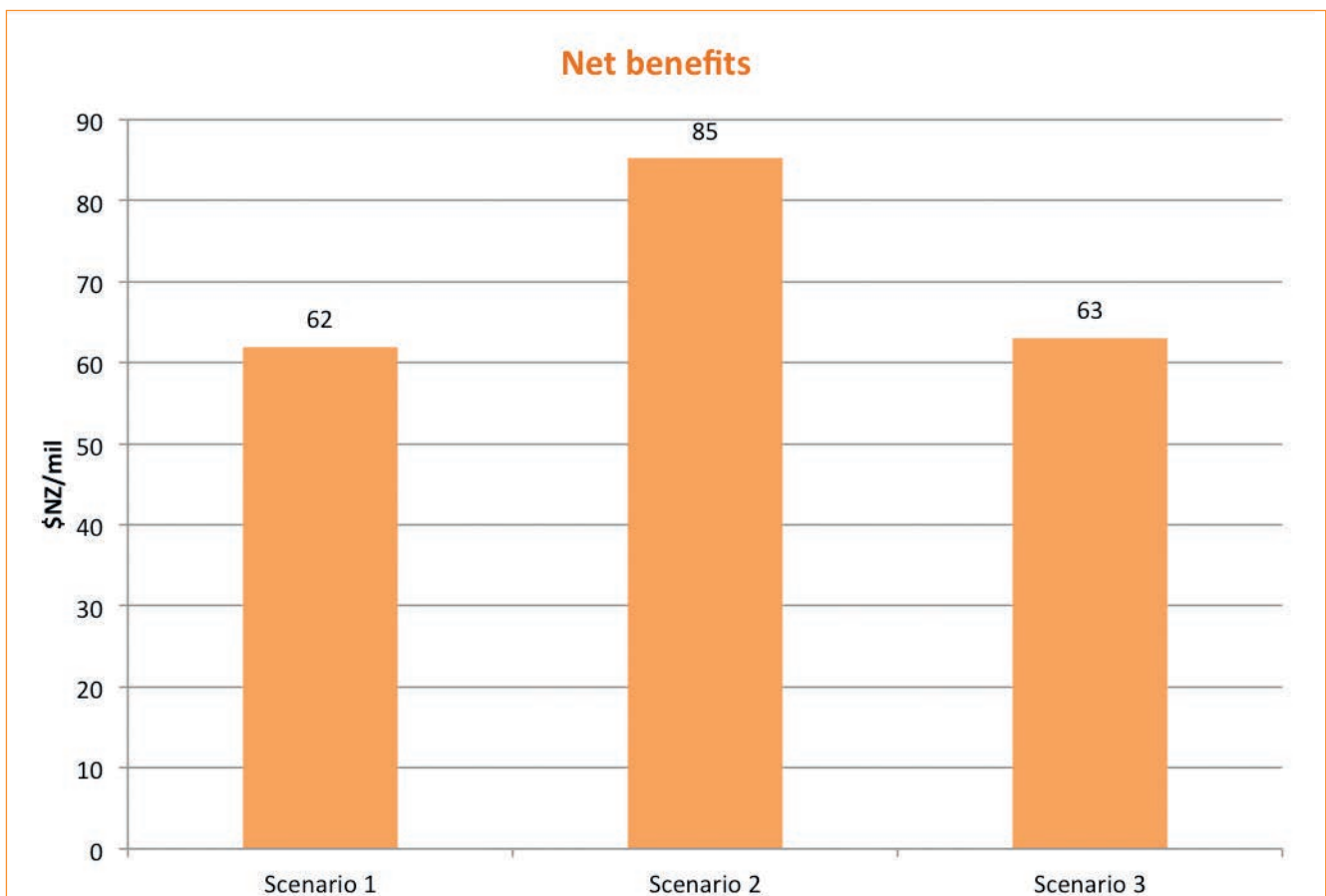


Figure 8: Net benefits

The net benefits (Figure 8) were highest under scenario 2, mainly because the impact on fisheries was lower than in scenario 3. Note that the difference in dolphin mortalities was only 5 individuals. In addition, scenario 3 included additional costs for MPA establishment and management that would reduce the net benefits.

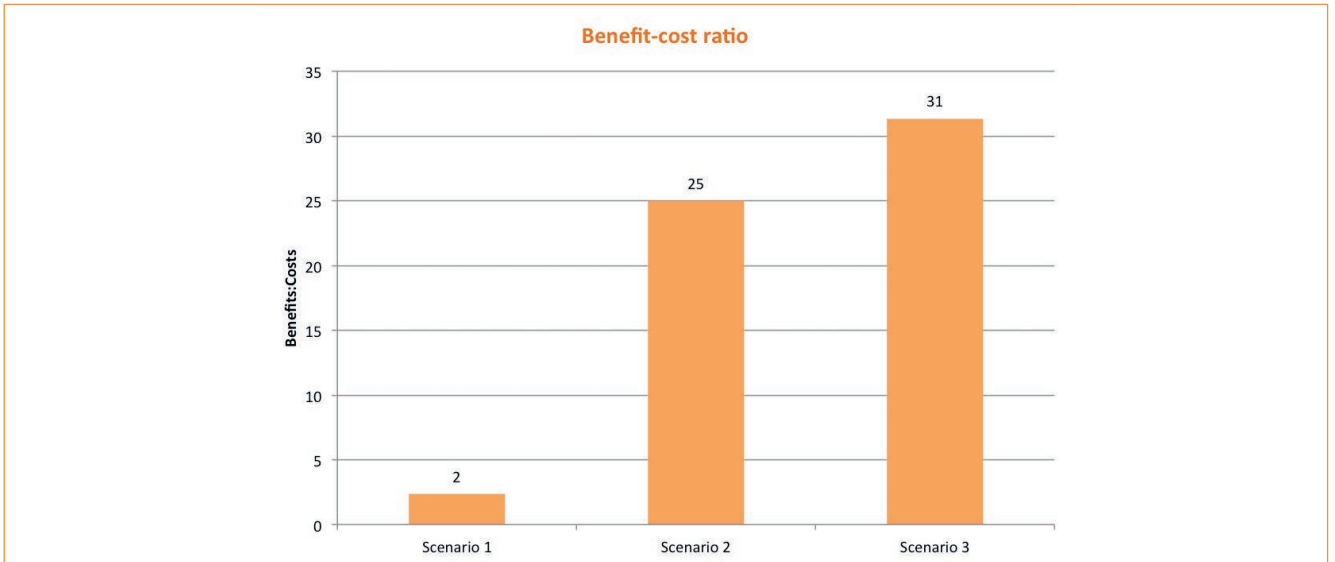


Figure 9: Benefit-cost ratio

Figure 9 shows that the benefit-cost ratio (BCR) was highest for scenario 3. Under scenario 3, for each \$1 NZD of costs, New Zealand would obtain \$31 of benefits. One reason why BCR is highest for scenario 3 is that it is the scenario in which the 'welfare' costs, due to dolphin mortalities, are minimised. In this sense, it is the most 'efficient' of the three options.

Scenario 1 has the lowest BCR, because although the gross benefits from 'fishing value added' are highest for this scenario, it also results in the largest impact on 'welfare' losses due to high dolphin mortalities.

We did not undertake sensitivity testing but the key variables for which sensitivity testing could be undertaken based on further research should be the impact on fisheries and the cost of establishing and operating a new MPA.



Figure 10: The NZ dolphin has a very low reproduction rate (Photograph by Steve Dawson).

DISCUSSION

Even when given very high fisheries values, our survey of New Zealand residents revealed that 80 percent favour strong measures to protect the NZ dolphin. 57 percent support the establishment of a marine protected area covering most of the New Zealand coast out to 100m depth, removing commercial set netting and trawl fishing and recreational set netting from this area (Figure 2).

63 percent of all respondents would be willing to pay more for their fish to reduce the numbers of dolphins killed by fishing activities, while 42 percent felt that no amount of money could compensate for the death of a dolphin due to fishing activities. 52 percent would support a 'dolphin protection tax' as an annual levy on every tax return.

From the survey, we were able to determine estimates of \$355,000 NZD per dolphin for WTP protection of a single dolphin and \$440,000 per dolphin for WTA fishing that results in dolphin deaths. These values are quite high but not unreasonable considering NZ dolphins are endemic to New Zealand waters, have low population numbers (especially the Maui's subspecies) and are well known by 70-80 percent of survey respondents.

Using the WTP figures per dolphin, the estimated 130 dolphins killed every year in fishing nets represents an estimated \$46 million NZD annual 'welfare' loss to the people of New Zealand ($\$355,000 \times 130 = \46 million).

Scenario 2 has the highest net benefits while scenario 3 has the highest benefit-cost ratio. Due to the difficulties of estimating the impacts of scenarios 2 and 3 on fisheries, these results are preliminary.

We conclude that while precise monetary values are uncertain, the most salient result of our investigation is that 80 percent of respondents voiced strong support for further measures to protect NZ dolphins and many were willing to pay for their increased protection.

This study does not attempt to estimate benefits and costs if set net and trawling fishing methods were to shift from current methods that kill dolphins to dolphin-friendly fishing methods. Changing to more selective fishing methods would, over time, benefit the fishing industry economically but comprehensive research to survey and evaluate benefits and costs was beyond the scope of the present study.

Further research should focus on the regional impacts of fisheries on individual NZ dolphin subpopulations, options for alternate fishing methods, increased utilisation of the catch to produce less waste, and a benefit-cost analysis of the marine tourism industry relevant to the NZ dolphin.

Given the small difference in mortalities between scenarios 2 and 3, focusing on alternatives to set nets and trawling, such as changing to longlining and potting to reduce bycatch, should be a priority.

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APPENDIX 1: SURVEY RESULTS

Following are the detailed survey results, beginning with three charts showing the demographic distribution of the respondents.

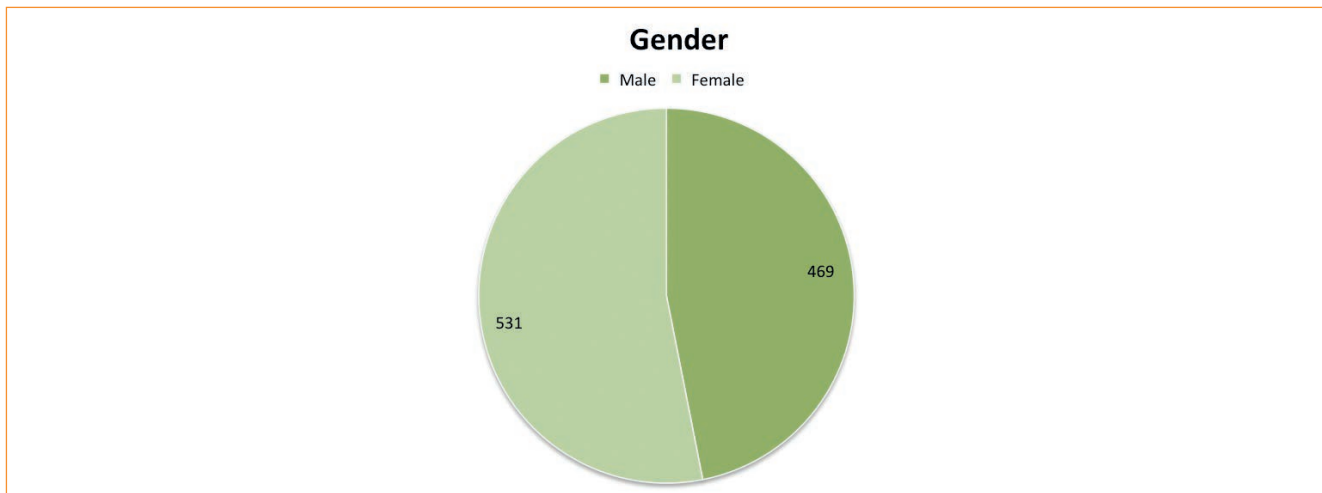


Figure A: Respondents by gender

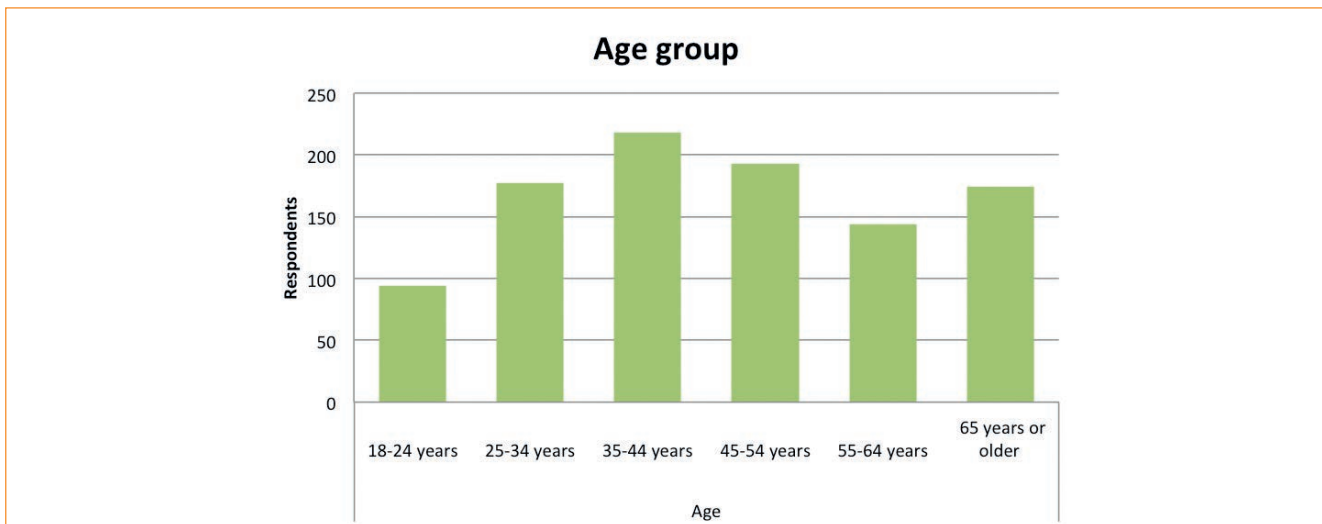


Figure B: Respondents by age group

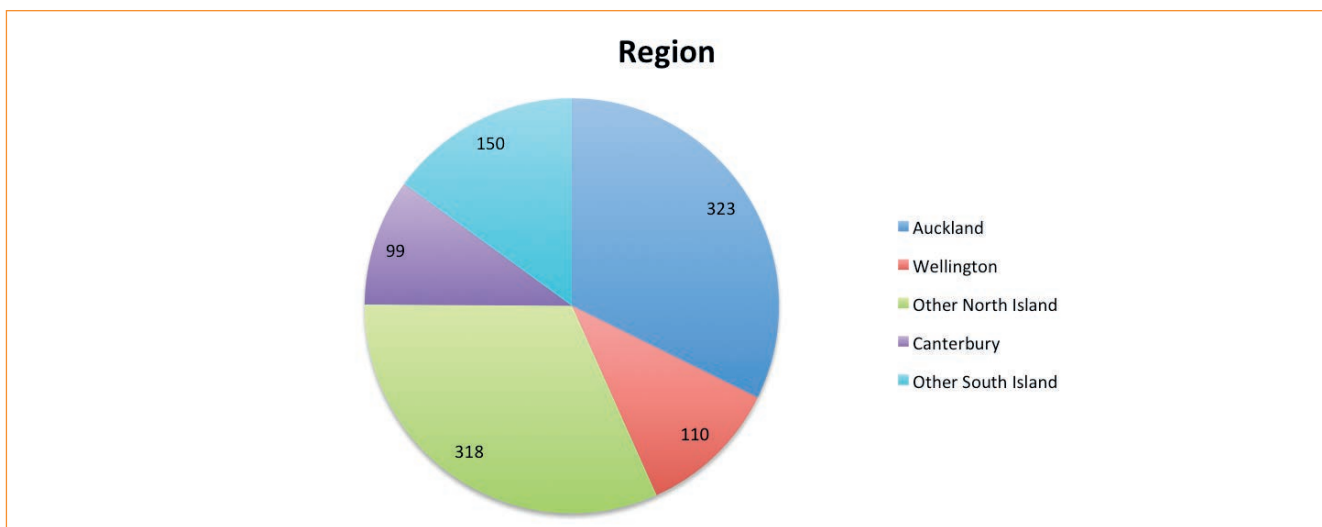


Figure C: Respondents by region

Table A: Responses to questions

Question	Answer	TOTAL	
		count	1000
		percent	100 percent
Had you previously heard of the NZ dolphin?	Yes	count	720
		percent	72 %
	No	count	280
		percent	28 %
Total	count	1000	
	percent	100 %	
Had you previously heard of Hector's or Maui's dolphin?	Hector's	count	227
		percent	23 %
	Maui's	count	67
		percent	7 %
	Both	count	502
		percent	50 %
Neither	count	204	
	percent	20 %	
Total	count	1000	
	percent	100 %	
Which policy response would you favour to protect dolphins?	Scenario 1 - No change, maintain existing policies.	count	50
		percent	5 %
	Scenario 2 - Require altered fishing methods in areas with dolphins less than 100m deep (red area on map).	count	230
		percent	23 %
	Scenario 3 - Establish marine protected area out to 100m deep in certain areas (red area on map), limiting all fishing.	count	566
		percent	57 %
Not sure	count	154	
	percent	15 %	
Total	count	1000	
	percent	100 %	
How many dolphins killed per year is an acceptable number? Consider: if fisheries were worth \$563 million NZD operating in areas affecting NZ dolphins; and there are only around 7,200 NZ dolphins surviving, and only 55 Maui's dolphins.	None	count	428
		percent	43 %
	0-10	count	351
		percent	35 %
	11-20	count	45
		percent	5 %
	21-50	count	20
		percent	2 %
	51-100	count	7
		percent	1 %
101-150	count	8	
	percent	1 %	
Not sure	count	141	
	percent	14 %	
Total	count	1000	
	percent	100 %	

If legislation to protect dolphins was introduced, what economic cost do you think is appropriate?	Scenario 1 – No change, no economic cost.	count	67
		percent	7 %
	Scenario 2 – Altered fishing methods, costs to fishing industry to adjust fishing methods. Higher retail cost of fish.	count	287
		percent	29 %
	Scenario 3 – Marine protected area, costs to fishing industry due to potential for reduced catch and moving to different areas.	count	431
		percent	43 %
	Not sure	count	215
		percent	22 %
Total	count	1000	
	percent	100 %	
If scenario 2 or 3 increased the 'per kg' retail price of fish, how much do you think would be a reasonable price increase to pay for reduced numbers of dolphins killed?	No increase is reasonable	count	141
		percent	14 %
	Less than \$1 per kg	count	146
		percent	15 %
	Between \$1 and \$3 per kg	count	327
		percent	33 %
	Between \$3 and \$5 per kg	count	111
		percent	11 %
	Over \$5 per kg	count	35
		percent	4 %
	Other (specify \$ per kg)	count	3
		percent	0 %
	Not sure	count	237
		percent	24 %
Total	count	1000	
	percent	100 %	
If scenario 2 or 3 increased the 'per piece' retail price of fish, how much do you think would be a reasonable price increase to pay for reduced numbers of dolphins killed?	No increase is reasonable	count	138
		percent	14 %
	\$0.25 per piece of fish	count	129
		percent	13 %
	\$0.50 per piece of fish	count	208
		percent	21 %
	\$1.00 per piece of fish	count	147
		percent	15 %
	\$1.50 per piece of fish	count	52
		percent	5 %
	\$2.00 per piece of fish	count	78
		percent	8 %
	Other (specify \$ per kg)	count	14
		percent	1 %
Not sure	count	234	
	percent	23 %	
Total	count	1000	
	percent	100 %	

If a new 'dolphin protection tax' were introduced to fund measures to protect the New Zealand dolphin under scenario 2 or 3, how much would you be willing to pay as an ongoing annual levy on your tax return for this tax?	\$0	count	203
		percent	20 %
	\$3	count	205
		percent	21 %
	\$6	count	99
		percent	10 %
	\$13	count	83
		percent	8 %
	\$32	count	75
		percent	8 %
	\$63	count	19
		percent	2 %
	\$95	count	13
		percent	1 %
\$127	count	14	
	percent	1 %	
Other (specify \$)	count	18	
	percent	2 %	
Not Sure	count	271	
	percent	27 %	
Total	count	1000	
	percent	100 %	
If a dolphin is killed by fishing activities, what value of fish caught do you think is reasonable to compensate for the dolphin mortality?	No amount can compensate	count	419
		percent	42 %
	\$5,000 worth of fish	count	48
		percent	5 %
	\$10,000 worth of fish	count	64
		percent	6 %
	\$100,000 worth of fish	count	52
		percent	5 %
	\$200,000 worth of fish	count	23
		percent	2 %
	\$400,000 worth of fish	count	20
		percent	2 %
	\$900,000 worth of fish	count	22
		percent	2 %
	\$1.8 million worth of fish	count	16
		percent	2 %
	\$2.8 million worth of fish	count	7
		percent	1 %
	\$3.75 million worth of fish	count	26
		percent	3 %
Other (specify \$)	count	6	
	percent	1 %	
Not Sure	count	297	
	percent	30 %	
Total	Count	1000	
	percent	100 %	

80% of New Zealanders are willing to help pay for strong protection measures to save endangered New Zealand dolphins.