

SHELLFISH FISHERIES

PROPOSED PROJECTS FOR 2005/06

<u>Code</u>	<u>Title</u>	<u>Priority</u>
COC2005/01	Stock assessment of Snake Bank cockles	High
CRA2005/01	Rock lobster recruitment	High
OYS2005/01	Foveaux Strait oyster stock assessment	High
PAU2005/02	Stock assessment of paua 5D	High
PAU2005/03	Stock assessment dive survey PAU 5A	High
SCA2005/01	Stock assessment of Coromandel scallops	High
SCA2005/02	Stock assessment of Northland scallops	High
SCI2005/01	Measuring the abundance of scampi	High

Project: Stock assessment of Snake Bank cockles

Project Code: COC2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To carry out a stock assessment of cockles (*Austrovenus stutchburyi*) on Snake Bank Whangarei Harbour, including estimating absolute biomass and sustainable yields.

Specific Objectives:

1. To estimate the size structure and absolute biomass of cockles on Snake Bank during March – April 2006. The target coefficient of variation (c.v.) of the estimate of absolute recruited biomass is 20 %.
2. To complete the cockle stock assessment and estimate yields for cockles on Snake Bank for the 2005/2006 fishing year.
3. To estimate growth of cockles in COC 1A.

Note:

This project is subject to review of a current project COC2004/01 Stock assessment of Snake Bank cockles by the Shellfish Fisheries Working Group.

Rationale:

General

Snake Bank is the only cockle bed in Whangarei Harbour that is open to commercial fishing. The commercial cockle fishery on Snake Bank (COC 1A) has existed since the early 1980s. In the early 1990's harvesting intensified and export markets expanded. COC 1A was introduced to the Quota Management system in October 2002 with a TAC of 400 t, comprising a customary allowance of 25 t, a recreational allowance of 25 t, an allowance for other fishing related mortality of 4 t, and a TACC of 346 t. For the eight years prior to QMS introduction the landings were between 501 and 405 tonnes. The value of the fishery at the current TACC based on the port price of \$1.9/kg is approximately \$657,400.

The recreational catch of cockles in FMA1 from the 1999/2000 telephone diary survey was estimated to be 58.9 t. In common with many other intertidal shellfish, cockles are very important to Maori as a traditional fishery. No quantitative information on the level of customary take is available.

Cockles recruit to the spawning stocks on Snake Bank at approximately 18 mm shell length. Spat may also be recruited from other areas. At the current harvest size of about >30 mm shell length there is probably a low risk of recruitment overfishing. However the risk of recruitment overfishing increases as the average size of cockles harvested decreases. The annual biomass estimates of cockles > 30 mm shell length show considerable variation from year to year. The absolute recruited biomass of cockles over 30 mm shell length on Snake Bank declined from 1478 t in 1995 to very low levels (<500 t) in 2001 and 2002. The biomass increased substantially to 889 t in 2003 but declined to 546 t in 2004. Because of uncertainty in the stock assessment for COC1 as to the relationship between B_{current} and B_{msy} , it is not known if current catch limits will allow the stock to move towards a size that will support the MSY. While the current TAC is higher than the current range of Current Annual Yield (CAY) estimates, an annual survey is required to monitor the stock while harvesting at this level.

The management objective of this project is to ensure that the TACC for the Snake Bank cockle fishery is sustainable. An annual biomass survey and stock assessment of Snake Bank cockles has been undertaken since 1998. Annual assessments are required, given the TACC and the current range of CAY estimates, to ensure that the catch level for the fishing year following the assessment is sustainable. In the absence of a Fisheries Plan, and while Stock Strategies are being developed, the Ministry will continue with the current management approach for the COC 1A fishery for 2005/06. This management approach is a CAY harvesting strategy requiring an annual estimate of biomass and yield. Managers assess the yield estimates against the TACC (estimates of yield are required for recruited sizes of >30 mm, >28 mm and >25 mm).

This project is feasible using the survey design and methodology as accepted by the Shellfish Fisheries Working Group for previous surveys. Current Annual Yield (CAY) is estimated using Method 1 and the full version of the Baranov Catch Equation in *Annala et. al.* 2003, "Guide to Biological Reference Points for the 2004-2004 Fisheries Assessment Meetings". This project is of high priority to maintain the sustainability of the Snake Bank cockle fishery at the current TACC.

Objective 1

This objective is to undertake a field survey to estimate the size structure and absolute biomass of cockles on Snake Bank during March – April 2006. The target coefficient of variation (c.v.) of the estimate of absolute recruited biomass is 20 %. The sampling methodology would be as for previous surveys.

Objective 2

This objective would undertake a stock assessment and estimate yields for cockles on Snake Bank for the 2005/2006 fishing year. The results of the stock assessment would be used for input into any decisions required to adjust the TAC under the CAY harvest strategy.

Objective 3

Previous attempts to investigate cockle growth have had limited success and growth rate estimates have been unexpectedly low. Accurate growth information is an important input into the stock assessment model currently being developed.

Cost Recovery Information:

The percentage allocation for this project will be attributed to the following Fishstocks according to rule 9 (1) (a) of the Fisheries (Cost Recovery) Rules 2001:

- COC 1A.

The project is estimated to cost between \$0 - \$50,000.

Project: Rock lobster recruitment

Project Code: CRA2005/01

Start Date: 1 October 2005

Completion Date: 31 December 2006

Vessel Use: None

Overall Objectives:

1. To correlate trends in puerulus settlement with trends in abundance for selected rock lobster fisheries.

Specific Objectives:

1. To estimate monthly and annual indices of puerulus settlement at key sites in CRA 3, CRA 4, CRA 5, CRA 7 and CRA 8 (Gisborne, Napier, Castlepoint, Wellington, Kaikoura, Moeraki, Halfmoon Bay, Chalky Inlet, and Jackson Head).
2. To investigate correlation between trends in settlement and trends in stock abundance for at least two rock lobster fishery (CRA) management areas.

Note:

The duration of this project will be 15 months, 1 October 2005 to 31 December 2006. This is to allow the successful tenderers time to present the results from the 12 months sampling (October 2005 to September 2006) to the Fishery Assessment Working Group in late 2006.

Rationale:

General

The rock lobster *Jasus edwardsii* supports the most valuable inshore fishery in New Zealand, with landings of almost 2700 t in 2002-03. Rock lobsters support an important recreational fishery and are also extremely important for traditional and customary users.

Ensuring continuing sustainability and optimum use of this fishery is a major management goal. The National Rock Lobster Management Group (NRLMG) is the primary source of advice to the Minister of Fisheries on rock lobster issues. The NRLMG has developed an overall plan of management for rock lobster fisheries and has oversight and coordination of regional harvest initiatives or Fishery Plans.

Understanding recruitment processes may enhance the timeliness of management interventions for rock lobster stocks, both in terms of interpreting recent changes in the fishery and in predicting trends in future stock abundance. The benefits of prediction of recruitment trends in a rock lobster fishery have been well demonstrated in Western Australia, where more than 30 years of settlement data allow improved financial planning and investment by fishers and processors, and proactive rather than just reactive fisheries management. Using collectors in

sufficient numbers to deal with spatial variability in settlement is the most cost-effective means of measuring puerulus settlement.

Almost every major rock lobster fishery in the world now has in place or is developing a settlement monitoring programme. The way ours was originally constructed (using inexpensive, effective collectors set mostly in shallow waters not requiring scuba for clearance) means that we probably have the most cost-effective system in place anywhere, covering an enormous coastline. Further, in 2002 the project was condensed, ineffective sets being discontinued. The major output is a set of annual indices of puerulus settlement that can be compared with indices of stock abundance.

The main value of the puerulus data to stock assessment and fishery management in New Zealand lies in the relationship between any trends in settlement levels and trends in stock abundance, rather than any year by year correlations. This is because there are many years (about 5-8 for males and 6-11 for females) between settlement and recruitment to the fishery, likely leading to blurring of annual signals.

It is only recently that trends in settlement in the New Zealand rock lobster fishery have become apparent. Further, these trends have become established in fisheries where the settlement signature will be less confounded than it used to be. For example, on the east coast of the North Island and central New Zealand, the fishery is now almost entirely based on newly-recruited males, and in the case of Gisborne, the lobsters are only about 4-5 years old. For Otago, with its lower size limit for most of the season, both males and females are about 4-5 years old at recruitment.

For the east coast of the North Island, and particularly CRA 3, settlement in the early 1990s was the highest recorded, falling in the late 1990s to the lowest, improving from 2000, and recently at about the long-term average. Consistent with this, the CRA 1, 2, and 3 and NSC assessments estimated large recruitment to the stock assessment model size range (32 mm TW) in the early to mid 1990s. Insufficient time has elapsed for the increased settlement from 2000 to register as recruits. For the southeast of the South Island, particularly Otago, there has been very low settlement since the early 1980s but it has improved markedly since 2000, and by 2003 had reached the levels seen on the east coast North Island. A similar, though somewhat muted, trend has been apparent at Halfmoon Bay.

Objective 1

The long-term key sites are Gisborne, Napier, Castlepoint, Wellington, Kaikoura, Moeraki, Halfmoon Bay, Chalky Inlet, and Jackson Bay. Only the most effective and representative collectors are now checked, with increased collector numbers in areas of low settlement. The aim is to check collectors monthly, at least during the main settlement season, leading to an annual index of settlement.

Objective 2

Appropriate spatial and temporal scales for the stock abundance indices will first be determined. Indices of settlement derived in Objective 1 will then be compared with various indices of stock abundance, including overall CPUE, and lobster numbers and CPUE for various size groups, particularly for CRA 3 and CRA 7.

Cost Recovery Information:

The percentage allocation for this project (based on an assessment of research effort according to rule 9 (2) of the Fisheries (Cost Recovery) Rules 2001) is as follows:

- CRA 3 20%;
- CRA 4 20%;
- CRA 5 20%;
- CRA 7 20%; and
- CRA 8 20%.

The project is estimated to cost between \$100,000 — \$150,000.

Project: Foveaux Strait oyster stock assessment

Project Code: OYS2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: Subject to tender

Overall Objectives:

1. To carry out a stock assessment of Foveaux Strait oysters (*Tiostrea lutaria*) in commercial areas of the fishery, including estimating abundance and sustainable yields.

Specific Objectives:

1. To carry out a survey in about January 2006 to determine the distribution and absolute abundance of pre-recruit and recruited oysters in both non-commercial and commercial areas of Foveaux Strait.
2. To estimate the sustainable yield for the areas of the commercial oyster fishery in Foveaux Strait following the survey described in Objective 1.

Note:

The final nature and extent of this project will be determined in consultation with the Bluff Oyster Management Company in 2005, prior to commencement of the survey in early 2006.

Rationale:

General

The Foveaux Strait oyster fishery is a very high value fishery that has been in existence for over 100 years. Commercial annual landings of Foveaux Strait oysters in recent years total around 15 million oysters with a landed value in excess of \$8 million. Recreational and customary fishers take about 1 million oysters annually.

Before 1985, the annual value of this fishery was about \$30 million. Between 1986 and 1992, a *Bonamia exitiosus* epizootic spread from an initial infection of the western beds in central Foveaux Strait to the periphery of oyster distribution. By 1992, the size of the oyster population had been reduced to probably less than 10% of the virgin level, and in 1993, the fishery was closed to allow the population to rebuild. The distribution of *Bonamia* was mapped in 1995, and the size of the oyster population estimated as 679 million oysters in October 1995. This was estimated to be around 39% of the 1975 population size, indicating a recovery since 1992. The fishery was subsequently reopened in 1996. The commercial population size declined from 275 million in October 1999 to 144 million in October 2002.

Dredge oyster populations have been substantially reduced by *Bonamia*. The status of the population is uncertain, but it is most likely to be below a size that will support the maximum

sustainable yield. Furthermore, it is likely to be locally depleted across parts of Foveaux Strait. However, stocks appear to be rebuilding as the current exploitation rate is low in relation to the current surplus production. It is not known if recent catch levels or the current catch limit is sustainable or will allow the stock to move towards a size that will support the maximum sustainable yield.

In the absence of a Fisheries Plan, and while Stock Strategies are being developed, the Ministry will continue with the current management approach for the OYU 5 fishery for 2005/06. This management approach is a Current Annual Yield (CAY) harvesting strategy requiring an annual estimate of biomass and yield.

A range of research was considered for the Foveaux Strait oyster fishery by managers and industry for 2004/05, including the development of a length based stock assessment model, the development of an epidemiological model of oyster mortality due to *Bonamia* and an investigation of the factors influencing *Bonamiosis* in Foveaux Strait oysters. The results of this research will be available in 2005.

In October 2001, all areas with high densities of recruited oysters including the designated commercial areas were found to have a high prevalence of infection from *Bonamia*. Further surveys in January 2002 and March 2002 indicated that *Bonamia* had reduced the commercial population, and by March 2002 it was estimated to be 40–65% of the October 2001 level. CAY estimates in March 2002 (8–45 million oysters) were lower than those made in October 2001 (21–70 million oysters). However, they were within the range of the TACC and the 2002 season with a catch limit of 14.95 million oysters went ahead.

The current management approach for the OYU5 Foveaux oyster fishery is a Current Annual Yield (CAY) harvesting strategy requiring an annual pre-season estimate of biomass and yield of pre-recruit oysters. The project is of high priority in order to set sustainable catch limits for the oyster season March to August 2006.

Objective 1

This objective proposes to undertake a survey to determine the distribution and absolute abundance of pre-recruited oysters in both commercial and non-commercial areas in Foveaux Strait.

Objective 2

This objective will estimate the sustainable yield for the commercial areas in the Foveaux Strait and would incorporate the results from the development of a length based model and an epidemiological model which are objectives for the current project OYS2004/01 Foveaux Strait oyster stock assessment. The results from this current project will be available in 2005, prior to the commencement of this objective.

Cost Recovery Information:

The percentage allocation for this project will be attributed to the following Fishstocks according to rule 9 (1) (a) of the Fisheries (Cost Recovery) Rules 2001:

- OYU 5.

The project is estimated to cost between \$100,000 - \$150,000.

Project: Stock assessment of PAU 5D

Project Code: PAU2005/02

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use:

Overall Objectives:

1. To carry out stock assessments for paua (*Haliotis iris*), in selected fishstocks, including estimating abundance and sustainable yield.

Specific Objectives:

1. To update the stock assessment for PAU 5D, including estimating abundance and sustainable yield, incorporating data from the 2003 dive survey.

Rationale:

General

The paua fishery is a very important commercial fishery with total reported landings for all areas combined around 1100 t. There are also substantial non-commercial fisheries, including customary take, and some illegal harvest. The PAU5D fishery extends around the coastline of Otago and Southland. The 2002/03 landings were 111.69 t (TACC148.81). Based on 2004 port prices the 2002/03 paua landings were worth approximately \$4.8 million. The recreational harvest is estimates to be around 87,000 paua. There is an important customary use for paua as food and for shells. For the 2002 stock assessment for PAUA 5D an estimate of 2505 paua (835) kg was used as the estimate of customary take.

The 2004 Plenary Report on PAU 5D notes that the 2002 stock assessment found that at the 2002 catch levels and minium legal size, the biomass of paua in PAU 5D is likely to decrease further and is unlikely to move towards the reference levels. These results suggest that the current catch level is not sustainable and will likely cause the stock to decrease further from the reference levels of biomass in the next five years (to 2007). The TACC remained at 148.81 t for 2002/03 but landing decreased from 148.74 t in 2001/02 to 111.69 t in 2002/03. The TACC was reduced to 89 t for 2003/04. The last stock assessment for PAU 5D was done in 2002 and requires updating. This project is high priority to provide an updated stock assessment for PAU 5D.

Objective 1

The 2002 stock assessment for PAU 5D indicated that the level of catch was not sustainable and would likely cause the PAU 5D stock to decrease further in the next five years. A staged reduction, over two years, saw the commercial harvest in PAU 5D reduced from 149 tonnes to 89 tonnes.

At that time, MFish proposed to update and review the PAU 5D stock assessment and review the management of the fishery in 2005. This objective would update the stock assessment for PAU 5D using the information obtained from research dive surveys undertaken in 2003. This project would use existing data from the Ministry of Fisheries research database.

Cost Recovery Information:

The percentage allocation for this project will be attributed to the following Fishstocks according to rule 9 (1) (a) of the Fisheries (Cost Recovery) Rules 2001:

- PAU 5D.

This project is estimated to cost between \$0 - \$50,000.

Project: Paua abundance PAU 5A

Project Code: PAU2005/03

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use:

Overall Objectives:

1. Estimate the relative size abundance and size frequency distribution of paua (*Haliotis iris*) in all commercial areas of PAU 5A during the summer of 2005/06 using a fishery independent diver survey.

Specific Objectives:

1. To undertake a dive survey in PAU 5A to determine the distribution and abundance of paua in commercially fished areas.

Note: This project will be subject to a review to be undertaken in 2004/2005 of the utility of research surveys in stock assessment models for paua and recommendations on the design and application of future surveys.

Rationale:

General

The paua fishery is a very important commercial fishery with total reported landings for all areas combined around 1100 t. Paua There are also substantial non-commercial fisheries, including customary take, and some illegal harvest. The PAU5A fishery extends around the Fiordland coastline. The 2002/03 landings were 149.76 t (TACC148.98). Based on 2004 port prices the 2002/03 paua landings were worth approximately \$6.4 million. The recreational harvest used for the 2004 stock assessment was 10 t. There are no estimates of customary harvest for PAU 5A.

A quantitative stock assessment for PAU5A was attempted for the first time in 2004. A key component of the stock assessment model is the use of a standardised index of relative abundance obtained from dive surveys. The results of the stock assessment were not accepted by the Plenary as the reference case represented a compromise between two conflicting data sets: the research dive survey index showed a decline from 1996 to 2002, while CPUE increased during the same period. An additional dive survey was recommended for input into the next stock assessment.

The status of paua stocks is determined by periodic stock assessments using fishery independent dive surveys to assess the abundance and estimate biomass, and catch rate and catch history data. A key component of the methodology for undertaking paua stock assessment is measuring relative abundance using dive surveys and interpretation of CPUE. The relative abundance of paua has been measured in recent years using a timed-swim

method where two 10 - minute searches are done at each site by divers using surface-supplied air. Divers search reef habitat from low water to 10m depth and count all paua found, measuring the first 4 in each separate patch. Dive surveys have been completed in most paua stocks but at lengthy intervals. The coverage in some stocks is also quite limited which means that the surveyed areas may not be representative of the whole area. A review of the dive survey programme is required to determine the utility of this approach to monitor paua stocks. This review would be undertaken in 2005 as a separate project, and this project (PAU2005/01) would not be undertaken until this review is completed and reviewed by the Shellfish Fisheries Working Group.

This is a high priority project required to update the stock assessment for PAU 5A that will be required in 2006/07 (subject to the review of research dive surveys). This stock assessment could not be made without the data on abundance and size structure from a recent dive survey.

Objective 1

This objective would undertake a dive survey to determine the abundance of paua in commercially fished areas. The survey area would areas surveyed in the 2002 survey, and additional areas. The dive survey would use a standard methodology that has been employed in all previous paua diver surveys. The relative abundance of paua would be measured using a timed-swim method where two 10 - minute searches are done at each site by divers using surface-supplied air. Divers search reef habitat from low water to 10m depth and count all paua found, measuring the first 4 in each separate patch. The proposed survey will allow manages to assess the size structure of the stock and the numbers of paua that could be expected to recruit into the fishery. The results from this survey would be used to revise the stock assessment model for PAU 5A in 2006/2007.

Cost Recovery Information:

The percentage allocation for this project will be attributed to the following Fishstocks according to rule 9 (1) (a) of the Fisheries (Cost Recovery) Rules 2001:

- PAU 5A.

This project is estimated to cost between \$150,000 - \$200,000.

Project: Stock assessment of Coromandel scallops

Project Code: SCA2005/01

Start Date: 1 October 2005

Completion Date: 31 March 2006

Vessel Use: Subject to tender

Overall Objectives:

1. To carry out a stock assessment of scallops (*Pecten novaezelandiae*) in the Coromandel fishery, including estimating abundance and sustainable yields.

Specific Objectives:

1. To carry out a survey in about May/June 2006 to estimate the absolute abundance and population size frequency of scallops in the main scallop beds. The target coefficient of variation (c.v.) of the estimate of absolute recruited abundance is 20 %.
2. To estimate yield following the completion of the survey described in Objective 1.

Note:

The duration of this project will be 18 months, from 1 October 2005 to 31 March 2007. The project will only proceed following consultation (including the timing of any survey) with commercial stakeholders in about April 2006.

Rationale:

General

The Coromandel scallop fishery is a small but highly valued fishery to commercial, and recreational fishers. Coromandel scallops were introduced into the QMS on 1 April 2002. 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, fishers preferring self-tipping “box” dredges to the “ring bag” designs used in Challenger and Chatham Island fisheries. The 2002 scallop season landings were 400 t greenweight and 35 t meatweight. Based on the 2004 port price, the 2002 meatweight landings were approximately \$560,000.

Recreational fishing for scallops 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.

Scallops are valued as a customary fishery but there is quantitative information on the level of customary harvest.

A wide variety of effort controls and daily catch limits have been imposed in the past, but the fishery has, since 1992, been limited by explicit seasonal catch limits specified in meatweight (adductor muscle with roe attached), together with some additional controls on dredge size, fishing hours and non-fishing days. Catch and catch rates from the Coromandel fishery are variable both within and among years, a characteristic typical of scallop fisheries worldwide. Catch rates typically decline as each season progresses, but such declines are highly variable and depletion analysis cannot be used to assess start-of-season biomass.

Until the 1994 season (15 July to 21 December each year), the minimum legal size for scallops taken commercially in northern scallop fisheries was 100 mm shell length. From 1995 onwards, a new limit of 90 mm shell length has applied. Since 1980 when the fishery was considered to be fully developed, landings have varied more than 30-fold from less than 50 t to over 1500 t (greenweight). The two lowest recorded landings were in 1999 and 2000.

In the absence of a Stock Strategy or a Fisheries Plan for the Coromandel scallop fishery, the current harvest strategy is a Current Annual Yield (CAY) strategy, which 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 CS is 22t. The current management approach 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.

The research is of high priority in order to set sustainable catch limits for the 2006 Coromandel scallop fishing season.

Objective 1

This objective proposes to undertake a survey to determine the distribution and absolute abundance of pre-season scallops in commercial areas of the Coromandel scallop fishery.

Objective 2

This objective will estimate yield following the completion of the survey described in Objective 1.

Cost Recovery Information:

The percentage allocation for this project will be attributed to the following Fishstocks according to rule 9 (1) (a) of the Fisheries (Cost Recovery) Rules 2001:

- SCA CS.

The project is estimated to cost between \$0 - \$50,000.

Project: Stock assessment of Northland scallops

Project Code: SCA2005/02

Start Date: 1 October 2005

Completion Date: 31 March 2007

Vessel Use: Subject to tender

Overall Objectives:

1. To carry out a stock assessment of scallops (*Pecten novaezelandiae*) in the Northland fishery, including estimating abundance and sustainable yields.

Specific Objectives:

1. To carry out a survey in about May/June 2006 to estimate the absolute abundance and population size frequency of scallops in the main scallop beds. The target coefficient of variation (c.v.) of the estimate of absolute recruited abundance is 20 %.
2. To estimate yield following the completion of the survey described in Objective 1.

Note:

The duration of this project will be 18 months, from 1 October 2005 to 31 March 2007. The project will only proceed following consultation (including the timing of any survey and areas to be surveyed) with commercial stakeholders in about April 2006.

Rationale:

General

The Northland scallop fishery is a small but highly valued fishery to commercial, and recreational fishers. Scallops were introduced into the QMS on 1 April 2002. They support regionally important commercial fisheries between Tauranga and Cape Rodney, the limits of the 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, fishers preferring self-tipping “box” dredges to the “ring bag” designs used in Challenger and Chatham Island fisheries. The 2002 scallop season landings were 400 t greenweight and 35 t meatweight. Based on the 2004 port price, the 2002 meatweight landings were approximately \$560,000.

Recreational fishing for scallops 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.

Scallops are valued as a customary fishery but there is quantitative information on the level of customary harvest. Scallops support regionally important commercial fisheries and an intense non-commercial interest off the northeast coast of the North Island. All commercial fishing is by dredge and self-tipping “box” dredges are preferred to the ring bag designs in common use in southern fisheries.

Fishing in the Northland 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.

The Northland fishery is managed under the QMS using individual transferable quotas (ITQ) that are proportions of the Total Allowable Commercial Catch (TACC). The season runs from 15 July to 14 February. The minimum legal size (MLS) for scallops for commercial fishers is 100 mm.

Recreational fishing is undertaken in suitable areas throughout the area, mostly in enclosed bays and harbours.

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.

In the absence of a Fisheries Plan, and while Stock Strategies are being developed, the management and stock assessment approach for Northland scallops is a Current Annual Yield (CAY) management strategy, with annual 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. Target harvest levels based on the estimate of MCY are not the most optimal management strategy for this fishery.

The TACC for SCA 1 is 40 t. However, the current management approach 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 during the fishing year.

The research is of high priority in order set sustainable catch limits for the 2006 Northland scallop fishing season.

Objective 1

This objective proposes to undertake a survey to determine the distribution and absolute abundance of pre- season scallops in commercial areas of the Northland scallop fishery.

Objective 2

This objective will estimate yield following the completion of the survey described in Objective 1.

Cost Recovery Information:

The percentage allocation for this project will be attributed to the following Fishstocks according to rule 9 (1) (a) of the Fisheries (Cost Recovery) Rules 2001:

- SCA 1.

The project is estimated to cost between \$0 - \$50,000.

Project: Estimating the abundance of scampi

Project Code: SCI2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: Subject to tender

Overall Objectives:

1. To estimate the abundance of scampi (*Metanephrops challengeri*).

Specific Objectives:

1. To estimate the relative abundance of scampi using photographic techniques in SCI 2.
2. To update and revise the stock assessment model for SC1, including estimating biomass and yield.
3. To start the development of a stock assessment model for SC2.

Note:

The specification of SCI 2 for Objective 1 will be confirmed subject to the results of the current project *SCI2004/01 Measuring the abundance of scampi*, in conjunction with managers, industry and the Shellfish Fishery Assessment Working Group

Rationale:

General

The scampi fishery is based on the species *Metanephrops challengeri*, which is widely distributed around New Zealand. The total scampi landings in 2002/03 were 861 t (limit 1137 t). Based on the 2004 port price the total scampi fishery was worth approximately \$16 million. Scampi were introduced into the QMS on 1 October 2004 with TACCs for each stock totalling 1291 t. An allowance of 65 t was made for other sources of mortality. Scampi are taken by light trawl gear, which catches the scampi that have emerged from burrows in the bottom sediment. The main fisheries are in waters 300 - 500 m deep. The fishery has developed into an important commercial fishery with total reported landings for all areas combined around 1000 t. Little is known about the growth rate and maximum age of scampi. Available information is that scampi are quite long lived.

Given the biology of the species and distribution, the recreational and customary fishery is assumed to be non-existent.

Current stock assessments are based of Fisheries Management Areas (FMAs). For FMAs 1, 2, 3, 4, 6A and 6B it is not known if current catch limits are sustainable in the long term or will allow the stock to move towards the size that will support the maximum sustainable

yield. There are no reliable estimates of virgin biomass (B_0) or the biomass that will support the MSY (B_{MSY}) for any scampi stock.

This project is required for setting sustainability measures (TACs and TACCs) for the scampi in SCI 1 and SCI 2. Additional research but not part of this project, is required for refining the sustainability measures for other scampi stocks. Estimates of scampi abundance are based on CPUE and trawl surveys indices and, more recently, on photographic surveys of scampi burrows. Indices of relative abundance of scampi were originally based on standardised or unstandardised CPUE analyses (for all fished areas), and from random stratified trawl surveys (FMAs 1 and 2). These indices were sensitive to changes in catchability caused in part by the cryptic behaviour of scampi. To address these problems photographic techniques have been developed to estimate the relative abundance of scampi. Photographic surveying has been used extensively to estimate the abundance of the European scampi, *Nephrops norvegicus*. Beginning in 1998, five photographic surveys have been undertaken in FMA 1, two in FMA2 and two in FMA3.

To-date, data from four surveys in FMA 1 have been analysed (analysis of the data from the fifth survey has not been completed), and analysis of data has been completed for one survey in QMA 2. Two indices are estimated from these surveys: the density of visible scampi (as an index of minimum absolute abundance), and the density of major burrow openings. The two indices (estimated from the core area of QMA 1 in 1998, 2000, 2001, and 2002) show different trends. The estimated abundance of visible scampi decreased from 28 million in 1998 to 12 million in 2001 before rising slightly to almost 15 million in 2002 (this trend is similar to that of unstandardised CPUE in QMA 1). Conversely, the estimated abundance of major burrow openings decreased from 155 million in 1998 to about 97 million in 2000, then increased to around 130 million in 2001 and 2002, and there seems little trend in this index.

Current catch rates in QMA's 1, 2, 6A and 6B are among the lowest recorded. The use of these indices in stock assessments has been questioned because of concerns that changes in these indices may be strongly influenced by changes in catchability caused by the behaviour of scampi rather than by changes in abundance.

A reliable stock assessment and subsequent determination of the status of the stock in relation to the B_{MSY} is not possible for any scampi stock. In the absence of a Fisheries Plan, and while Stock Strategies are being developed, the management and stock assessment approach for scampi is to develop a time series of relative abundance indices for scampi QMAs in an effort to better understand the status of scampi in each fish stock, and to develop a model for a quantitative stock assessment. A preliminary stock assessment model for FMA1 has been developed but it requires further refinement with the addition of additional data. Photographic surveys of scampi burrows are required on an annual basis for selected scampi stocks to provide indices of relative abundance.

This research project is of high priority given current state of the scampi fishery in SCI 2.

Objective 1

This objective will undertake a photographic survey to estimate the relative abundance of scampi in SCI 2. The SCI 2 fishery is the second largest trawl fishery for scampi (TACC 200 t). Unstandardised CPUE has declined since 1994/95 and in 2002/03 was about 37% of that in 1988/89, the lowest recorded since the start of the fishery in 1998/89. It has previously been

established that an ongoing time series of abundance estimates derived from photographic surveys for the major scampi stocks is an important component in the stock assessment of scampi. A photographic survey SCI 2 will provide a fourth index of abundance and will be sufficient for input into a stock model being developed for SCA 2 (Objective 3). This objective is feasible and will use the photographic survey methodology previously employed and presented to the Shellfish Fisheries Working Group.

Objective 2

This objective would update and revise the stock assessment model for SCI 1, using the five photographic indices available. A stock assessment model was initiated for SCI 1 in 2003/04. The model requires updating and revision using the results from project *SCI2004/01 Measuring the abundance of scampi*. It is expected that a number of iterations of the model will be required over time before it can be accepted as a reliable indicator of current and projected stock status.

Objective 3

This objective is designed to begin the development of a stock assessment model for scampi in SCI 2. There are currently three photographic biomass indices for scampi in SCI 2. The work to date on the development of a model for scampi in SCI 1 will assist in the development of the SCI 2 model. However given the difficulties in developing a stock assessment model for scampi the development of a model for SCI 2 will probably require several iterations over time.

Cost Recovery Information:

The percentage allocation for this project will be attributed to the following Fishstocks according to rule 9 (2) of the Fisheries (Cost Recovery) Rules 2001:

- Objective 1 Scampi SCI 2;
- Objective 2 Scampi SCI 1; and
- Objective 3 Scampi SCI 2.

The project is estimated to cost between \$200,000 - \$600,000.