

NON - COMMERCIAL FISHERIES

Code	Title
BCO2008/01	Abundance of BCO from Oamaru to Shag Point (BCO 3)
BCO2008/02	Abundance of BCO in Dusky Sound (BCO 5)
OYS2008/02	Kaipara Harbour oyster reserves
REC2008/02	Estimation of recreational harvest
REC2008/05	Chatham Islands marine recreational fishing survey
REC2008/06	Monitoring recreational fisheries in Kaikoura and Motanau
SCA2008/01	Abundance of scallops on Northland and Coromandel recreational fishing areas
TOH2008/01	Distribution and abundance of toheroa
TOH2008/02	Estimation of growth and age in toheroa

Project: Abundance of blue cod from Oamaru to Shag Point (BCO 3)

Project code: BCO2008/01

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: Subject to tender

Overall Objectives:

1. To estimate relative abundance, maturity state, sex ratio, and age structure of blue cod (*Parapercis colias*) around Oamaru to Cornish Head.

Specific objectives:

1. To undertake a potting survey from Oamaru to Cornish Head to estimate relative abundance, size- and age-at-maturity, sex ratio and collect otoliths from pre-recruited and recruited blue cod.
2. To analyses biological samples collected from the potting survey.
3. To determine stock status of blue cod populations in this area.

Reporting Requirements:

Research Reporting

Objectives 1 to 3

1. To submit to MFish a Voyage Programme as specified in Research Reporting form 2, one month before the beginning of the survey.
2. To submit to MFish a Voyage Report as specified in Research Reporting form 3, one month after the completion of the survey.
3. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.
4. To present the report in 3 above to meetings of the Southern Inshore Fishery Assessment Working Group in August-September 2009 in Wellington or Dunedin. Presentations to more than one meeting may be required.
5. To submit to MFish a draft revised Working Group Report as specified in Research Reporting form 8 for blue cod by 1 September 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2009.

Rationale:

General

The national diary surveys of marine recreational fishing found blue cod to be the second most frequently landed finfish species nationally, and the most frequently landed species in the South Island. Blue cod is an important species for Maori customary fishers, but the catch is unknown. Recreational take in BCO 3 was estimated at 175 and 245 t in 1994 and 1996. A smaller amount (180 t) of blue cod is landed annually by commercial fishers in BCO 3. The reef area in BCO 3 supporting blue cod is not extensive. Recreational catch rates are reported to be low. Recreational fishers are also concerned that the lowering of the blue cod bag limit to 10 per day for the northern area of BCO 3 (from Waimakariri River to Clarence Point) may result in a transfer of fishing effort south.

In the 2000-01 Sustainability Round, the Ministry undertook to work with stakeholders in the area to monitor blue cod populations. A series of relative biomass estimates based on potting surveys was consequently initiated with a view to conducting surveys every three years (see Inshore Medium Term Research Plan). The first survey was conducted in Jan-Apr 2002 with a second in 2005 (BCO2004-01). The next survey is scheduled for early 2009.

Objective 1

Blue cod populations on important recreational fishing grounds in BCO 3 are currently monitored using relative biomass indices generated by cyclical potting surveys (every third year).

Under this objective a potting survey will be undertaken between Oamaru and Cornish Head (the northern point of Waikouaiti Bay). Note that this is a slight extension to the area previously surveyed and all comparisons to previous surveys should ensure that they account for this. The previous survey should be considered and any necessary improvements implemented. All physical environmental data thought to influence catchability of the pots should be simultaneously collected at each sample site.

Biological samples should be collected to allow determination of the size and age composition of the blue cod populations and other important biological characteristics such as sex ratio and age/size-at-maturity. While ensuring that sufficient biological samples are available, care should be taken to minimize the impact of the sampling on population density.

Objective 2

Biological samples should be analysed to describe the size, age, and sex composition of blue cod in the region. The spatial distribution of samples should be considered when producing raised estimates of population quantities, e.g. size and age structure.

Objective 3

While a formal stock assessment (based on a stock assessment model) is not proposed for blue cod at this time, there are multiple sources of information that can be used to provide information on stock status and the sustainability of current removals.

Under this objective, three primary tasks are envisaged:

- calculation of a standardised abundance index from the potting survey;
- estimation of total mortality (Z) from catch composition data; and
- estimation of spawning biomass per recruit reference points.

A standardised relative abundance index will be calculated for the potting survey. To the extent that other factors influence catchability of potting activities, historical data should be included and those estimates revised as appropriate.

Age structure provides a tool with which exploitation rate can be measured, allowing for both temporal and spatial comparisons. Monitoring age structure also provides a means to better evaluate the response of a population to changes in regulations. Some outputs from this objective will include:

- estimates of total fishing mortality that incorporate uncertainty in key parameters (e.g. age-at-full recruitment and other selectivity issues) and the different properties of regression and Chapman-Robson estimators; and
- discussion of the consistency of signals over time and space should be included e.g. is the progression of cohorts apparent and are estimates of Z stable between years.

Finally, the length, age, maturity and mortality data should then be used to determine estimates of spawner biomass per recruit that can be used to develop BMSY-related proxies that will provide a basis for determining likely stock status based on the estimates of Z from the catch curve analysis.

Project: Abundance of blue cod in Dusky Sound (BCO 5)

Project code: BCO2008/02

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: Subject to tender

Overall Objective:

1. To estimate relative abundance, maturity state, sex ratio, and age structure and the relative abundance of blue cod (*Parapercis colias*) in Dusky Sound.

Specific objectives:

1. To undertake a potting survey in Dusky Sound to estimate relative abundance, size- and age-at-maturity, sex ratio and collect otoliths from pre-recruited and recruited blue cod.
2. To analyses biological samples collected from the potting survey.
3. To determine stock status of blue cod populations in this area.

Reporting Requirements:

Research Reporting

Objectives 1 to 3

1. To submit to MFish a Voyage Programme as specified in Research Reporting form 2, one month before the beginning of the survey.
2. To submit to MFish a Voyage Report as specified in Research Reporting form 3, one month after the completion of the survey.
3. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.
4. To present the report in 3 above to meetings of the Southern Inshore Fishery Assessment Working Group in August-September 2009 in Wellington or Dunedin. Presentations to more than one meeting may be required.
5. To submit to MFish a draft revised Working Group Report as specified in Research Reporting form 8 for blue cod by 1 September 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2009.

Rationale:

General

The national diary surveys of marine recreational fishing found blue cod to be the second most frequently landed finfish species nationally, and the most frequently landed species in the South Island. Blue cod is an important species for Maori customary fishers, but the catch is unknown. Recreational take in BCO 5 was estimated at 51t during the 1997-1998 survey. The commercial landings in BCO 5 was 1344 t in 2005-06 fishing season. A number of submissions concerning the *Review of Sustainability Measures for 2000-01* provided anecdotal evidence of a decline in blue cod populations off North Canterbury leading to the lowering of the blue cod bag limit to 10 per day for the northern area of BCO 3 (from Waimakariri River to Clarence Point). Recreational fishers are concerned that this may shift some fishing effort further south.

In the 2000-01 Sustainability Round, the Ministry undertook to work with stakeholders to monitor blue cod populations in the area. A series of relative biomass estimates based of potting surveys was consequently initiated with a view to conducting surveys every three years (see Inshore Medium Term Research Plan). The first survey in Dusky sound was conducted in 2002.

Objective 1

Blue cod populations on important recreational fishing grounds in BCO 5 are currently monitored using relative biomass indices generated by cyclical potting surveys (every third year).

Under this objective a potting survey will be undertaken in Dusky Sound. The previous survey should be considered and any necessary improvements implemented. All physical environmental data though to influence catchability of the pots should be simultaneously collected at each sample site.

Biological samples should be collected to allow determination of the size and age composition of the blue cod populations and other important biological characteristics such as sex ratio and age/size-at-maturity. While ensuring that sufficient biological samples are available, care should be taken to minimize the impact of the sampling on population density.

Objective 2

Biological samples should be analysed to describe the size, age, and sex composition of blue cod in the region. The spatial distribution of samples should be considered when producing raised estimates of population quantities, e.g. size and age structure.

Objective 3

While a formal stock assessment (based on a stock assessment model) is not proposed for blue cod at this time, there are multiple sources of information that can be used to provide information on stock status and the sustainability of current removals.

Under this objective, three primary tasks are envisaged:

- calculation of a standardised abundance index from the potting survey;
- estimation of total mortality (Z) from catch composition data; and
- estimation of spawning biomass per recruit reference points.

A standardised relative abundance index will be calculated for the potting survey. To the extent that other factors influence catchability of potting activities, historical data should be included and those estimates revised as appropriate.

Age structure provides a tool with which exploitation rate can be measured, allowing for both temporal and spatial comparisons. Monitoring age structure also provides a means to better evaluate the response of a population to changes in regulations. Some outputs from this objective will include:

- estimates of total fishing mortality that incorporate uncertainty in key parameters (e.g. age at full recruitment and other selectivity issues) and the different properties of regression and Chapman-Robson estimators; and
- discussion of the consistency of signals over time and space should be included e.g. is the progression of cohorts apparent and are estimates of Z stable between years.

Finally, the length, age, maturity and mortality data should then be used to determine estimates of spawner biomass per recruit that can be used to develop BMSY-related proxies that will provide a basis for determining likely stock status based on the estimates of Z from the catch curve analysis.

Project: Kaipara Harbour oyster reserves

Project Code: OYS2008/02

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: N/A

Overall Objectives:

1. To assess the distribution and relative abundance of oysters¹ within the Te Uri o Hau Maori oyster reserves of the Kaipara Harbour.

Specific Objectives:

1. To provide a qualitative or semi-quantitative assessment of the nature and extent of the distribution and relative abundance of oysters within five of the six Te Uri o Hau oyster reserves of the Kaipara Harbour.
2. To provide a quantitative assessment of the distribution and relative abundance of oysters within one Te Uri o Hau oyster reserve of the Kaipara Harbour.

Note: The oyster reserves in Kaipara Harbour are of significant importance to Te Uri o Hau. The Ministry of Fisheries will be involved in consultation with the successful tenderer and Te Uri o Hau to involve tangata whenua in the conduct of this research project. The final determination of reserves to be surveyed will depend on consultation with Te Uri o Hau.

Reporting Requirements:

Research Reporting

Objectives 1 to 2

1. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.
2. To present the report in 3 above to meetings of the Shellfish Fishery Assessment Working Group in August-September 2009 in Auckland or Wellington. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

¹ Oysters of most interest include Pacific oyster and rock oyster

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2009.

Rationale:

General

Te Uri o Hau is a hapu of Ngati Whatua. The rohe for this hapu is based principally around the northern Kaipara Harbour. The Te Uri o Hau Claims Settlement Act 2002 (Settlement Act) records an agreement reached by the Crown and Te Uri o Hau Governance Entity. The purpose of the Settlement Act is to give effect to certain provisions of the Te Uri o Hau Deed of Settlement 2000, being a deed that settles the historical claims of Te Uri o Hau.

In accordance with the Deed, the Minister of Fisheries is currently in the process of finalising specific regulations that empower Te Uri o Hau to manage the taking of oysters from six oyster reserve areas within the Kaipara Harbour. Under the proposed Fisheries (Te Uri o Hau Oyster Reserves) Regulations 2007, the primary purpose of management committees will be to manage customary food gathering of oysters from the oyster reserves.

In their role of managing the customary food gathering of oysters from the oyster reserves, management committees will need to periodically assess the status of the resource. These assessments may alter the manner in which management committees:

- issue authorizations for customary food gathering of oysters;
- apply management practices within the scope of the proposed regulations (eg, resource enhancement, or prohibitions or restrictions); and
- develop or prioritise management objectives within a management plan for the oyster reserves.

This project seeks to obtain baseline information regarding the status of oyster resources within the oyster reserve areas. Obtaining this information will provide a reasonable basis from which the management committees established under the proposed regulations can undertake their duties.

Objective 1

The six oyster reserve areas within the Kaipara Harbour fall between the mean low water and high water marks as follows:

- the area of the Arapaoa River from Wakaiti to Tahupo Creek;
- the area of the Arapaoa and Otamatea Rivers from Te Kopua Point to Waipako;

- the area of the Otamatea River from Batley to Tanoa Point;
- the area of the Otamatea River from Paparoa Point to Onoke Point;
- the area of the Oruawharo River from Raekau to Waingopai Creek;
- the area of the Wairoa River from Poutu to Sail Point.

The intent of this objective is to derive a cost effective approach to either qualitatively or semi-quantitatively assess the distribution and relative abundance of oysters. The assessment is to be applied to five of the six oyster reserves, excluding the reserve between Poutu and Sail Point. The areas involved cover a broad geographic area, and the distribution and relative abundance of oysters within the intertidal area is likely to quite variable. Identifying whether local beds are comprised of rock oyster or Pacific oyster would be of interest. Early reports suggest that rock oyster may have been the predominant species of oyster in the harbour, although Pacific oyster has become more prevalent.

The assessment method used should adequately identify areas of low to high abundance and the likely characteristics of the intertidal area within an oyster reserve that may affect the species distribution and relative abundance. Documenting anecdotal information held by fishery interests on any recent changes in distribution and relative abundance of oysters would be desirable.

The assessment should provide enough information to aid management committee members in the carrying out of their duties, in terms of issuing authorizations for customary food gathering, as well as their considering fisheries management objectives for the management of the oyster resources.

Qualitative assessment should take into account water quality parameters such as temperature, dissolved oxygen, secchi depth, pH, salinity, and nitrogen levels. These tests are neither time consuming or expensive.

Objective 2

The intent of this objective is to obtain a quantitative assessment of the distribution and relative abundance of oysters within the area of the Arapaoa River from Wakaiti to Tahupo Creek (Kirikiri Inlet only). The focus will be on developing a cost effective and simple approach to providing estimates on the current status of the oyster resource. This area has been chosen for assessment following discussion with representatives from Te Uri o Hau in September 2007.

The quantitative assessment method should be repeatable for comparability purposes, and be able to be applied in other oyster reserves within the Kaipara Harbour without significant modification. The management committee and/or the local community may wish to use the methods developed to assess the resource themselves in future years.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.5, 0.5.

Project: Recreational harvest estimates

Project Code: REC2008/02

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: None

Overall Objectives:

1. To estimate the marine recreational harvest by species and fishstock.

Specific Objectives:

1. To review current research on recreational harvest both within New Zealand and overseas, including information on the legislative/policy frameworks that require information on recreational harvest, and provide recommendations on obtaining future estimates of recreational harvest in New Zealand.

Reporting Requirements:

Research Reporting

Objectives 1

1. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.
2. To present the report in 1 above to meetings of the Recreational Fisheries Working Group in August-September 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2009.

Rationale:

General

Estimates of the extent of recreational harvest are essential for the management of New Zealand fish stocks, particularly in those areas where specific species comprise a significant proportion of the total extraction (commercial, recreational and customary). The legislation governing fisheries in New Zealand requires the minister of Fisheries to set an allowance for recreational fishers, before setting the commercial TACC. Obtaining estimates on a national basis and to a degree of accuracy to make the estimates meaningful and reliable is complex and expensive.

Various estimates of recreational harvest have been made using different methodologies over the period 1991 to the present. Regional telephone/diary surveys were conducted in the South Region in 1991, Central Region in 1993 and the North Region in 1994. A national telephone diary survey was conducted in 1995/96, followed by a further national telephone diary survey in 1999/2000. A roll over national telephone diary survey was conducted in 2000/2001. Subsequent to the results of the 1999/2000 and 2000/2001 surveys, a review of the harvest estimates and methodologies revealed a methodological error in the 1995/96 survey. While this made the absolute harvest estimates unreliable, relative estimates were comparable between stocks. Within the 1999/2000 survey, the estimates for QMA 2 were considered to be unreliable and the estimates for some other fishstocks were considered to be unbelievably high.

Alternative methodologies using aerial overflights and boat ramps have been carried out in QMA 1 to estimate the recreational harvest of snapper, kahawai and kingfish. This methodology is currently being used to estimate the recreational harvest of snapper in SNA 2. The method has also been used to estimate the recreational of key fish species in the Marlborough Sounds and Tasman and Golden Bays.

The aerial overflight/boat ramp survey methodology is only applicable where recreational fisheries take the major part of their catch using trailer boats. No suitable and cost effective alternative to a national telephone/diary survey has been developed for other key species and fishstocks such as rock lobsters and paua.

A current project *REC2004/06 Analysis of diary data* will evaluate and compare the harvest estimates derived for different fish stocks derived from the national telephone diary surveys and the overflight/boat ramp census methodology.

Objective 1

Research on the marine recreational harvest in New Zealand has been an iterative process over the past 15 years with the use of national telephone diary surveys that became increasingly more refined with each successive survey. However with the difficulties experienced with overcoming some of the inherent methodological problems with these surveys, the aerial overflight methodology was developed and refined over the past four years. This objective would review past research on recreational harvest estimates in New Zealand and review current international

research directed at marine recreational harvest, and the legislative requirements and management purposes for which these harvest estimates are required and utilised. The review would include the outcomes from project *REC2004/06 Analysis of diary data*. The review would consider the requirements for the purposes of estimating the marine recreational in New Zealand within the current legislative and management framework. The objective would provide recommendations on research for estimating recreational harvest in the future.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 1.0.

Project: Chatham Islands marine non-commercial fishing survey

Project Code: REC2008/05

Start Date: 1 October 2008

Completion Date: 30 June 2010

Vessel Use: Nil

Overall Objectives:

1. To characterise the non-commercial fishery around the Chatham Islands.

Specific Objectives:

1. To determine the areas fished, seasonality, methods, and composition and size structure for the key non-commercial species around the Chatham Islands.
2. To estimate the non-commercial harvest of key fish species around the Chatham Islands.

Reporting Requirements:

Research Reporting

Objectives 1 to 4

1. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2010.
2. To present the report in 1 above to meetings of the Recreational Fisheries Working Group in August-September 2010.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2010.

Rationale:

General

Non-commercial fishing is highly valued around the Chatham Islands, but little information is available on the nature and extent of the non-commercial harvest. The non-commercial harvest includes recreational fishing (including charter boats), the harvest for subsistence fishing, which is not necessarily considered as recreational fishing by some fishers, and customary fishing under reg 27/27A of the Amateur Fishing regulations. (As Tangata Kaitiaki appointments are yet to be confirmed under the kaimoana customary fishing regulations there is, currently, no fishing for customary purposes under these regulations.)

Information on the areas fished, seasonality, methods used and species caught is important for management of a non-commercial fishery. A Chatham Islands Inshore Fisheries Plan will be developed within the next 3-4 years, and this information will be fundamental to the non-commercial participants in this process, as it will be to the commercial participants. Members of the Chatham Islands Iwi Forum (Pā Tangaroa) strongly support this project and wish to be involved in developing the methodology.

Determining the non-commercial harvest of important species is also necessary so that the contribution of the non-commercial harvest to the total harvest is known. It is particularly crucial to determine the non-commercial harvest where non-commercial fishers take a significant part of the total harvest so that appropriate allowances are made for the recreational and customary fisheries when Total Allowable Commercial Catches (TACCs) are set or varied. Neither PAU4, nor BCO4 have TACs and allowances set.

Estimates of the recreational harvest from most fishstocks have been undertaken by two national surveys in 1996 and 2000, but FMA 4 (Chatham Islands) was not surveyed. Although it is understood, anecdotally, that non-commercial fishing is a significant activity on the Chatham Islands, there are no estimates of non-commercial harvest.

Objective 1

There is presently no information on the scale and scope of non-commercial fishing around the Chatham Islands. There is a strong fishing community on Chatham and Pitt Islands, which is expressed through commercial fishing activity and non-commercial fishing. Non-commercial fishing being defined as recreational fishing and other fishing that is considered as customary or subsistence fishing, but which is exercised through the recreational fishing regulations. This objective would establish the areas fished, methods used, species and sizes caught, and the seasonality of fishing for the non-commercial fishery around the Chatham Islands. The objective would also focus on the developing fishing tourism business in the Chatham Islands that is reported to be increasing the non-commercial harvest from around the Chatham Islands.

Objective 2

There are no estimates of the non-commercial harvest of key species targeted by non-commercial fishers around the Chatham Islands. Information on the level of non-commercial harvest is important for fisheries management purposes. This objective would estimate the non-commercial harvest of key fish species around the Chatham Islands taken by non-commercial fishers, including the developing fishing tourism take. It is recognised that there could be methodological difficulties in estimating the non-commercial harvest. This would be due to the small size and nature of the Chatham Islands' population and the difficulty of applying what might be considered standard technique in the Chathams. An innovative way of addressing these problems would be required for this objective to be achieved. Local Chatham Islanders have expressed interest in being involved with or undertaking this project.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.4, 0.3, 0.3.

Project: Monitoring recreational fishing in the Kaikoura – North Canterbury area

Project Code: REC2008/06

Start Date: 1 October 2008

Completion Date: 30 March 2010

Vessel Use: None

Overall Objectives:

1. To monitor the recreational fishery for key fisheries in the North Canterbury – Kaikoura area.

Specific Objectives:

1. To monitor changes in recreational catch rates of key target species in the North Canterbury – Kaikoura area.
2. To monitor changes in the size of key target species in recreational catches in the North Canterbury – Kaikoura area.

Reporting Requirements:

Research Reporting

Objectives 1 and 2

1. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2010.
2. To present the reports in 3 above to meetings of the Southern Inshore Fishery Assessment Working Group and Recreational Fisheries Working Group in August-September 2010.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2010.

Rationale:

General

The national diary surveys of marine recreational fishing found blue cod to be the third most frequently landed species nationally (behind snapper and kahawai), and the most frequently landed species in the South Island. Surveys undertaken in 1992 and 1996 put the recreational harvest along the east coast of the South Island in BCO 3 at between 175 and 245 t. In addition, commercial fishers in this area land about 150 to 160 t of blue cod annually. Blue cod is also an important species for Maori customary fishers. About 80% of the recreational blue cod catch in BCO 3 is taken in Otago waters off Moeraki, Karitane and Taieri Mouth; however, blue cod is still a very important species in the northern part of BCO 3. Throughout its distribution, there are likely to be many, largely independent, sub-stocks of blue cod, therefore this species is susceptible to localised depletion.

A characterisation of the recreational fishery in Kaikoura was undertaken in 1998-99. A further research project was commissioned in 2002/03 (*REC2002/04 Monitoring the recreational blue cod and sea perch fishery in the Kaikoura-North Canterbury area*) to monitor the recreational blue cod and sea perch fishery in Kaikoura and North Canterbury (Motanau). This research established a satisfactory sampling design to detect changes in recreational fishing for blue cod and sea perch, and anticipated that further surveys would be undertaken at appropriate intervals to provide a time series to monitor the status of blue cod and sea perch in the areas, and to gauge the effectiveness of the current management regimes. The 2002/03 survey was conducted over the period January to April 2003. Recreational fishers are currently expressing concern about the performance of recreational fishing across a number of fish stocks in the Kaikoura – North Canterbury area. This current project would undertake a survey of recreational fishing in January to April 2007, which would provide a contrast with the previous surveys and would contribute to a time series of information on catch rates and size frequency. This information will assist MFish and recreational fishers in managing the recreational fisheries in the area by monitoring any changes in the recreational fishery and assessing the effectiveness of various management measures.

Objective 1

This objective would monitor changes in recreational catch rates for key target fish species blue cod and sea perch in the North-Canterbury- Kaikoura area from boat ramp surveys. The methodology would repeat the survey undertaken in 2003 so as to provide a direct comparison in catch rates. This objective would include comparison with information obtained from previous surveys.

Objective 2

The aim of this objective is to determine the size distribution key target fish species taken by recreational fishers in the North Canterbury – Kaikoura area. The methodology would repeat the survey undertaken in 2003 so as to provide a direct comparison in size frequencies. This objective would include comparison with information obtained from previous surveys.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.5, 0.5.

Project: Abundance of scallops in Northland and Coromandel recreational fishing areas

Project Code: SCA2008/01

Start Date: 1 October 2008

Completion Date: 30 September 2011

Vessel Use: Subject to tender

Overall Objectives:

1. To establish a relationship between scallop abundance in the main commercial scallop beds estimated each year in pre-season surveys, and scallop abundance in recreational fishing areas in the Northland and Coromandel scallop fisheries.

Specific Objectives:

1. To investigate the relationship between scallop abundance in commercial and non-commercial areas in the Northland scallop fishery by undertaking a survey in about May/June 2009, 2010 and 2011, to estimate the absolute abundance and population size frequency of scallops in the recreational scallop beds.
2. To estimate yield following the completion of the survey described in Objective 1.
3. To investigate the relationship between scallop abundance in commercial and non-commercial areas in the Coromandel scallop fishery by undertaking a survey in about May/June 2009, 2010 and 2011, to estimate the absolute abundance and population size frequency of scallops in the recreational scallop beds.
4. To estimate yield following the completion of the survey described in Objective 3.

Note: This project is supported by the Coromandel Fisheries Plan 2006. The project will need to be undertaken in conjunction with projects *SCA2007/01 Stock assessment of Coromandel scallops* and *SCA2007/02 Stock assessment of Northland scallops*. This project would proceed following consultation (including the timing of any survey and areas to be surveyed) with commercial and recreational stakeholders in about April 2008. This is a three year project.

Reporting Requirements:

Research Reporting

Objectives 1 to 4

1. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009, 1 September 2010, 1 September 2011.

2. To present the reports in 1 above to meetings of the Shellfish Fishery Assessment Working Group and Recreational Fisheries Working Group in August-September 2009, 2010 and 2011 in Auckland.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2011.

Rationale:

General

The Northland (SCA 1) and Coromandel (SCA CS) scallop fisheries are highly valued by commercial, recreational and customary fishers. The Northland commercial fishery is conducted within discrete beds in Spirits Bay, Tom Bowling Bay, Great Exhibition Bay, Rangaunu Bay, Doubtless Bay, Stevenson's Island, the Cavalli Passage, Bream Bay, and the coast between Mangawhai and Pakiri Beach. All commercial fishing is by dredge. The Northland fishery is managed under the QMS with a TAC of 75 t and a TACC of 40 t.

In the Northland fishery, recreational fishing is undertaken in suitable areas throughout the fishery, more especially in enclosed bays and harbours, many of which are closed to commercial fishing. Consequently the recreational fishery is largely spatially separated from the commercial fishery.

Amateur taking of scallops is usually by diving using snorkel or SCUBA, although considerable amounts are also taken using small dredges. In some areas, especially in harbours, scallops can be taken by hand from the intertidal zone, and in storm events, scallops can be cast onto lee beaches in large numbers. Some areas have been closed to commercial fishing for scallops in an attempt to separate, as far as possible, the commercial and non-commercial fisheries for scallops. Such closed areas include most harbours and popular dive locations, although some areas of spatial conflict still exist. Regulations restrict the daily harvest to 20, there is a minimum legal size of 100 mm shell length, and the season runs from 15 July to 14 February.

The Coromandel scallop fishery is smaller but also highly valued by commercial, recreational fishers and customary fishers. Coromandel scallops were introduced into the QMS on 1 April 2002 with a TAC of 48 t and a TACC of 22 t. The recreational

and customary allowances are set at 7.5 t each, and an allowance of 11 t for other sources of mortality. Scallops support regionally important commercial fisheries between Tauranga and Cape Rodney, the limits of the Coromandel fishery. Fishing is conducted within a number of discrete beds around Little Barrier Island, east of Waiheke Island, at Colville, south and east of the Mercury Island group, and in the Bay of Plenty (principally off Waihi, and around Motiti and Slipper Islands). They support regionally important commercial fisheries between Tauranga and Cape Rodney, the limits of the Coromandel fishery. Fishing is conducted within a number of discrete beds around Little Barrier Island, east of Waiheke Island, at Colville, south and east of the Mercury Island group, and in the Bay of Plenty (principally off Waihi, and around Motiti and Slipper Islands). All commercial fishing is by dredge.

In the Coromandel fishery, recreational fishing is undertaken in suitable areas throughout the fishery, more especially in enclosed bays and harbours, many of which are closed to commercial fishing. Consequently the recreational fishery is largely spatially separated from the commercial fishery. The recreational harvest of scallops in the Coromandel fishery was estimated to be 30.1 t in 1999/2000, as derived from the national telephone diary survey. Amateur regulations restrict the daily harvest to 20, there is a minimum legal size of 100 mm shell length, and the season runs from 15 July to 14 February. Amateur taking of scallops is usually by diving using snorkel or SCUBA, although considerable amounts are also taken using small dredges. In some areas, especially in harbours, scallops can be taken by hand from the intertidal zone, and in storm events, scallops can be cast onto lee beaches in large numbers. Many areas within these two fisheries have been closed to commercial fishing for scallops in an attempt to separate, as far as possible, the commercial and non-commercial fisheries for scallops. Such closed areas include most harbours and popular dive locations, although some areas of spatial conflict still exist.

The Current Annual Yield (CAY) harvest strategy for the Northland and Coromandel scallop stock requires annual, pre-season surveys used to estimate abundance, growth, and meat yield. Scallop populations are highly variable from year to year, in terms of abundance, growth rates, and meat yield. Because of this high degree of variability, the estimate of Maximum Constant Yield (MCY) from scallop stocks is typically close to zero. Therefore, target harvest levels based on the estimate of MCY are not the optimal management strategy for this fishery. The current TACC for SCA 1 is 40 t is 22t and for SCA CS the TAC is 48 t and the TACC 22 t. The current management approach for both fisheries is flexible and enables management to respond to the annual variability in abundance of this species by issuing additional ACE above the 'base' TACC, if this can be supported by information about the abundance of scallops prior to commencement of the fishing season. For both fisheries, annual pre-season biomass estimates and stock assessments are undertaken which provide for in season changes to the TAC.

Annual pre-season surveys have been undertaken in the commercial areas of each fishery for many years. Fisheries management requirements now require some estimate of abundance in the recreational areas to allow for changes in the recreational allowance and for any management decisions concerning bag limits. For some recreational areas, it is likely that changes in the abundance of scallops in the commercial areas will be reflected by similar changes in abundance in the recreational areas. It is not proposed that the annual pre-season abundance surveys for the

commercial areas be extended to include recreational areas each year. Instead it is proposed that any relationship between abundance in the surveyed commercial and recreational areas be determined. Any relationship in abundance between commercial and recreational areas might be associated with the degree of separation between the areas and substrate type. The abundance of scallops in some recreational areas may show no relationship in abundance with commercial areas.

This is a high priority project to continue with surveys of recreational fishing areas to establish any relationship between abundance in commercial recreational areas.

Objectives 1 and 2

This objective proposes to undertake a survey to determine the distribution and absolute abundance of pre-season scallops in recreational areas of the Northland scallop fishery. This would be the fourth consecutive survey conducted in the Coromandel fishery and the third survey conducted in the Northland fishery. The abundance would be compared with abundance in the main commercial scallop beds to establish any relationship in abundance between the commercial and recreational scallop beds. A yield estimate will be made for the recreational beds surveyed. With the three years of data available from this survey (previous surveys of some recreational areas undertaken in 2006 and 2007), this objective would examine any relationship between abundance and size frequency between commercial and recreational areas.

Objectives 3 and 4

This objective proposes to undertake a survey to determine the distribution and absolute abundance of pre-season scallops in recreational areas of the Coromandel scallop fishery. The abundance would be compared with abundance in the main commercial scallop beds to establish any relationship in abundance between the commercial and recreational scallop beds. A yield estimate will be made for the recreational beds surveyed. With the three years of data available from this survey (previous surveys of some recreational areas undertaken in 2006 and 2007), this objective would examine any relationship between abundance and size frequency between commercial and recreational areas.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.25, 0.25, 0.25, 0.25.

Project title: Distribution and abundance of toheroa

Project code: TOH2008/01

Start date: 1 October 2008

Completion Date: 30 September 2009

Vessel use: None

Overall Objectives:

1. To determine the distribution of toheroa (*Paphies ventricosum*) beds, and the abundance and size structure of toheroa on Oreti Beach and Bluecliffs Beaches.

Specific Objectives:

1. To estimate the size structure and absolute abundance of toheroa on Oreti Beach, during February 2009. The target c.v. for the estimate of absolute abundance of legal sized toheroa (≥ 100 mm shell length) is 20%.
2. To describe changes in the size structure and absolute abundance of toheroa on Oreti Beach by comparing the results from this work with those from previous surveys.
3. To estimate the size structure and absolute abundance of toheroa on Bluecliffs Beach, during February 2009. The target c.v. for the estimate of absolute abundance of legal sized toheroa (≥ 100 mm shell length) is 20%.
4. To describe changes in the size structure and absolute abundance of toheroa on Bluecliffs Beach by comparing the results from this work with those from previous surveys.

Note: The Ministry of Fisheries recognises the importance of the toheroa resource to customary fishers. The successful tenderer will consult with and involve tangata whenua in the conduct of this research project. The final determination of surveying beaches will depend on consultation with tangata whenua.

Reporting Requirements:

Research Reporting

Objectives 1 to 2

1. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.

2. To present the report in 3 above to meetings of the Shellfish Fishery Assessment Working Group in August-September 2009 in Wellington, and the Southern Shellfisheries Plan Committee in Dunedin.
3. To submit to MFish a draft revised Working Group Report as specified in Research Reporting form 8 for blue cod by 1 September 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2009.

Rationale:

General

Toheroa (*Paphies ventricosum*) have been subjected to intensive harvesting over the last 100 years and fishing is now prohibited throughout New Zealand in response to declining population numbers. The only major toheroa populations in the South Island are found at Oreti and Bluecliffs Beaches in Southland. Historically both beaches were important recreational fisheries supporting extended open seasons. The only harvest from these beaches over the last 30 years has been customary take and occasional one-day seasons at Oreti Beach. Regular monitoring of the toheroa populations at Oreti and Bluecliffs Beaches is important for determining if the toheroa populations can potentially support an open season/ and or the level of sustainable customary take. The last survey for both Oreti Beach and Bluecliffs Beach was undertaken in 2005. This survey will focus on Oreti Beach.

Objectives 1 and 2

Between 1971 and 1990, 22 toheroa surveys were carried out at Oreti Beach providing a time series of population estimates for toheroa \square 80 mm. The population was relatively stable with one to two million fish within this size range during this period, despite one-day open seasons in 1972, 1973, 1974, 1978, 1980, 1981, and 1990. However, by 1996 the population had declined markedly to about 400 000 toheroa \square 80 mm. Two years later in 1998, population estimates were about 700 000. The most recent surveys in 2002 (TOH2001/01) and 2005 (TOH200301) put estimates at 720 000, and 714 000, respectively. Thus, the population is still significantly smaller than in the 1970s and 1980s and has not recovered. This

population should therefore be monitored on a regular basis. A survey of toheroa on Oreti Beach is proposed for February 2009, 4 years since the 2005 survey.

Objectives 3 and 4

The Ministry of Fisheries monitored toheroa numbers at Bluecliffs Beach regularly between 1966 and 2005. Estimates of legal sized toheroa (≥ 100 mm) in the mid 1960s were about 1.8 million toheroa. Following a population crash in the early 1970s, toheroa numbers remained relatively stable for some time at about 600,000. However by 1990 the population was estimated at less than 100 000 toheroa, i.e., a reduction in numbers from the 1960s of nearly 20 fold. By 1998 the population had further declined to about 70 000 toheroa. A series of 10 surveys carried out by NIWA for Meridian Energy Ltd between 1997 and 2001 showed that the population averaged about 100 000 toheroa. Recruitment has been shown to be very low in recent times. The most recent survey in February 2005 (TOH200301) estimated the population at 165 000, the largest it has been since the mid 1980s, but still very low compared to historical estimates. This population should therefore be monitored on a regular basis. A survey of toheroa on Bluecliffs Beach is proposed for February 2009, 4 years since the 2005 survey.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.25, 0.25, 0.25, 0.25.

Project: Estimation of growth and age in toheroa

Project Code: TOH2008/02

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: None

Overall Objectives:

1. To estimate growth and age in toheroa using stable isotopes.

Specific Objectives:

1. To estimate the age and growth in toheroa from Oreti Beach and Ninety Mile Beach.
2. To validate the aging of toheroa using stable isotopes measurements.

Reporting Requirements:

Research Reporting

Objectives 1 to 2

1. To submit to the MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.
2. To present the report in 1 above to meetings of the Shellfish Fishery Assessment Working Group in August-September 2009 in Wellington and the Southern Shellfisheries Plan Committee in Dunedin.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 31 October 2009.

Rationale:

General

Toheroa (*Paphies ventricosum*) are a shellfish species endemic to New Zealand and are highly valued by all New Zealanders. Some 40 to 50 years ago there were substantial toheroa fisheries on Ninety-Mile beach and along Kapiti coast, however, both populations have substantially declined. Oreti Beach has the most significant population of toheroa (*Paphies ventricosum*) in the South Island and is one of only a few places in the country where toheroa are found in substantial numbers.

Toheroa are found inter-tidally on beaches fully exposed to surf, with fine sand, and enough moisture to prevent desiccation at low tide. The upper parts of the beach are particularly important for juveniles, which are often located only a few centimetres below the surface.

The 2003 assessment of Toheroa at Oreti Beach suggested that the current abundance was very low compared with estimates from the 1970s and early 1980s. The assessment also used a yield per recruit analysis to estimate an appropriate level of exploitation for the stock, but noted that more reliable estimates could be achieved with better estimates of age and growth. No estimate of maximum age is available for Toheroa at Oreti Beach and growth estimates used in the analysis were derived from a 1955 study, in which age was estimated using a shell-reading technique. The technique estimates age as the number of light and dark concentric rings on the shell, and relies upon the assumption that band formation is annual, although this has not been validated.

Stable isotopes have proved useful in determining the age and growth patterns of some surf clams and mussels, and for Toheroa, may provide validation of the shell-reading technique, as well as information on growth and age. The basis of this method is that the $^{18}\text{O}/^{16}\text{O}$ ratio ($\delta^{18}\text{O}$) of the carbonate of mollusc shells reflects actual water temperatures in the sea at the time the shell was precipitated. This then allows the annual temperature cycle preserved along the growth axis of the shell to be used as year tag or marker, which in turn allows growth at length and age to be estimated for individual shells. One-off samples from a population are therefore capable of yielding growth data not only for the most recent year but for the entire life of the shell sampled allowing insights into growth variation across years, data not normally available using traditional tag/recapture approaches.

Toheroa (*Paphies ventricosum*) are highly valued by all New Zealanders and are an important resource to customary fishers. More comprehensive growth and age information is needed to properly assess and manage this resource.

Objective 1

This objective will estimate the age and growth of toheroa at three selected beaches. The toheroa populations to be selected will be Oreti Beach in Southland. The recent 2005 stock assessment of toheroa on Oreti Beach would have been greatly improved if additional information on maximum age and growth had been available. These objectives will provide information on age and growth that will be integrated into future assessments of toheroa stocks.

Objective 2

This objective will validate the shell reading technique used for aging toheroa using stable oxygen isotopes.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.5, 0.5.