INSHORE FINFISH & FRESHWATER EEL FISHERIES

PROPOSED PROJECTS FOR 2005/06

Code	Title	Priority
BCO2005/03	Characterisation of the blue cod fishery in BCO 4	High
BNS2005/01	Validation of growth zones in bluenose otoliths	High
EEL2005/01	Monitoring commercial eel fisheries	High
FLA2005/01	Productivity of yellow belly flounder	High
GUR2005/01	Monitoring GUR 1	High
GUR2005/02	Relative abundance of red gurnard in GUR 2	High
INS2005/01	Monitoring the length and age structure of commercial landings of alfonsino, gemfish, and rubyfish in QMA 2	High
INS2005/02	To estimate relative abundance of GUR, JDO, TAR and other inshore stocks around northern New Zealand	High
JDO2005/01	Monitoring JDO1	High
SNA2005/02	Estimation of snapper year class strength in SNA 1	High
SNA2005/03	Estimation of snapper year class strength in SNA 8	High
SPD2005/01	Relative abundance of spiny dogfish in SPD 3 and 5	High
SPE2005/01	Characterisation of Chatham Rise sea perch Fisheries	High
TAR2005/01	Monitoring the length and age structure of commercial landings of tarakihi in TAR 1	High

Project: Characterisation of the blue cod fishery in BCO 4

Project Code: BCO2005/03

Start Date: 1 October 2005

Completion Date: 30 September 2006

Overall Objectives:

1. To monitor or assess the status of the blue cod (*Parapercis colias*) BCO 4 Fishstock.

Specific Objectives:

1. To characterise the BCO 4 fishery by analysing existing commercial catch and effort data and make recommendations on appropriate methods to monitor or assess the status of this Fishstock.

Rationale:

General

BCO 4 supports the second largest commercial fishery for blue cod. The BCO 4 catch is taken largely by a target fishery using cod pots. Reported landings have increased from 192 t in 1983 to 721 t for the 2002/03 fishing year. Catches have exceeded 600 t for the last three fishing years and it is not known whether these catches are sustainable. Currently MFish does not have a reliable means to monitor the BCO 4 Fishstock. This project is therefore given high priority.

Objectives 1

This project will characterise the BCO 4 fishery by analysing available data and provide recommendations on information needs and/or appropriate methods to monitor or assess the status of this Fishstock. Given the resident nature of blue cod and possible spatio/temporal trends in effort, it will be necessary to investigate separate standardized CPUE indices of abundance for each of the four main statistical areas in BCO 4: 049-052.

Cost Recovery Information:

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

- BCO 4.

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

Project: Validation of growth zones in bluenose otoliths

Project Code: BNS2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To validate bluenose ages determined from otoliths using radiocarbon techniques.

Specific Objectives:

1. To obtain radiocarbon (14C) values from the cores of selected bluenose otoliths.

2. To compare these values (as ages) with ages derived from conventional zone counts and to develop a reliable aging protocol for this species.

Note:

MAFRI have measured radio carbon levels in one otolith from each pair of a set of bluenose otoliths. NIWA and SeaFIC are currently attempting to obtain the otolith section and the core reading from each pair. This project will only proceed if they are either unsuccessful or additional samples are required.

Rationale:

General

Targeted and bycatch bluenose landings are ~2500 t annually. The bycatch of bluenose is taken as a component of multi-species trawl fisheries (alfonsino, rubyfish, etc.) and line fisheries (hapuku, bass, ling, etc.). Such fisheries are difficult to monitor by CPUE, and any stock declines (and TACC reductions) have a flow-on effect to the other species.

Given the drawbacks of commercial CPUE as an index of bluenose abundance, greater emphasis has been placed on using the age structure of the catch to monitor bluenose stocks. BNS 1, 2, 3, 7 & 8 are managed under the AMP and although otoliths are being collected, these will only be aged once a validated ageing protocol has been established.

Bluenose have proved extremely difficult to age in both New Zealand and Australia using the standard procedure of counting growth zones. Growth checks usually irregular in appearance, being variably broad, narrow, clear, faint, and split. All readers now count most visible zones, obtaining maximum ages of 30–35 years. If apparently split rings were counted singly, higher ages would be obtained. (The highest reported age in Australia, when split rings *may* have been counted singly, is 49).

There have been two previous validation attempts using the bomb radiocarbon (^{14}C) chronometer procedure. An Australian (ANU/MAFRI) study using otolith cores found a discrepancy between radiocarbon and zone count ages that suggested the latter (at 30–35) were too low. The zone age:otolith weight relationship also strongly suggested zone ages for larger fish were too low. A New Zealand (MFish/NIWA) study using within-otolith sequences of radiocarbon values gave very similar results; i.e. a discrepancy (or offset) of radiocarbon and zone count ages that implied either that the latter were too low, or that there was a radiocarbon time-lag-with-depth problem. The agreement between the Australian and New Zealand results suggests that under ageing is more likely.

In both studies, the predicted rise in radiocarbon level was detected (although delayed), indicating that radio carbon methods can be used to validate bluenose ages. The problem with the previous study using otoliths cores is that the predicted radio carbon curve – ie that based on ages estimated from growth zones – was constructed using one ageing protocol. Alternatives were unfortunately not tested, and the "time lag" in the predicted rise in radio carbon indicates that the ageing protocol underestimated age.

The purpose of this study is to use core radio carbon levels to derive an ageing protocol for bluenose otoliths so that this species can be effectively aged and monitored. This study differs from the Australian one in that curves constructed using alternative ageing protocols will be compared with a validated curve for inshore/surface waters off New Zealand.

Given that monitoring of bluenose fisheries is largely dependant on the development of an ageing protocol this project is given high priority.

Objectives 1 and 2

Bluenose otoliths should be selected from archived collections with expected birth-dates spanning the period when radio carbon in surface waters rose and later declined i.e.1950–1990. Radio carbon curves generated for each competing ageing protocol should then be compared with the validated radiocarbon curve determined for surface/inshore waters in New Zealand from snapper otoliths (Kalish 1993).

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:

- all BNS.

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

Project Title: Monitoring commercial eel fisheries

Project Code: EEL2005/01

Start Date: 1 October 2005

Completion Date: 30 December 2006

Vessel Use: None

Overall Objectives:

1. To monitor size and species composition of commercially processed eels.

Specific Objectives:

1. To monitor size and species of eels by recording quantities in the different commercial size grades and link this to catch location.

Note:

This project is subject to a review of *EEL2004/02 - Monitoring commercial eel fisheries*.

Rationale:

General

The commercial eel fishery is a moderate volume fishery of around 850 t per year spread throughout the North and South Islands, and the Chatham Islands. The fishery targets both species of eel found throughout New Zealand, the shortfin *Anguilla australis* and the longfin *A. dieffenbachii*. The South Island fishery was introduced into the QMS in October 2000, the Chatham Island fishery in October 2003, and the North Island fishery from 1 October 2004. The combined South Island landings for the 2002/03 fishing year were 295.61 t (combined TACC 420.10 t). Based on the 2004 port price (ANG $3.50/kg), the South Island landings were worth around $1.03 million. North Island landings totalled 554.8 t, valued at approximately $1.94 m.

There are no estimates of recreational harvest at the level of the stock. Recreational harvest is limited to a daily bag limit of six eels. Eel are highly valued by Maori. Historically eels constituted a very important food source. There is no quantitative assessment of the current level of customary harvest. For the introduction of North Island eel stocks into the QMS from 1 October 2004 an allowance of 120 tonnes has been made for customary use and 95 tonnes for recreational harvest.

It is not known if the current catch levels and TACs (North Island TACs effective from 1 October 2004) for either species are sustainable or at levels that will allow the stock to move to towards a size that will support the MSY. TACs for North Island eel stocks have been set under s 14 of the Fisheries Act 1996 that allows TACs to be set using an alternative management strategy where the application of an MSY approach is not applicable to a particular fish stock. Eel stocks are severely impacted by other anthropogenic (non-fishing)

activities including habitat destruction and modification, blockage to upstream fish passage and direct mortality through the effects of hydro-electric turbines and drainage clearance. MCY cannot be readily estimated for each eel stock because of the inability to include estimates of non-fishing mortality and the division of a single biological stock into several management units.

Conventional stock assessment techniques are difficult to apply to eels because of their biology and stock structure. In the absence of stock strategies or Fisheries Plans, the management approach is to ensure spawning escapement, particularly for longfin eels that are more susceptible to over exploitation because of their limited geographical distribution and longevity compared to shortfins. This approach has been put into effect by assessing the contribution areas closed to fishing make to spawning escapement, monitoring recruitment, and monitoring the species composition and size of eels taken by the commercial fishery.

Commercial catches of eels were sampled in both the North and South Islands over three consecutive seasons from 1995–96 to 1997–98 and again in 1999–2000 and 2003–04 (South Island only). The results showed that the size, and sex composition of longfins has been substantially altered compared to the shortfin in some areas since the beginning of commercial fishing in the 1960s. In particular there was an absence of larger longfin females from the main fisheries suggesting there was little, if any, spawning escapement of longfin females from these areas. The eel fishing industry accepted that these areas contributed little to spawning escapement but that larger longfin females were present in other parts of the fishery. Tracking the size grades of eels processed would demonstrate that larger eels were consistently being caught and that there was no decline in the fishery of larger female longfin eels.

A pilot programme was conducted in the North Island in 2003–04 (EEL2002/04) to monitor size of eels by recording quantities and species of eels in the different commercial size grades in four processing factories, and linking these to discrete catchment-based areas (subsets of Eel Statistical Areas (ESAs)). The preliminary results (October 2003 – April 2004) have been promising and data have been compiled from virtually all landed catch throughout the North Island over this 7-month period. A follow up project EEL2004/02, will extend the trail project EEL2002/04 to provide a two-year data set on the size and species composition of eels processed through processing facilities.

Eel processors have been fully supportive of the size grade monitoring programme and linking catches to catchment based areas. Current catch reporting requirements by Catch Effort Landing Returns (CELRs) do not provide sufficient spatial detail that could be useful to monitor landing by sub-area, although the form and coding system has been designed to allow for this detail in the future. In future additional coding and sub-area definition could be specified to capture the catchment based areas and the monitoring programme based on the current model could be undertaken directly by the eel industry through the standard reporting regime. In the absence of such arrangements the eel processors fully support the current monitoring programme.

This project is part of an ongoing monitoring programme to track the size grades of eels being processed through eel processing factories. This monitoring will monitor the total New Zealand commercial catch and specifically track the largest size grade of eels comprising female longfin eels. Catches can be related to specific catchments. The project is high priority to maintain the continuity of the monitoring.

Objective 1

This objective would continue a programme on monitoring the size grades and species of eels processed through eels processing facilities according to the location of catch. This will develop a three-year time series of data on eel size grades according catch location for the North Island, and a two-year time series for the South Island.

Cost Recovery Information:

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

- all ANG, SFE and LFE.

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

Project: Productivity of yellow belly flounder

Project Code: FLA2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To determine the productivity of species comprising the flatfish (FLA) group.

Specific Objectives:

1. To determine age and growth of yellow-belly flounder (*Rhombosolea leporina*).

Rationale:

General

The flatfish ITQ provides for the landing of eight species of flatfish. These are: the yellow-belly flounder, *Rhombosolea leporina*; sand flounder, *R. plebeia*; black flounder, *R. retiaria*; greenback flounder, *R. tapirina*; lemon sole, *Pelotretis flavilatus*; New Zealand sole, *Peltorhamphus novaezeelandiae*; brill, *Colistium guntheri*; and turbot, *C. nudipinnis*. For management purposes landings of these species are combined.

The flatfish fishery is mainly confined to the inshore domestic trawl fleet except for small incidental by-catch of soles, brill and turbot by deepwater trawlers, and some localised set-netting, particularly in the north of New Zealand.

There are important recreational fisheries, mainly for the four flounder species, in most harbours, estuaries, coastal lakes and coastal inlets throughout New Zealand. In 1996 the recreational catch was estimated to be about 200 t. Quantitative information on the current level of Maori customary take is not available.

Flatfish TACCs have purposely been set at high levels so as to provide fishers with the flexibility to take advantage of the inherent variability associated with annual flatfish abundance. For this reason TACCs are not be expected to be reached each year. The current TACC of 6670 t was introduced in the 1990/91 fishing year. TACs were originally set at the level of the sum of the provisional ITQs for each fishery. A minimum size limit provides protection for spawning fish before they recruit into the fishery. Since 1992/93, total flatfish landings have fluctuated between about 3000 t and 5000 t per year.

There is little information on the individual species of flatfish. In general, New Zealand flounders are known to be fast growing and short-lived, generally only surviving to 3–4 years of age, with very few reaching 5–6 years. Project FLA2000-01 examined the productivity of turbot and brill to test the assumption that these species are as productive as the other flatfishes.

The research showed that turbot and brill grow rapidly for the first 3 years of life, but thereafter growth slows down appreciably. Maximum observed ages were 21 years for brill and 16 years for turbot. Lemon sole is being examined in project FLA2002-02. The purpose of the research series is to evaluate whether flatfish should be managed as a single complex. Depending on the results it may be necessary to separate long and short-lived species.

Two previous studies have investigated age and growth of yellow belly flounder using whole otoliths (Colman 1974, Mutoro 2001). However, as has been demonstrated for turbot, brill and New Zealand sole, whole otoliths may lead to gross underestimates of age. It is therefore necessary to compare growth zones in whole and sectioned otoliths of large yellow belly flounder.

The initial aim was to complete a productivity study on one flatfish species every year, until all had been covered. Given that no study was proposed for the 2004/05 fishing year, this project is given high priority.

Objective 1

This project is the sixth in a series examining the productivity of the flatfish species that make up the FLA group. Managers will use the information to assist gauge the risks associated with managing eight flatfish species in one management group.

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:

- all FLA.

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

Project: Monitoring GUR 1

Project Code: GUR2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To characterise the red gurnard (*Chelidonichthys kumu*) fishery in GUR 1 and to make recommendations on the use of standardized commercial CPUE to monitor abundance.

Specific Objectives:

1. To characterise the GUR 1 fishery by analysing existing commercial catch and effort data and data from other sources; and to make recommendations on appropriate methods to monitor or assess the status of this Fishstock.

Rationale:

General

Red gurnard is an important component of the inshore mixed species bottom trawl fishery in GUR 1; catches have ranged between 927 and 1629 t over the last decade. Red gurnard is also an important recreational species with the annual catch from GUR 1 estimated to be 188-256 t during the 1999/2000 survey.

Relative abundance of GUR 1 was previously monitored using trawl surveys targeting juvenile snapper in the Hauraki Gulf, Bay of Plenty and west coast of the North Island. With the recent focus on tagging surveys to provide estimates of abundance for SNA 1 and SNA 8, the future of these surveys is uncertain. The last trawl survey in each series was conducted in 2000 in the Hauraki Gulf and in 1999 for the other two areas.

Currently MFish does not have reliable means to monitor the abundance of the GUR 1 Fishstock. The purpose of this project is to characterise the GUR 1 fishery and to develop the best possible index of abundance based on standardized commercial CPUE, including data up to the 2004/05 fishing year. If successful the index will be updated every three years and used in conjunction with the age structure of the catch (2-3 years in every 5), to monitor the fishery.

As MFish does not have a monitoring tool for GUR1, this project is given high priority.

Objective 1

Red gurnard occurring off the east and west coasts of GUR 1 appear to comprise separate stocks, so independent indices will probably be necessary. Owing to complexities and

limitations of the MFish catch and effort database, methods used to groom data prior to standardization can have a large influence on both the amount of usable data and on the quality of the abundance index. Potential science providers will need to take cognisance of recent progress in data grooming procedures developed for standardising catch and effort for species taken in mixed species and/or bycatch fisheries (e.g. SeaFic 2003 AMP proposals).

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:

- GUR 1.

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

Project: Relative abundance of red gurnard in GUR 2

Project Code: GUR2005/02

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To monitor the abundance of red gurnard (*Chelidonichthys kumu*) GUR 2 using Catch and Effort data.

Specific Objectives:

1. To update the standardised CPUE indices for GUR 2 using data up to the end of 2004/2005.

Rationale:

General

Red gurnard are a major by-catch of inshore trawl fisheries in most areas of New Zealand. Up to 15% of the total red gurnard catch is taken by longline and setnet. Target fisheries for red gurnard are known in Pegasus Bay, off Mahia (GUR 2) and off the west coast South Island. Red gurnard is also a minor by-catch in the jack mackerel trawl fishery in the South Taranaki Bight.

Reported landings from GUR 2 ranged between 469 and 663t over the last decade. Relative abundance of this Fishstock is monitored using the age structure of the catch (2-3 years in every 5) and an index of abundance based on standardized CPUE from bottom trawls targeting FLA 2, TAR 2 and GUR 2 (updated every 3 years). The previous CPUE analysis updated the series to 2000/01 and produced a gradually declining trend. The purpose of this project is to update the standardized cpue index for GUR 2 to the end of the 2004/05 fishing year. In terms of the three year cycle the analysis proposed has already been delayed by one year. This project is therefore given high priority.

Objective 1

Owing to complexities and limitations of the MFish catch and effort database, methods used to groom data prior to standardization can have a large influence on both the amount of usable data and on the quality of the abundance index. Potential science providers should therefore take cognisance of recent progress in data grooming procedures developed for standardising catch and effort for species taken in mixed species and/or bycatch fisheries (e.g. SeaFic 2003 AMP proposals).

Cost Recovery Information:

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

- GUR 2.

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

Project: Monitoring the length and age structure of commercial landings of alfonsino, gemfish, and rubyfish in QMA 2

Project Code: INS2005/01

Start Date: 1 October 2005

Completion Date: 31 March 2008

Vessel Use: None

Overall Objectives:

1. To determine the length and age structure of the commercial catch of alfonsino (*Beryx splendens*), gemfish (*Rexea solandri*) and rubyfish (*Plagiogeneion rubiginosum*) in QMA 2.

Specific Objectives:

1. To conduct sampling in fish processing sheds and determine the length and age composition of the commercial catch of alfonsino in BYX 2, gemfish in SKI 2, and rubyfish in RBY 2 during the 2005/06 fishing year. The target coefficient of variation (c.v.) for the catch at age is 30 % (mean weighted c.v. across all age classes).

2. To conduct sampling in fish processing sheds and determine the length and age composition of the commercial catch of alfonsino in BYX 2, gemfish in SKI 2, and rubyfish in RBY 2 during the 2006/07 fishing year. The target coefficient of variation (c.v.) for the catch at age is 30 % (mean weighted c.v. across all age classes).

3. To estimate fishing mortality for BYX 2 and to evaluate this quantum based on Per-recruit analysis.

Note:

This project continues the time series of length and age determined for alfonsino, gemfish and rubyfish in QMA 2 (refer to projects INS9801, INS1999/01 and INS2000/01).

The duration of this project will be 30 months, from 1 October 2005 to 31 March 2008. This is to allow the successful tenderer time to analyse the results from sampling over the entire 2006/07 fishing year and report their findings to the Inshore Fishery Assessment Working Group during February-March 2008.

Rationale:

General

Alfonsino and rubyfish are important Inshore target and bycatch species in QMA 2, where current landings of each of these species are among the highest around the country.

Alfonsino has supported a major mid-water target trawl fishery off the southern east coast of the North Island since 1983 and is a minor bycatch of other trawl fisheries around New Zealand. Reported BYX 2 landings have fluctuated between 1252 and 1868 t since 1986/86.

Rubyfish catches were first reported in the early 1980s. In 1990/91, 250 t was landed, mainly as bycatch in trawl fisheries for alfonsino, gemfish, barracouta, hoki and jack mackerel. Since 1992/93 annual total landings of RBY 2 have fluctuated between 233 and 500 t. The level of targeting on rubyfish has increased in recent years, especially by mid-water trawlers.

Gemfish supports target mid-water trawl fisheries off the eastern and northern coasts of New Zealand. The combined TACCs for the SKI 1 / SKI 2 stock has been reduced in the past as stock assessments have indicated that the stock was declining in abundance. Based on the 2003 stock assessment the stock is most likely to be below the level that will support the MSY but increasing in abundance at current catch levels. Future research requirements are i) ongoing catch at age sampling from the commercial fisheries to monitor year class strength to ensure that poor recruitment does not result in further declines in abundance; and ii) periodic updates of CPUE analyses to allow the stock assessment to be updated.

MFish does not have reliable indices of abundance for alfonsino or rubyfish with the result that BYX 2 and RBY 2 are monitored by measuring the age structure of the catch for the first two to three consecutive years in every 5-year-cycle. The latest shed sampling programme in both cases covered the fishing years 1998/99, 1999/00, 2000/01 (INS 1998/01, 1999/01 & 2000/01). The next sampling programme should have been conducted over the 2003/04 and 2004/05 fishing years, but was postponed in favour of BYX 3 sampling. Owing to the previous delays shed sampling of BYX 2 and RBY 2 in 2005/06 and 2006/07 is given high priority.

Objectives 1 & 2

The proposed catch sampling and ageing will provide length and age structure information for alfonsino, gemfish and rubyfish catches from the longline and mid-water trawl fisheries operating within QMA 2. These data are mainly used to estimate year class strengths which will be used in the stock assessments.

Objective 3

Full stock assessment for alphonsino is at this stage not realistic. Apart from the lack of an index of abundance, alfonsino have a circumglobal distribution and there is no information on the source of recruits to the NZ EEZ. Yield-per-recruit analyses would, however, provide some information on F required to maximise yield from recruiting cohorts. Fishing mortality (F) is to be estimated from the age structure of the catch (Objectives 1&2) using either catch curves or the Chapman and Robson method.

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:

- BYX 2;
- RBY 2; and
- SKI 2.

The project is estimated to cost between $200, 000 - $250,000.

Project: To estimate relative abundance of GUR, JDO, TAR and other inshore stocks around northern New Zealand

Project Code: INS2005/02

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To assess the feasibility of a northern New Zealand trawl survey series to monitor stock abundance in key areas for GUR, JDO, TAR and other stocks by undertaking a desktop study.

Specific Objectives:

1. Collate commercial catch data, and identify the main spatial areas of catch for JDO, GUR, TAR and other selected species around northern New Zealand (Cape Egmont – East Cape).

2. To determine whether 'cost-effective' abundance indices can be derived for JDO, GUR, TAR and other selected species around northern New Zealand by sampling only higher abundance sub-areas using a trawl survey.

Rationale:

General

Relative abundance of the northern stocks of John dory and red gurnard have been monitored since the early 1980's using trawl surveys of the West Coast North Island (WCNI), Hauraki Gulf (HAGU), and Bay of Plenty (BOP). Tarakihi have also been monitored since 1996 on the WCNI. Three trawl surveys of the east coast of Northland (ECNI) were also carried out in the early 1980s. Snapper were the primary target for all these surveys, but with the recent move towards using tagging programmes for monitoring snapper these trawl survey series have been discontinued. As a result, there is now no means of obtaining fishery independent indices of stock abundance for JDO, GUR and TAR, as well as other species (e.g., juvenile trevally on the WCNI).

A catch sampling program is currently in place for JDO and GUR around northern New Zealand and there is a proposal to add TAR. These data will provide important information on the size and age composition of the catch, which will be useful for estimating fishing selectivity and year class strengths. However, to use these data in a stock assessment model to estimate biomass and yields requires a time series of abundance indices. Catch per unit effort analyses have been carried out for these species in the past, but there are no recent fishery independent surveys to determine whether these CPUE indices are monitoring abundance.

This project will examine the feasibility of using a new 'northern' trawl survey series to monitor the abundance of these three species. Rather than sampling across the entire area from Cape Egmont to East Cape, the focus would be on representative sub-areas, between 10 and 400 m water depth (depending on species). These sub-areas would be chosen from areas historically supporting higher abundances (measured by research trawl), and/or associated high commercial extractions. This would allow ongoing monitoring of these stocks, but avoid the high costs of running discrete trawl surveys for each of the traditionally surveyed regions. The intention would be to carry out the proposed survey in November so that for the WCNI and HAGU the indices could be regarded as a continuation of the existing time series. Such a survey could be undertaken every two years.

Objective 1

Commercial catch data will be collated and mapped to identify areas that dominate landings. These data would be used in conjunction with data from trawl surveys to select areas suitable for inclusion in the trawl survey series.

Objective 2

With twenty-nine trawl surveys completed across the four northern areas (WCNI, ECNI, HAGU, BOP), with several thousand trawl shots, there is a good spatial coverage across northern New Zealand coastal waters on which to run simulations to generate a new trawl time series. This desktop study would identify areas of high abundance for target species (in conjunction with the results of Objective 1), and run simulations to assess the likely sampling effort required to achieve accurate and precise abundance estimates within these areas. Variability across years would also be assessed, to ensure that these areas held consistently higher abundances, and were not part of temporally unstable, broader scale spatial patterns (which would negate the value of monitoring them).

The Workshop to review the monitoring of inshore finfish which is to held in February 2005 will provide additional input into the approach to be taken for this objective.

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:

- JDO 1;
- GUR 1; and
- TAR 1.

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

Project: Monitoring JDO1

Project Code: JDO2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To characterise the fishery for John Dory (*Zeus faber*) in JDO 1 and to make recommendations on the use of standardized commercial CPUE to monitor abundance.

Specific Objectives:

1. To characterise the JDO 1 fishery by analysing existing commercial catch and effort data and data from other sources; and to make recommendations on appropriate methods to monitor or assess the status of this Fishstock.

Rationale:

General

John dory is mainly taken as a by-catch of inshore bottom trawl and Danish seine fisheries, although targeting has increased since the early 1990s. Approximately 80% of the total reported catch is taken in JDO 1, where annual catches have ranged between 439 and 721 t over the last decade. John dory is also an important recreational species with the annual catch from JDO 1 estimated to be 174-280 t during the 1999/2000 survey.

Relative abundance of JDO 1 was previously monitored using trawl surveys targeting juvenile snapper in the Hauraki Gulf, Bay of Plenty and west coast of the North Island. With the recent focus on tagging surveys to provide estimates of abundance for SNA 1 and SNA 8, the future of these surveys is uncertain. The last trawl survey in each series was conducted in 2000 in the Hauraki Gulf and in 1999 for the other two areas.

Currently MFish does not have reliable means to monitor the abundance of the JDO 1 Fishstock. Despite increased targeting, annual landings have declined consistently from 721 t in 1994-95 to 439 t in 2002/03 and are currently well below the 704 t TACC. This project is therefore given high priority.

Objective 1

The purpose of this project is to characterise the JDO 1 fishery and to develop the best possible index of abundance based on standardized commercial CPUE, including data up to the 2004/05 fishing year. John dory occurring off the east and west coasts of JDO 1 appear to comprise separate stocks, so independent indices will probably be necessary. Owing to complexities and limitations of the MFish catch and effort database, methods used to groom

data prior to standardization can have a large influence on both the amount of usable data and on the quality of the abundance index. Potential science providers will therefore need to take cognisance of recent progress in data grooming procedures developed for standardising catch and effort for species taken in mixed species and/or bycatch fisheries (e.g. SeaFic 2003 AMP proposals).

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:

- JDO 1.

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

Project: Estimation of snapper year class strength in SNA 1

Project Code: SNA2005/02

Start Date: 1 October 2005

Completion Date: 31 September 2006

Vessel Use: None

Overall Objectives:

1. To estimate the year class strengths of snapper (*Pagrus auratus*) in SNA 1

Specific Objectives:

1. To carry out sampling and estimate the relative proportion at age and length of recruited snapper sampled from the commercial longline catch in SNA 1 during spring and summer of the 2005/06 fishing year. The target coefficient of variation (c.v.) for the catch at age will be 20 % (mean weighted c.v. across all age classes).

Note:
The work plan and costing for this project should take cognisance of the fact that some of the shed sampling would be completed during the tag recovery (catch scanning) phase of SNA 2004/05.

Rationale:

General

The snapper fishery is New Zealand's largest inshore finfish fishery by value. SNA 1 is the largest snapper fishery with a current TACC of 4500 t out of the total snapper TACC for all areas combined of 6494 t. Snapper also form important fisheries for Maori and recreational fishers, but the annual catch is not known.

In the current stock assessment model, yearly recruitment indices are estimated using trawl survey indices and catch at age data sampled from the commercial fisheries. The catch at age data are collected annually but the trawl surveys are now planned to be carried out at irregular intervals; the plan is to survey 1+ snapper in the following year if the 0+ cohort has experienced extremely warm or cool conditions. The latest Hauraki Gulf survey was in November 2000.

The aim of shed sampling is to estimate the age and length structure of the commercial landings of snapper. This provides catch-at-age information, which may be combined with estimates of selectivity-at-age to estimate stock age composition. This information on age and length composition is an important input into the age-structured models used for the assessment of snapper stocks and contributes to the estimation of productivity and sustainable yields. This project is therefore assigned a high priority.

Objective 1

In SNA 1 the East Northland, Hauraki Gulf and the Bay of Plenty fisheries will be sampled for longline catches in spring and summer of the 2005/06 fishing year. Given that SNA 1 are targeted during all seasons, year-round sampling was attempted for the first time during the 2003/04 fishing year (SNA 2003/02). However, owing to the recent escalation in costs of year-round sampling, SNA2005/02 has reverted to sampling in spring and summer. These data will be used to update the snapper assessment for SNA1 in 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:

- SNA 1.

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

Project: Estimation of snapper year class strength in SNA 8

Project Code: SNA2005/03

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To estimate the year class strengths of snapper (*Pagrus auratus*) in SNA 8.

Specific Objectives:

1. To carry out sampling and estimate the relative proportion at age and length of recruited snapper sampled from the commercial trawl catch in SNA 8 during spring and summer 2005/06. The target coefficient of variation (c.v.) for the catch at age will be 20 % (mean weighted c.v. across all age classes).

Rationale:

General

The snapper fishery is New Zealand's largest inshore finfish fishery by value. SNA 8 is the second largest snapper fishery with a current TACC of 1500 t. Snapper also form important fisheries for Maori and recreational fishers, but the annual catch is not known.

In the current stock assessment model, yearly recruitment indices are estimated using trawl survey indices and catch-at-age data sampled from the commercial fisheries. The catch-at-age data are collected annually but the trawl surveys are less regular; the last west coast (SNA 8) survey was in 1999.

Information on age and length composition may, combined with estimates of selectivity-at-age, be used to estimate stock age composition, and is an important input into the age-structured models used for the assessment of SNA 8, including estimation of productivity and sustainable yields. This project is therefore assigned a high priority.

Objective 1

The aim of shed sampling is to estimate the age and length structure of the commercial landings of snapper. SNA 8 is sampled in the spring/summer period when most of the catch is taken.

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:

- SNA 8.

The project is estimated to cost between $50,000 - $100,000.

Project: Relative abundance of spiny dogfish in SPD 3 and 5

Project Code: SPD2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To monitor the relative abundance of spiny dogfish in SPD 3 and 5 using commercial catch-effort data.

Specific Objectives:

1. To update standardised catch-per-unit-effort time series for SPD 3 and 5 to include data from the 2001–02 to 2004–05 fishing years.

2. To analyse the information on size composition and sex ratio collected by observers on commercial trawlers in SPD 5.

Rationale:

General

Spiny dogfish (*Squalus acanthias*) comprise one of New Zealand's largest inshore commercial fisheries in terms of tonnages landed although they are not presently managed under the Quota Management System (QMS). Spiny dogfish are due for admission into QMS on 1 October 2004. Following entry into the QMS, New Zealand's spiny dogfish fisheries will be managed as seven separate fishstocks: SPD 1, 3, 4, 5, 7, 8, and 10. The main stocks in terms of reported catches are currently SPD3 and SPD5. Given the low productivity of spiny dogfish (low fecundity and growth rates), and collapse of fisheries for this species in other parts of the world, it is essential to effectively monitor these stocks.

According to the Medium Term Research Plan for Inshore Finfish, SPD 3 is monitored using standardized CPUE of core vessels in the set-net fishery. SPD 5 is monitored using standardized bottom trawl CPUE as well as the size composition and sex ratio of the commercial catch as recorded by observers. Standardized CPUE series for SPD 3 and 5 are updated every 4 years. The previous analysis (SPD2002-01) covered the 1989–90 to 2000–01 fishing years. This project will update the SPD 3 and 5 CPUE time series to the end of the 2004–05 fishing year (an additional four fishing years of data). This project is therefore assigned a high priority.

Objectives 1 and 2

Following Manning et al. (2004)[1], it is envisaged that an approach linking catch-effort data and landed catches on different catch-effort and landing reporting form types will be used to groom data prior to CPUE standardisation.

Observer coverage of spiny dogfish in SPD 5 was increased in 2004.

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:

- SPD 3; and
- SPD 5.

The project is estimated to cost between $50,000 - $100,000.

[1] Manning, M.J.; Hanchet, S.M.; Stevenson, M.L. (2004). A description and analysis of New Zealand's spiny dogfish (*Squalus acanthias*) fisheries and recommendations on appropriate methods to monitor the status of the stocks. Draft FAR.

Project: Characterisation of Chatham Rise sea perch Fisheries

Project Code: SPE2005/01

Start Date: 1 October 2005

Completion Date: 30 September 2006

Vessel Use: None

Overall Objectives:

1. To characterise the sea perch (*Helicolenus percoides*) fisheries on the Chatham Rise.

Specific Objectives:

1. To determine spatial and temporal patterns in sea perch abundance on the Chatham Rise using data from *RV Tangaroa* trawl surveys.

2. To determine spatial and temporal patterns in sea perch size/age structure on the Chatham Rise using otoliths and lengths collected during *RV Tangaroa* trawl surveys and by observers on commercial vessels.

3. To determine relative year class strength of sea perch on the Chatham rise based on otoliths and lengths collected during *RV Tangaroa* trawl surveys.

4. To determine spatial and temporal patterns in commercial effort and sea perch CPUE on the Chatham rise.

5. To compare temporally catch rates of sea perch reported by observers and commercial vessels to determine how reporting rates may have changed over time.

Rationale:

General

Sea perch are most abundant at depths of < 500m. Given the sedentary nature of the adults and the fact that they produce live demersal young, sea perch on the Chatham Rise probably comprise a discrete biological stock. Whilst most of the Rise falls within SPE 4, a portion of the western end is included in SPE 3. Sea perch on the Chatham Rise are largely taken as a by-catch by vessels targeting hoki (59%), ling (25%) and hake (10%). Landings reported from SPE 4 ranged between 872 and 910 after sea perch was introduced into the QMS in 1998-99, but escalated dramatically to 1685 t in 2002/03. As a result the TACC for SPE 4 will be increased from 533 to 910 t in October 2004.

It is not uncommon for reported landings to increase substantially once a by-catch species is introduced into the QMS, and this was indeed the case for SPE 4. However, given that reported landings were fairly stable for the first four years after being introduced into the QMS, the 2002/03 increase is unlikely to be an artifact of previous under-reporting, and may well have resulted from a change in fishing behaviour. It is noteworthy that the SPE 3 CPUE for hoki

vessels fishing the western portion of the Rise increased dramatically in the 2002/03 fishing year.

Annual swept area trawl surveys of the Chatham Rise appear to provide good estimates of the relative abundance of sea perch (cvs = 8-14%). Relative biomass indices dropped from 8417 t in January 2002 to 6904 t in 2003 and 5800 t in 2004, the decline coinciding with the increase in catch reported for the 2002/03 fishing year. Owing to the low productivity of sea perch (long lived and slow growing), the decrease in the relative biomass estimates and corresponding increase in catch are cause for concern. This project is therefore assigned a high priority.

Objectives 1 – 4

The purpose of this project is to determine whether there have been temporal changes in a) the distribution and abundance of sea perch, b) the distribution of commercial effort or c) rates of sea perch reporting. For the purposes of this study the Chatham Rise is define by 174^{o} E and 175 ^{o} W and 42 – 45 ^{o} S.

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:

- 15% SPE 3; and
- 85% SPE 4.

The project is estimated to cost between $50,000 - $100,000.

Project: Monitoring the length and age structure of commercial landings of tarakihi in TAR 1

Project Code: TAR2005/01

Start Date: 1 October 2005

Completion Date: 31 March 2009

Vessel Use: None

Overall Objectives:

1. To determine the length and age structure of the commercial catch of tarakihi in TAR 1.

Specific Objectives:

1. To conduct sampling in fish processing sheds and determine the length and age composition of the commercial catch of tarakihi in TAR 1 during the 2005/06 fishing year. The target coefficient of variation (c.v.) for the catch at age is 30 % (mean weighted c.v. across all age classes).

2. To conduct sampling in fish processing sheds and determine the length and age composition of the commercial catch of tarakihi in TAR 1 during the 2006/07 fishing year. The target coefficient of variation (c.v.) for the catch at age is 30 % (mean weighted c.v. across all age classes).

3. To conduct sampling in fish processing sheds and determine the length and age composition of the commercial catch of tarakihi in TAR 1 during the 2007/08 fishing year. The target coefficient of variation (c.v.) for the catch at age is 30 % (mean weighted c.v. across all age classes).

Note:

The duration of this project will be 42 months, from 1 October 2005 to 31 March 2009. This is to allow the successful tenderer time to analyse the results from sampling over the entire 2007/08 fishing year and report their findings to the Inshore Fishery Assessment Working Group during February-March 2009.

Rationale:

General

Tarakihi is an important inshore commercial species caught in coastal waters off the North and South Islands, Stewart Island and the Chatham Islands, down to depths of 250 m. The major fishing grounds are west and east Northland (TAR 1), the western Bay of Plenty to Cape Kidnappers (TAR 1 and 2), Cook Strait (TAR 2), Cape Campbell to the Canterbury Bight (TAR 3), and Jackson Head to Cape Foulwind (TAR 7). The main fishing method is trawling — typically in depths of 100 to 200 m. Set netting is most common near Kaikoura.

Tarakihi and other inshore finfish in QMA 1 are believed to comprise two separate biological units: one east and one west of North Cape. Commercial landings reported from TAR 1 have ranged between 1387 and 1516 t over the last decade, with 70-80% of this targeted. Tarakihi is also an important recreational species in TAR 1; the annual recreational harvest was estimated to be between 516 and 755 t during the 1999/2000 survey.

The TAR 1 resource is monitored using standardized CPUE (updated every 4 years), and age structure of the commercial catch (3 years in every 5). Although TAR2004/02 will update the CPUE series to the end of the 2003/04 fishing year, the present project is the first in the catch-at-age series. This programme was previously delayed on account of an unsuccessful proposal to include TAR 1 in the Adaptive Management Programme. TAR 2 and TAR 3 will each be managed under the AMP from October 2004, and will be monitored using standardized CPUE and catch-at-age. This project is therefore assigned a high priority.

Objectives 1 and 2

Annual growth zones have been validated in tarakihi otoliths and ageing protocols established. The proposed catch sampling and ageing will provide length and age structure information for tarakihi in TAR 1. These data are used to monitor the resource and to estimate year class strength and selectivity for future stock assessments. This project should therefore include catches made both target and by-catch fisheries.

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:

- TAR 1.

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