A SOCIO-ECONOMIC IMPACT ASSESSMENT OF FISHERS: PROPOSED OPTIONS TO MITIGATE FISHING THREATS TO HECTOR'S AND MAUI'S DOLPHINS

Executive Summary

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RESEARCH PROCESS

A rapid socio-economic impact assessment of commercial trawl, commercial set net and recreational set net fishers in four regions of New Zealand was undertaken between August and October 2007.

The four regions and the associated Ministry of Fisheries statistical areas are listed below:

- West Coast South Island (WCSI) - 033, 034, 035 and 036;
- East Coast South Island (ECSI)- 017, 018, 020, 022, 024 and 026;
- South Coast South Island (SCSI) - 025 and 030;
- West Coast North Island (WCNI)- 041, 042, 043, 044, 045 and 046.

The assessment involved surveying fishers in each region in respect of an array of options proposed by the Ministry of Fisheries and the Department of Conservation (MFish, 2007) to mitigate the risk of fishing to Hector's and Maui's dolphins.

Primary data was collected by way of focus groups (18), interviews (79) and questionnaires (236) and was analysed. In total over 530 separate sample points were collected from individual fishers using these three methods and 52% of these were from commercial fishers. There was some overlap in participation by fishers amongst these three methods (i.e. some participants were in involved in one or more methods). While the frequency and degree of overlap varies between regions the average overall overlap was approximately 30% for commercial trawl fishers, 50% for commercial set netters and 30% for recreational set netters. For commercial trawl fishers, 60%-70% of participants from all regions were involved in one method only. For commercial set net fishers the rates of participation in a single method only are approximately 50% (WCSI), 30% (ECSI), 45% (SCSI) and 65% (WCNI). Participation rates in a single method only for recreational set netters are approximately 80% (WCSI), 65% (ECSI), 50% (SCSI) and 85% (WCNI).

There are several gaps in the dataset that relate to poor participation rates of several groups rather than non-participation of a group. These include the low number of fishers surveyed from the WCNI inshore trawl fishery and from commercial set netters in the WCNI harbours, especially the Manukau. Very few fishers from Nelson participated although some fish both the east and west coasts of the South Island and venture north to the west coast of the North Island. This also applied to Wellington based fishers. The majority of commercial trawl fishers surveyed were owner-operators of smaller vessels (10 - 18m) that primarily inshore bottom trawl. Few fishers or skippers from larger trawl vessels (25m+) had direct participation although representatives of

several fishing and processing companies that own-operate or contract such vessels attended focus groups, completed questionnaires and/or were interviewed. These larger vessels are capable of trawling inshore and offshore and tend to land their catch, and are serviced in the larger ports (e.g. Timaru, Nelson, Lyttleton, Auckland).

Participation in interviews and focus groups by recreational fishers was greater for those associated with boating clubs and/or by those living in larger provincial centres, which is partly due to the logistics of the data collection process. However, questionnaires were also returned from fishers resident in smaller towns and communities (e.g. Awhitu, Haast, Ross, Barrytown, Punakaiki, Birdlings Flat, Oaro, Kaka Point, Portobello, Aramoana, Gore and Orepuki). In addition, some recreational set netters travelled for over two hours to attend focus groups.

Few Maori recreational set netters participated in the survey due to issues of process. The only direct input from Maori recreational set netters was from 1-2 iwi/hapu representatives from the Kaipara, Waikato and Murihiku regions by way of face to face, phone or email discussions.

Data was also collected from Licensed Fish Receivers (LFRs), processors, fishing service industry participants and retailers in each region. How these organisations could be impacted by the various options is not reported here.

Despite these limitations in representation, a large and rich primary dataset was produced representing the 12 different target groups (i.e. commercial trawl, commercial set net and recreational set net in each of the four regions). Multiple methods not only ensured more widespread participation and produced a greater variety of data, they allowed for triangulation which confirmed the findings were consistent across methods. Triangulation refers to the use of more than one approach to the investigation of a research question in order to enhance confidence in the ensuing findings (Bryman, 1998).

Given the timeframe and the extensive dataset a coarse-level analysis was undertaken which, in terms of the nature and magnitude of the potential impacts of the proposed options, has shown a high degree of commonality amongst individuals of the same group (e.g. South Coast South Island Trawl fishers). It has also shown that the relative impacts on individual fishers vary depending on a range of context specific variables (e.g. equity, adaptive capacity). While a coarse analysis approach taken with the primary and secondary data has produced some clear trends with quantitative and qualitative qualifiers for each group, there is the danger with this approach, of under-emphasising the less common and/or more extreme impacts on individuals or sub-groups. As such, a finer level of analysis was undertaken on some of the qualitative data, in particular, in order to illustrate the complexity and nature of the fishers' behaviour, motivations and

constraints thereby elucidating the potential effects of various options in specific contexts. Where the impacts of an option are of low frequency but are significant for the individual or small number of fishers, they are also reported.

The dataset used for the secondary data analysis was sourced from MFish's *catch _by _client database*. Data files were provided to Aranovus by MFish for the fishing years 2003/04, 2004/05 and 2005/06 for each of the four region's (WCSI, ECSI, SCSI and WCNI) statistical areas. Apart from some preliminary analysis, only data from the 2005/06 fishing year was analysed. The secondary data analysis was only undertaken for commercial fishers as no secondary data was available for recreational fishers.

The analysis of secondary data showed the value of the commercial inshore bottom trawl catch and set net catch and their relative significance to total fish catch in each region. It also showed how many commercial fishers may be affected in each region, the overall economic impact from the different options at a regional level and the relative impact on fishers, depending on their reliance on inshore bottom trawling or set netting.

For commercial fisheries, port price was used in the secondary data analysis to estimate economic value and the potential economic loss of value under each option. Accordingly these values should be regarded as conservative estimates. No attempt has been made to estimate the flow-on economic impacts from secondary data, although primary data indicate these could range from minor to very significant for some down-stream and service operations in some areas depending on how fishers respond.

While the secondary data analysis quantified theoretical increments of economic loss under the various options, fishers reported that even minor reductions in income combined with minor increases in costs would see their operations become economically unviable. The inability to assess fisher sensitivity is a limitation of the secondary data analysis, which could be addressed by detailed analysis of the primary data. However, although the primary data is of sufficient quality and quantity to illustrate fishers' sensitivity and adaptive capacity to the price-cost squeeze created by some of the options, such an analysis has not been undertaken other than at a coarse level.

COMMERCIAL TRAWL

Overview

The impacts of the options will primarily affect inshore bottom trawl vessels. There will be minor impacts on other forms of trawling (i.e. mid-water and pair trawling) if, for example, they fish within 4nm on the WCNI and, in the other regions, they will be required to comply with additional monitoring and the voluntary codes of practice if they fish within 6nm (WCSI), 12-18nm (ECSI) and 12nm (SCSI).

The total value of inshore bottom trawling from the four regions subject to the proposed options exceeds $21 million of which ECSI contributes more than 40% ($8.7 million), WCNI 30% ($6.4 million), WCSI 25% ($5.24 million) and the SCSI 5% ($1.0 million). The total number of inshore bottom trawler fishers that will be affected by the options is over 200 in total, accounting for around 80% of all bottom trawl fishers in the WCSI and SCSI and 95% in ECSI and WCNI. The reliance on inshore bottom trawling varies amongst these 200 inshore bottom trawlers with over 50 vessels being exclusive inshore bottom trawl fishers. *Exclusive* means 75-100% of their total catch is from inshore bottom trawling.

Exclusive inshore bottom trawl vessels are the most vulnerable to the proposed options and will incur the greatest relative impacts. However, vessels with less reliance on inshore bottom trawling (i.e. 25-75%) reported that reductions of 10-20% in revenue combined with increases of 10-20% in costs could tip the revenue-expenditure balance and see their fishing operations come to an end. Without exception, fishers reported they were operating as efficiently as possible within their individual constraints with little or no room to accommodate further cost increases as avenues for cost recovery were exhausted.

Average gross incomes for South Island inshore bottom trawler fishers ranged from $60-75K per year and for WCNI $80-125K (note: small sample size). For 80% of all South Island commercial inshore bottom trawl fishers, 80-100% of income is from fishing indicating a high degree of dependence on fishing income. For WCNI the figure is 60% with other income earned by a spouse.

Net income for owner-operators is reported as 10-20% of turnover. Many fishers are deferring maintenance and undertaking management for which they are not taking a wage. For many of the smaller vessel owner-operators repairs and maintenance work was being deferred in order to ensure priority operating costs (i.e. fuel and crew wages) and household/family expenses were being met. Ninety five percent of fishers have dependents and, depending on the region, 50-80% of fishers carry debt. Debt levels vary widely but, in some cases, are over 100% of asset value.

According to many fishers individual debt levels, diversity of fishing portfolio, diversity of income streams, age and alternative employment opportunities will have a large bearing on how fishers respond to the proposed options.

The capacity and opportunity to adapt within the fishing industry (i.e. take up other fishing methods or strategies) to make up for any losses imposed by the options was extremely limited for the single vessel owner-operators due to barriers to entry into other types of fishing including knowledge, scale, equipment, uncertainty, competition, few opportunities, access and cost of ACE and capital costs. The species they target (e.g. flatfish) are not concentrated in large enough numbers in easily accessed locations outside the option zones for them to continue fishing for these species. Furthermore, the capacity to adapt or move into other employment is constrained by their age, experience and cultural ties to fishing. Fishers are generally in their late forties to early fifties with experience averaging 25 years (experience range is 10 - 45 years). For many fishers, fishing is an inter-generational vocation with some fishers coming from 3rd or 4th generation fishing families.

The secondary data shows that 78% (36/46: WCSI), 61% (62/102: ECSI), 22% (7/32: SCSI) and 74% (17/23: WCNI) of inshore bottom trawlers rely on this fishing method for 50-100% of their catch. Based on this level of reliance (i.e. 50-100%), a total 122 fishing vessels throughout New Zealand and around 200-300 fishers and crew will be significantly affected by the proposed options.

These fishers are unlikely to be able to accommodate even minor negative changes to their revenue – cost balance due to the reasons outlined above. Fishers with less reliance on inshore bottom trawling (e.g. 5-50%) will still be directly affected by proposed options and some to the extent that they can no longer operate. On the WCNI, 2 vessels are responsible for 59% of the total inshore bottom trawl catch. Individually, inshore bottom trawling accounts for 25-50% of the total catch for one vessel and less than 25% for the other. Each vessel could incur a significant absolute loss of value of around $1.5 million dollars annually.

Managers from fishing companies with several vessels acknowledged they a have greater adaptive capacity than the single vessel owner-operators but would also incur financial losses from 10-30% and see job losses in processing.

Economic Impacts from Secondary Data Analysis

Table I below was largely produced from the secondary data but was informed by the primary data in terms of estimates of economic losses attributed to each species from each option.

The four tables provide estimates of economic value of landed bottom trawl and potential loss of value under Options 2 and 3 for each region. For the South Island the majority of inshore bottom trawl fishers considered that Option 2 (without Option 1) was workable as it resulted in 4.5-14% loss in value, whereas Option 3 (41-45% loss in value) would put 130 out of 180 inshore bottom trawlers out of business. Only those vessels with less than 25% reliance on inshore bottom trawling (i.e. 50 of 180 vessels) could accommodate the level of economic impact resulting from Option 3 and even then it would be difficult for some.

For the WCSI, it is estimated that Option 2 will see a reduction of value of around 14% ($0.73 million). Option 3 could see a 45% ($2.35 million) loss in value spread across 46 WCSI inshore bottom trawlers. The 26 fishers whose total catch is made up of 50-100% inshore bottom trawl could lose between 20-45% of their current fishing revenue while the remaining 10 fishers could lose between 1-25%. Under Option 3, the estimated economic losses amongst the 46 WCSI vessels are distributed as follows: 1 vessel could lose $235,000; 5 vessels could lose $155,000 each; 14 vessels could lose $75-76,000 each and 26 vessels could lose $10-11,000 each.

For the ECSI, it is estimated that Option 2 will see a reduction of value of around 13% ($1.1 million). Option 3 could see a 41% ($3.59 million) loss in value spread across the 102 ECSI inshore bottom trawlers. The 62 fishers whose total catch is made up of 50-100% inshore bottom trawl could lose between 20-40% of fishing revenue while the remaining 40 fishers could lose between 1-20% of revenue. Under Option 3, the estimated economic losses amongst the 102 ECSI vessels are distributed as follows: 1 vessel could lose $684,000; 2 could lose $270,000 each; 11 vessels could lose $105,000 each and 88 vessels could lose $14,000 each.

For the SCSI, it is estimated that Option 2 will see a reduction of value of around 4.5% ($45,726). Option 3 could see a 44% ($450,397) loss in value spread across the 32 SCSI inshore bottom trawlers. The 7 fishers whose total catch is made up of 50-100% inshore bottom trawl could lose between 20-44% of fishing revenue while the remaining 25 fishers could lose between 1-20% of fishing revenue. Under Option 3, the estimated economic losses amongst the 32 SCSI vessels are distributed as follows: 6 vessels could lose $37,000; 14 vessels could lose $13,500 each and 12 vessels could lose around $3,000 each.

For the WCNI, fishers could accommodate the 10% loss in value from Option 2. However, Option 3 would see a 73% loss in value ($4.68 million) which would result in most of the 22 WCNI bottom

trawlers exiting the industry. Some of these vessels, especially the larger company vessels may be large enough to be redeployed elsewhere. Under Option 3, the estimated economic losses amongst the 22 WCNI vessels are distributed as follows: 2 vessels could lose $1.4 million each; 2 vessels could lose $398, 000 each; 8 vessels could lose around $111,000 each and 10 vessels could lose $24,000 each.

Table I - Economic Value of Landed Bottom Trawl Catch and Potential Loss of Value Under the Options

a) West Coast South Island

			Loss of Value to Fishers	
Species	Port Price	Catch value	Option 2	Option 3
FLA (all)	$3.35	$1,967,793	$98,390	$1,180,676
GUR	$1.62	$522,006	$104,401	$182,702
RCO	$0.54	$926,859	$185,372	$324,401
TAR	$2.47	$1,693,044	$338,609	$592,565
SPO	$3.19	$95,761	$0	$47,880
ELE	$1.80	$36,095	$0	$18,048
	Total	**$5,241,559**	**$726,772**	**$2,346,272**
		% Value lost	**14%**	**45%**

b) East Coast South Island

			Loss of Value to Fishers	
Species	Port Price	Catch value	Option 2	Option 3
FLA (all)	$3.35	$2,396,391	$119,820	$1,437,835
GUR	$1.62	$916,444	$183,289	$320,755
RCO	$0.54	$1,460,257	$292,051	$511,090
TAR	$2.47	$2,544,105	$508,821	$890,437
SPO	$3.19	$122,627	$0	$36,788
ELE	$1.80	$1,334,423	$0	$400,327
	Total	**$8,774,246**	**$1,103,981**	**$3,597,231**
		% Value Lost	**13%**	**41%**

Table I cont'd - Economic Value of Landed Bottom Trawl Catch and Potential Loss of Value Under the Options

c) South Coast South Island

			Loss of Value to Fishers	
Species	Port Price	Catch value	Option 2	Option 3
FLA (all)	$3.35	$672,864	$0	$336,432
GUR	$1.62	$154,833	$30,967	$61,933
RCO	$0.54	$35,805	$7,161	$14,322
TAR	$2.47	$37,991	$7,598	$15,196
SPO	$3.19	$22,279	$0	$4,456
ELE	$1.80	$90,286	$0	$18,057
	Total	**$1,014,058**	**$45,726**	**$450,397**
		% Value lost	**4.5%**	**44%**

d) West Coast North Island

			Loss of Value to Fishers	
Species	Port Price	Catch value	Option 2	Option 3
BAR	$0.29	$657,200	$131,440	$394,320
FLA	$3.35	$22,405	$4,481	$20,164
GSH	$0.59	$4,723	$945	$4,251
GUR	$1.62	$812,545	$40,627	$406,273
JDO	$4.64	$292,371	$14,619	$233,897
KAH	$0.43	$53,620	$5,362	$42,896
SCH	$1.77	$88,840	$4,442	$44,420
SNA	$4.67	$3,418,501	$341,850	$2,734,801
SPD	$0.47	$4,798	$240	$2,399
TAR	$1.53	$192,677	$9,634	$96,339
TRE	$0.86	$868,402	$86,840	$694,722
WAR	$1.37	$7,549	$755	$7,549
	Total	**$6,423,630**	**$641,234**	**$4,682,029**
		% Value lost	**10%**	**73%**

Impacts from Primary Data Analysis

Option 1

In all regions:

- Voluntary Code of Practice:
  - Fishers report they support this idea in principle, but have concerns about participation and enforcement.
- Additional Monitoring:
  - As currently defined fishers cannot afford the $800-1000 per day for observers as this would incur costs of $100-200,000 per year for each vessel.
  - Video surveillance is more widely accepted but there are concerns over costs, privacy issues and practicalities
- For Option 1 to work much greater thought and refinement is required with input from fishers. As it is currently defined 90-100% of fishers would go out of business

Option 2

- Option 2 for the South Island trawlers requires fishers to comply with Option 1 as well as Option 2. When combined in this way Option 2 would put most South Island trawl fishers out of business largely due to the costs of observers (as currently defined). For the WCNI there is no requirement for Option 2 to include Option1.
- For South Island inshore bottom trawl fishers Option 2 without Option 1 could be acceptable and might avoid significant impacts on income for most fishers on WCSI, ECSI and SCSI.
- On the WCSI, ECSI and SCSI there may be a direct loss of up to 20% of existing income from inshore bottom trawling for approximately half of all South Island inshore bottom trawl fishers. If fishers are highly reliant on inshore trawling (i.e. 75-100% income from inshore bottom trawling) and/or operate small vessels, such losses may make fishing unviable.
- Conversely, many (25-50%) South Island fishers are already fishing as required by Option 2 (without Option 1) so would be largely unaffected. The others would incur costs of modifying nets and gear.
- On the WCNI, Option 2 would lead to a 5%-15% reduction in income for individual fishers. Most fishers could tolerate this, however, the 10 WCNI inshore bottom trawl fishers whose income is almost exclusively from inshore bottom trawling may struggle to continue fishing especially if variable costs (e.g. fuel) continue to rise and if they operate smaller (10-18m) vessels.

Option 3

- All inshore bottom trawl fishers view Option 3 (not including Option 1) as being unviable in terms of operating a fishing business as fishers will lose access to significant fishing grounds.
- The WCNI bottom trawl fleet would lose access to 15-20% of its total catch (i.e. 70-75% of inshore bottom trawl catch) resulting in a loss in value of over $4.5 million. This would result in the majority of 22 inshore bottom trawl fleet being unable to continue inshore trawling. A portion of these fishers, perhaps 5-10, may be able to transfer their fishing effort further off shore (i.e. greater than 4nm) but this would incur greater costs due to extra distances covered and because water depths are greater requiring heavier gear (e.g. ropes, winches).
- Option 3 would result in a loss of almost all revenue to inshore bottom trawl fishers in the South Island. About 50% (90/180) of inshore bottom trawl fishers in the South Island would lose 40-50% of revenue and would be out of business immediately. The remainder would lose 5-20% of income and would not be able to support the current fishing infrastructure and services (e.g. port services, fuel depots, marine engineering services, fishing storage and distribution depots) especially in some small centres. Like the WCNI, some would be able to transfer their fishing effort further off shore but this would incur greater costs as they would have to travel further, spend more time trawling and use heavier gear.

Fishers report there will be a wide range of impacts on their health and on the health of their families depending on their current situation and capacity to accommodate changes. In some case these impacts will be small but for fishers that lose their livelihoods they will be severe and long lasting, including premature death.

COMMERCIAL SET NET

Overview

Setting netting includes a gill net or other sort of net that acts by enmeshing, entrapping, or entangling fish. Ring shooting (or ring netting) is included in the definition of set netting.

The total value of set netting exceeds $7 million, of which WCNI contributes 45% ($3.3 million), ECSI 37% ($2.7 million), SCSI 13% ($0.9 million) and the WCSI 5% ($0.4 million). The total number of set netters that could be affected by the options is close to 200, of which 111 are in the WCNI. In total there are 127 exclusive set netters, of which 79 are in the WCNI. *Exclusive* set netters means 75-100% of their total catch is from set netting. In the WCSI and SCSI set netters make up less than 20% of all fishers, whereas in ECSI and WCNI they are around 40% and 80% respectively.

While exclusive set netters are most vulnerable to the proposed options and will incur the greatest relative impacts, fishers with a lower proportion of income from set netting (e.g. 25-50%) reported the viability of their business was reliant on the income from set netting which, if lost, could not be easily recovered from other fishing methods. Like trawlers, set net fishers are currently operating as efficiently as possible within their individual constraints. All options for cost recovery have been exhausted although many costs (i.e. fuel, repairs and maintenance) continue to rise.

WCSI, ECSI and WCNI set net fishers tend to be older (average age ~53 years old) than their SCSI and counterparts (average age 41 years old). For many fishers, fishing is an inter-generational vocation with some fishers coming from 3rd or 4th generation fishing families. Eighty percent of fishers reported they had dependents.

For the South Island set netters average gross annual incomes range from $30,000 to $160,000 with an average of $60-70,000 per year. For 80% of South island set netters, 80%-100% of their income is from fishing. Around 50% of fishers owned their own vessels and all their fishing assets. Conversely 50% carry debt. Debt levels vary widely from around $60,000 to $1.2million.

WCNI set netters number 111 of which 79 exclusively set net and 93 contribute a combined total of 35% of total WCNI set net catch. This indicates the majority of WCNI set operators are very small, probably fishing single-handed out of small vessels (4m dinghies) for mullet and flatfish on the Manukau and Kaipara harbours. Average gross income was slightly lower than their South island counterparts at around $56,500 per annum.

For most set net fishers, especially those in the WCNI the capacity and opportunities to adapt positively to the options are extremely limited. Most vessels, nets and gear are purpose built and cannot be transferred to other fishing methods. Most commercial set net vessels in the South Island are unable and/or unlikely to venture too far offshore because they are not designed for offshore conditions and the fish they target are inshore. Apart from some vessels operating out of New Plymouth most commercial set net vessels now operating on the WCNI are designed for use in harbours or inshore coastal waters when conditions are good.

Economic Impacts from Secondary Data Analysis

Set Netters

The following was produced primarily from secondary data with information from primary data utilised where appropriate.

The secondary data shows that 67% (8/12) of WCSI, 67% (42/62) of ECSI, 55% (6/11) of SCSI and 80% (86/107) of WCNI commercial set netters rely on this method for 50-100% of their catch. Based on this level of reliance (i.e. 50-100%) at least 66% (56/85) of South Island set netting vessels and around 80-100 fishers and crew will be significantly affected by the proposed options. Most set netters tend to operate single handed or employ crew for part of the year.

On the WCNI at least 80% (86/107) of set netting vessels and around 100 fishers and crew will be significantly affected by the proposed options, where 50-100% of income/catch is reliant on set netting. Of these 86 vessels, 72 are likely to be operated by a single fisher while the remainder would employ a crew member for some part of the year. Many are assisted by their spouse or family members to clean and prepare fish for collection and with management tasks, for which no direct wages are paid.

Table II below provides estimates of economic value of landed set net catch and potential loss of value under various options. For the South Island, options 2A, 2B and 3 are assessed without Option 1. Option 1 was not considered, except in WCNI, because, according to participants, the additional monitoring component is ambiguous, poorly thought out and not workable as currently defined. In WCNI Option 1 is a spatial ban, so losses from this loss of fishing grounds could be estimated.

For the WCSI, it is estimated that Option 2A (2nm prohibition) will see a reduction of value of between 15-38% ($62-158,000) depending on the closure period (i.e. 3, 6 or 12 months). Under Option 2Ac (2nm-12 month closure) the estimated annual loss in revenue amongst the 12 WCSI

set netters is as follows: 2 vessels could each lose $34,000; 2 vessels could each lose $19,000; 4 vessel could each lose $12,600 and 4 vessels could lose $400 each.

Under Option 2B (4nm prohibition) there will be a loss in value of between 17-47% ($70-195,000) depending on the closure period (i.e. 3, 6 or 12 months) for commercial WCSI set netters. Under Option 2Bc (4nm-12 month closure) the estimated annual loss in revenue amongst the 12 WCSI set netters is as follows: 2 vessels could each lose $42,000; 2 vessels could each lose $23,400; 4 vessel could each lose $15,600 and 4 vessels could lose $500 each.

Under Option 3 (6nm-12 month closure), the WCSI set net fleet will lose 63% ($261,059) of their annual income. Under Option 3, the estimated annual loss in revenue amongst the 12 WCSI set netters is as follows: 2 vessels could each lose $56,000; 2 vessels could each lose $31,300; 4 vessel could each lose $20,900 and 4 vessels could lose $650 each.

For the ECSI and SCSI the options that relate to designated butterfish and flatfish areas are not considered, as fishers reported that they were not able to take advantage of these areas and that they made no difference whatsoever. As such, the options considered for both ECSI and SCSI are Option 2Ac (2nm prohibition-12 months), Option 2Bc (4nm prohibition – 12 months) and Option 3 ECSI (12-18nm prohibition -12 months).

Under Option, 2Ac ECSI set netters will suffer a reduction of value of 59% ($1.62 million), distributed amongst the 62 ECSI set netters as follows: 1 vessel could lose $292,000; 5 vessels could each lose $136,270; 11 vessel could each lose $47,200 and 45 vessels could lose just under $3000 each.

Under Option 2Bc ECSI set netters will suffer a reduction of value of 70% ($1.91 million), distributed amongst the 62 ECSI set netters as follows: 1 vessel could lose $344,240; 5 vessels could each lose $160,650; 11 vessel could each lose $55,600 and 45 vessels could lose $3400 each.

Under Option 3, ECSI set netters will suffer a reduction of value of 91% ($2.5 million) distributed amongst the 62 ECSI set netters as follows: 1 vessel could lose $449,000; 5 vessels could each lose $209,600; 11 vessels could each lose $72,600 and 45 vessels could lose around $4400 each.

Under Option 2A, SCSI set netters will suffer a reduction of value of 22% ($206,368), distributed amongst the 11 SCSI set netters as follows: 3 vessels could each lose $58,470; 1 vessel could lose $16,500; 2 vessels could each lose $6,200 and 5 vessels could lose just over $400 each.

Under Option 2B, SCSI set netters will suffer a reduction of value of 35% ($325,537), distributed amongst the 11 SCSI set netters as follows: 3 vessels could each lose $92,235; 1 vessel could lose $26,000; 2 vessels could each lose $9,750 and 5 vessels could lose $650 each.

Under Option 3, SCSI set netters will suffer a reduction of value of 84% ($781,891), distributed amongst the 11 SCSI set netters as follows: 3 vessels could lose $221,500; 5 vessels could each lose $62,500; 2 vessels could each lose $23,450 and 5 vessels could lose $1560 each.

For the WCNI, Option 1 would result in a loss of revenue to the WCNI set net fishery of 13% or $421,032. Due to the nature of the Option 1 (specific area closures) it is unlikely the loss in revenue would be proportionately shared amongst the 111 set net fishers. Instead, it will likely fall on the 14 fishers that collectively catch 65% of the total WCNI set net catch. As such, Option 1 losses could be distributed amongst these 14 set netters as follows: 1 vessel could lose $136,000 in annual income; 2 vessels could each lose $52,000 and 11 vessels could each lose $16, 500.

Under Option 2, WCNI set netters will collectively lose 55% ($1.82 million) of their current revenue. Unlike Option 1, this will be distributed amongst all 107 WCNI set netters as follows: 1 vessel could lose $382,850; 2 vessels will each lose $145,800; 11 vessels could each lose $46,400 and 93 vessels could each lose around $7000 annually.

Under Option 3, WCNI set netters will lose 104% of current revenue ($3,478,881). This loss accounts for new losses resulting from the closure of coast from Pariokariwa Pt to Cape Egmont. Option 3 losses will be distributed amongst set netters as follows: 1 vessel could lose in excess of $730,000; 2 vessels will each lose $278,300; 11 vessels could each lose $88,500 and 93 vessels could each lose around $13,100 annually.

Drift Netters

There are only 4 drift netters operating commercially on the lower reaches of the Waikato River. The total economic value of drift netting is $96,170 (Table III). Under Option 1 they lose will 90% of there income and under Option 2 they will lose 100% of income. Under Option 2 the loss in revenue will be distributed amongst the drift net fishers as follows. Two fishers will each lose $39,500, while the other 2 will lose about $16,000 and $1000 respectively.

Table II - Economic Value of Set Net Catch and Potential Loss of Value Under the Options

a) West Coast South Island

			Loss of Value to Fishers						
			Option 2A			Option 2B			Option 3
Species	Port Price	Catch value	a	b	c	a	b	c	3
SCH	$1.77	$120,797	$2,174	$4,227	$6,039	$4,227	$7,851	$12,079	$42,279
SPO	$3.20	$189,078	$54,832	$132,354	$141,808	$60,505	$149,371	$160,716	$179,624
LIN	$2.23	$86,387	$0.00	$0.00	$0.00	$0.00	$0.00	$8,638	$21,596
SPD	$0.53	$5,305	$0.00	$0.00	$530	$0.00	$0.00	$1,591	$3,448
ELE	$1.80	$10,611	$4,668	$8,276	$8,488	$5,305	$9,231	$9,549	$10,611
WAR	$1.00	$3,499	$314	$909	$1,399	$524	$1,574	$2,449	$3,499
	Total	**$415,679**	**$61,991**	**$145,769**	**$158,268**	**$70,563**	**$168,030**	**$195,026**	**$261,059**
		% Value lost	**15%**	**35%**	**38%**	**17%**	**40%**	**47%**	**63%**

Notes: Table is based on port prices. Catch value is calculated by catch (kg) x port price.
Loss of Value to Fishers calculated by % catch lost under each option x catch (kg) x port price.

b) East Coast South Island

			Loss of Value to Fishers		
Species	Port Price	Catch value	Option 2A	Option 2B	Option 3
SPD	$0.53	$149,818	$14,982	$29,964	$121,562
TAR	$2.47	$492,238	$344,567	$393,791	$443,030
SPO	$3.19	$537,862	$430,290	$484,076	$537,862
ELE	$1.80	$291,913	$145,957	$204,339	$283,350
HPB	$3.78	$529,296	$370,507	$423,437	$477,060
SCH	$1.77	$224,377	$11,219	$22,438	$183,768
BSH	$2.05	$251,479	$176,035	$201,183	$226,331
MOK	$0.73	$38,059	$1,903	$3,806	$8,029
LIN	$1.36	$68,911	$48,238	$55,129	$62,027
BFL	$2.96	$75,151	$37,575	$45,090	$75,152
FLA	$3.35	$82,015	$41,008	$49,209	$77,110
	Total	**$2,741,124**	**$1,622,282**	**$1,912,464**	**$2,495,282**
		% Value lost	**59%**	**70%**	**91%**

Table II cont'd - Economic Value of Set Net Catch and Potential Loss of Value Under the Options

c) South Coast South Island

			Loss of Value to Fishers		
Species	Port Price	Catch value	Option 2A	Option 2B	Option 3A
SCH	$1.77	$559,030	$27,951	$55,903	$419,272
SPD	$0.53	$65,566	$6,557	$13,113	$52,453
SPO	$3.19	$268,224	$134,112	$214,580	$268,225
ELE	$1.80	$41,942	$37,748	$41,942	$41,942
	Total	**$934,762**	**$206,368**	**$325,537**	**$781,891**
		% Value lost	**22%**	**35%**	**84%**

d) West Coast North Island

			Loss of Value to Fishers			20% Stat Area 41 as adjustment for Stat Area 40
Species	Port Price	Catch value	Option 1	Option 2	Option 3	
GMU	$2.55	$1,588,923	$308,251	$1,090,001	$1,592,153	$3,230
SCH	$1.77	$373,339	$0.00	$1,867	$442,206	$68,867
SPO	$3.19	$505,995	$57,683	$151,798	$558,195	$52,200
FLA	$3.35	$511,069	$43,441	$325,040	$520,537	$9,468
YBF	$3.35	$307,872	$5,850	$225,978	$307,872	$0
KAH	$0.43	$18,656	$1,903	$11,007	$18,740	$84
TRE	$0.86	$27,888	$3,904	$17,207	$28,981	$1,093
SPD	$0.47	$10,198	$0.00	$204	$10,198	$0
	Total	**$3,343,939**	**$421,032**	**$1,823,102**	**$3,478,881**	**$134,942**
		% Value lost	**13%**	**55%**	**104%**	**4%**

Table III - Economic Value of Drift Net Catch and Potential Loss of Value Under the Options

West Coast North Island Commercial Drift Netting (Stat Area 42 Only)				Loss of Value to DN Fishers	
Species	Catch (kg)	Port Price	Catch Value	Option 1	Option 2
GMU	36,212	2.55	$92,341	$83,107	$92,341
KAH	6,245	0.43	$2,685	$2,417	$2,685
YEM	465	2.46	$1,144	$1,030	$1,144
		Total	**$96,170**	**$86,553**	**$96,170**
		% Value Lost		**90%**	**100%**

Impacts from Primary Data Analysis

WCSI, ECSI and SCSI Regions

Option 1

- Voluntary Code of Practice:
  - Fishers report they support this idea in principle, but have concerns about participation and enforcement.
- Additional Monitoring:
  - As currently defined fishers cannot afford the $800-1000 per day for observers as this would incur costs of $100-200,000 per year for each vessel.
  - Video surveillance is more widely accepted but there are concerns over costs, privacy issues and practicalities.
- For Option 1 to work much greater thought and refinement is required with input from fishers. As Option 1 is currently defined, 90-100% of fishers would go out of business.

Option 2A

WCSI

- Option 2Aa (2nm- 3 month ban Dec-Feb) without Option 1 would see WCSI set netters lose up to 30-50% of their income which could put 50-70% out of business.
- Option 2Ab (2nm- 6 month ban Oct-Mar) without Option 1 would see set netters lose 50 - 80% of their income which would put 80 - 90% out of business.

- Option 2Ac (2nm- 12 months) without Option 1 would see set netters lose 80% of their income which would put all fishers out of business.

ECSI

- Designated butterfish and flounder areas make no difference to 99% of set netters so Options 2Aa and 2Ab are redundant.
- Option 2Ac (2nm – 12 months) would result in a loss of 75-80% of income and see most set netters exit the industry.

SCSI

- Designated butterfish and flounder areas make no difference to 99% of set netters so Options 2Aa and 2Ab are redundant.
- Option 2Ac (2nm – 12 months) would result in a loss of 75%-80% of income and see most set netters exit the industry

Option 2B

WCSI

- Option 2Ba (4nm- 3 month ban Dec-Feb) without Option 1 would see WCSI set netters lose up to 50-100 % of their income which could put 75-100% out of business
- Option 2Bb (4nm- 6 month ban Oct-Mar) without Option 1 would see set netters lose 90-100% of their income
- Option 2Bc (4nm- 12 month ban) as for 2Bb

ECSI

- Designated butterfish and flounder areas make no difference to 99% of set netters so Options 2Ba and 2Bb are redundant.
- Option 2Bc (4nm – 12 months) would result in a loss of 80-100% of income and see most set netters exit the industry

SCSI

- Designated butterfish and flounder areas make no difference to 99% of set netters so Options 2Ba and 2Bb are redundant.
- Option 2Bc (4nm – 12 months) would result in a loss of 80-100% of income and see most set netters exit the industry

Option 3 (All South Island Regions)

- 100 % of set netters unable to continue fishing.

WCNI Region

Option 1

- Rig fishers in the Manukau Harbour would lose 50% of their rig income and would be unable to continue fishing.
- Fishers would lose mullet winter fishing grounds in the Manukau Harbour potentially impacting 50% of Manukau fishers.
- Little impact on Kaipara Harbour fishers.
- All drift netters out of busines

Option 2

- 75 % of WCNI set netters out of business immediately
- All drift netters out of business

Option 3

- 100 % of WCNI set netters out of business immediately

Regardless of region, fishers reported there could be a wide range of impacts on their health and the well being of their families as a result of the establishment of the proposed options. The nature and extent of these impacts are context specific and depend on each fishers current financial situation, social network, and capacity to accommodate and adapt to the proposed options. In some cases the impacts will be minor but for fishers that lose their livelihoods impacts on themselves and their families will be severe and long lasting, including premature death.

RECREATIONAL SET NET

Set netters can be divided into three general groups: regulars (locals), semi-regulars (locals and holidaymakers) and opportunists (holiday makers), each with distinctive set netting characteristics. Recreational setting is an extremely important cultural activity to these groups especially for regulars and semi-regulars, many of whom rely on it for food and leisure.

For many set netters, set netting is a necessary part of providing relatively cheap and healthy food for their families. This is especially the case in the West Coast South Island although there was evidence of this from all regions. For some families the cost of replacing set net fish would be $40-80/week which they can not afford. Store bought fish is also perceived to be of poorer quality.

Regardless of where recreational set netting occurs the types of 'value' set netting provides is common amongst practitioners throughout all the survey areas. These include:

- Provision of fresh healthy food
- Economic value to domestic budget
- Leisure activity
- Rewards from sharing
- Efficient and exciting fishing
- Targeting favoured catch species
- Social cohesion and capital
- Skills such as boat handling, reading sea and weather conditions and fish preparation.

Impacts of Options: South Island Regions

Option 1

- The attendance requirement would reduce set netting events by 90% (WCSI), 50% (ECSI) and 75% (SCSI).
- Night set netting on its own would result in a 50-80% reduction in set netting in each region
- The above 2 requirements would see overall fishing effort from set netting reduced by 75-100%. This reduction occurs primarily because of the impracticalities of attendance and night setting which reduce both the time available to fish and the ability to coordinate with tides (and other activities) which in turn reduces fish catch.
- One net per person and/or boat and a maximum net length of 30m was of no issue for 99% of fishers surveyed.

Option 2 and 3

- Very few South Island fishers surveyed set net beyond 2nm and no one surveyed set net beyond 4nm (Option 2B) Those that do set between 2-4nm usually combine it with rod/line fishing or diving. However, because Option 2 includes the Option 1 requirements, the overwhelming response from participants was that Option 2 would eliminate 90% of legal set netting in the South Island.
- Subsequent options mean a further reduction in any remaining set netting until Option 3, recreational set netting on the coast would be eliminated by 95%
- Designated fishing areas for butterfish (ECSI, SCSI) are in places of low public use, difficult access, and exposed coast increasing the risk to fishers of accidents and drowning. Most fishers would not consider using these areas.
- There may be an increase in the concentration of fishing effort in harbours, lagoons, estuaries and inlets that are not affected by the options.
- There will be an increase in illegal set net fishing.
- There will be the loss of the important values associated with set netting (listed above) and with them the skills and health and social benefits fishers, their families, friends and communities currently enjoy.

Impacts of Options: West Coast North Island

Option 1

- For residents and bach owners in the closed areas there would be a significant reduction in set netting activity and with it the associated values and benefits the community enjoys.

Option 2

- 40% of those surveyed said attendance would be a significant problem due to impracticalities, safety issues and the time required.
- The prohibition of night set netting would result in at least a 25% reduction in set netting activity depending on how strict the rules are.
- The overall impact of Option 2 would be a reduction in set netting by 30 - 50%
- One third of fishers had no issue with Option 2, with some saying it was their preferred option as at least they would still be able to set net.

Option 3

- The loss of all the benefits and values associated with legal set netting to fishers, their families, friends and communities.
- Around 10% of fishers suggested that no change in their fishing practice would occur making their activity illegal.