Inshore Finfish Fisheries

Post RCC PROJECTS FOR 2009/2010

Code	Title
BNS2009/01	Age composition of the commercial catch of bluenose in BNS 1, BNS 2, BNS 3, BNS 7 and BNS 8
GMU2009/01	Spatial mixing of GMU 1 using otolith microchemistry
GMU2009/02	Monitoring the length and age structure of commercial landings of grey mullet in GMU 1
GUR2009/01	Fishery characterisation and CPUE analysis of GUR 1
INS2009/03	Characterisation of FMA 2 fisheries
INT2009/01	Trawl survey for FMAs 1 & 9
JDO2009/03	Feasibility of using the Danish seine catch to monitor John dory in JDO 1
SCH2009/01	Catch-at-length of the commercial landings of school shark in SCH 1 and 2
SNA2009/01	SNA 2 stock assessment
SNA2009/02	Catch-at-age and CPUE of snapper in SNA 7
SNA2009/03	Identification of major SNA 1 nursery areas and the quantification of their relative contribution to SNA 1 annual recruitment
TAR2009/01	Catch-at-age of the commercial catch of tarakihi in TAR 2
TAR2009/02	Catch-at-age of the commercial catch of tarakihi in TAR 3
TRE2009/02	Monitoring the length and age structure of commercial landings of trevally in TRE 7

Project: Age composition of commercial catch of bluenose in BNS 1, 2, 3, 7 and 8

Project Code: BNS2009/01

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: None

Overall Objectives:

1. To determine the stock status of bluenose (*Hyperoglyphe antarctica*) by investigating the spatial and temporal age structure of the New Zealand bluenose commercial catches.

Specific Objectives:

1. To investigate stock structure by determining the age structure of the bluenose catches across areas.
2. To assess fishing mortality rates by comparing the age structure of bluenose catches over time.

Note:

The HMS RPG re-considered this project and decided that as the post cost recovery BNS2008/01 would not complete this work within its budget this project should be progressed with a number of modifications in order to compete the study.

Reporting Requirements:

Research Reporting

Objective 1-2

1. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

2. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

3. To present the report in 2 above to meetings of the Inshore Fishery Assessment Working Group in February-March 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 September 2010.

Rationale:

The results from the 2008 AMP Working Group suggest that the CPUE indices from many bluenose fisheries appear to reflect changes in abundance and there is an urgent need to ground truth the apparent decline in abundance suggested by the CPUE indices. Therefore, the pilot survey originally proposed in project BNS2008/01 to produce a fishery independent index has been postponed by a year. The new objectives in this project are proposed to determine if evidence of the large declines in abundance seen in CPUE can also be seen in the age structure of commercial catch. There are a large number of otoliths available from existing SeaFIC and MFish collections and they will be aged to assess mortality over time.

The various commercial logbook sampling programmes that have operated under some of the BNS AMPs have collected over 12,000 otoliths since 1994/95, particularly in BNS 1. In addition to this, otoliths have been collected form BNS from several shed sampling programmes. Ageing validation studies have confirmed that BNS can be reliably aged using otoliths, and indicated that BNS are substantially longer lived than previously thought, attaining a maximum age of up to 60 years.

Although CPUE has previously not been considered to be a reliable indicator of abundance of BNS stocks, close coincidence observed in declining CPUE trends in most BNS stocks in recent years has increased confidence in their value as indices of abundance for some component (at least) of the BNS stocks in each QMA. Standardised CPUE series, based on data from six fisheries which span most of major fisheries taking BNS in the NZ EEZ, have declined an average of 64% over the period 2001/02 to 2006/07.

The AMP Working Group noted that localised depletion of slow-growing adults that have accumulated on preferred seabed features could have occurred. The Working Group emphasized the importance of obtaining spatially and temporally representative size- and age-frequency information for all the major BNS fisheries.

This project will conduct age determinations on an appropriate subset of the otoliths, selected to be representative of spatial (area and depth) and time strata appropriate for stock assessments. Otoliths to be read should be selected to represent areas or features fished consistently over time, to provide comparative Z estimates for these fisheries. Commercial stakeholder organizations will need to be consulted with regard to the availability of data and samples for conducting this ageing work.

Using the recommended otoliths catalogued in BNS2008/01

Objectives 1 and 2

While BNS2008/01 investigated the age structure in BNS 1 this project is expected to build on that work and these two objectives will explore the stock and age structure of the BNS population(s) in New Zealand. Information on the spatial and temporal mortality of these populations will be required. It is important to note that the spatial scale of this work should be feature specific and not by fishery area. Under this objective the remaining (based on the recommendation of BNS2008/01) otoliths for the analysis will be aged.

A change to the age structure of this catch through time is one potential source of information on the status of exploited fish stocks. Under these objectives the successful tenderer provide:

- Estimates of total fishing mortality that incorporate uncertainty in key parameters (e.g. age at full recruitment and other selectivity issues) and the different properties of regression and Chapman-Robson estimators.

- Comparison of the age / size composition of the catch to the age / size-at-maturity

- Discussion of the consistency of signals over time, e.g. is the progression of cohorts apparent and are estimates of Z stable between adjacent years.

Such information will be important in informing discussions on the most appropriate approaches for the longer-term monitoring of these stocks and the likely frequency of catch sampling.

Weighting of Objectives:

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

Project: Spatial mixing of GMU 1 using otolith microchemistry

Project Code: GMU2009/01

Start Date: 1 October 2009

Completion Date: 30 March 2011

Vessel Use: None

Overall Objectives:

1. To determine the level of spatial mixing and connectivity of grey mullet (*Mugil cephalus*) populations using otolith microchemistry.

Specific Objectives:

1. To collect and analyse the chemical composition of grey mullet otoliths.

2. To analyse the otoliths collected under Objective 1 to determine if the samples can be spatially separated.

Note: if this project is successful it will be necessary to undertake further analyses in future (2-3 years) on adult fish, to assess if fish collected in the same sample locations have the same chemical signatures as those in the current study and then make inferences on connectivity of grey mullet populations. This work, if progressed, will occur under a separate project.

Reporting Requirements:

Research Reporting

Objectives 1 & 2

1. To present the proposed sampling design for specific objective 1 to the Northern Inshore working Group in April 2009.

2. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 October 2010.

3. To present the report in 2 above to meetings of the Inshore Fishery Assessment Working Group in November 2010 in Wellington or Auckland. Presentations to more than one meeting may be required.

4. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 March 2011.

5. To present the report in 4 above to meetings of the Inshore Fishery Assessment Working Group in March 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 April 2011.

Rationale:

General

Commercial fishing for grey mullet occurs predominantly in the GMU 1, where annual landings increased from approximately 420 t in 1974 to a maximum of 1142 t in 1983–84. Marked changes in fishing effort occurred during this period through the development of more efficient fishing techniques and an increase in the market demand for this species. Before the introduction of the QMS, total domestic catches declined from the maximum (1160 t) in 1983–84 to 901 t in 1985–86. The TACC was consistently under caught after GMU 1 was introduced into the QMS. The Minister of Fisheries therefore reduced the TACC for GMU 1 to 925 t, beginning in 1998–99. The reduction in TACC had little effect on the annual catches, and it has only ever been reached in GMU 1 in 2004–05. Although catches declined slightly in 2006–07 from the previous year, they were still above the average catch for the last 15 years.

Spawning in northern New Zealand occurs during November through February. It is likely that grey mullet spawn at sea. Small post-larval grey mullet occur seasonally in estuaries, which serve as nursery grounds for juveniles.

GMU 1 is currently assessed using CPUE data and these analyses suggest that the GMU 1 fishery is composed of a number of spatially distinct sub-stocks and tagging data suggest low to moderate mixing between them. CPUE analyses undertaken using data through to 2001-02 led the Inshore FAWG to conclude in 2005 that catches on the west coast of GMU 1 were unlikely to be sustainable. Updated CPUE analyses using data up to 2005–06 have found that the CPUE in the Kaipara Harbour, Manukau Harbour, and east Northland (which collectively account for over 80% of the GMU 1 catch) have increased since 2002. Therefore, catches in these areas appear to be sustainable in the short-term.

It is not known which of the main estuaries on the west coast of North Island are the most important as nursery areas for grey mullet. At this stage it is not clear from

which nursery area(s) fish in this QMA are recruited. Such knowledge is important for stock assessment and for the interpretation of abundance indices (e.g. CPUE).

This research is necessary because:

- grey mullet support important commercial, recreational, and customary fisheries;
- current stock status of is unknown, no formal stock assessments are undertaken for this species; and
- grey mullet connectivity has been identified as integral to the grey mullet component of the New Zealand Inshore Fisheries Medium Term Research Plan;

Within this context, this research project is considered a **high** priority.

Objective 1

Under this objective the research provider would be expected to collect 20-30 otoliths form juvenile grey mullet in each of at least six regions within GMU 1. Samples will need to be collected in order to asses if there are differences between the east and west coasts as well as finer scale differences along each coast. Then analyse the chemical composition of the otolith microstructure.

Sample design, will be reviewed by the Inshore FAWG.

Objectives 2

Using the information collected under Objective 1 the samples should be assessed in order to determine if spatial separation of the sample areas is possible and at what scale that separation should be undertaken.

Weighting of Objectives:

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

Project: Monitoring the length and age structure of commercial landings of grey mullet in GMU 1

Project Code: GMU2009/02

Start Date: 1 October 2009

Completion Date: 30 March 2011

Vessel Use: None

Overall Objectives:

1. To determine the length, age, sex and maturity structure of the commercial catch of grey mullet in GMU 1.

Specific Objectives:

1. To characterise the GMU 1 fishery.

2. To conduct representative sampling to determine the sex, maturity state, length and age composition of the commercial catch of grey mullet in GMU 1 during the 2009/10 fishing year. The target coefficient of variation (CV) for the catch-at-age is 30 % (mean weighted CV across all age classes).

Note:
The sampling design will be reviewed by the Inshore Working Group prior to the sampling commencing using the criteria set out in the "Guidelines to the design, implementation and reporting of catch sampling programmes". This contains details of what is expected in relation to designing and implementing a catch sampling programme and reporting the subsequent results back to a working group.

Reporting Requirements:

Research Reporting

<u>Objectives 1 & 2</u>

1. To present the proposed sampling design for specific objective 1 to the Northern Inshore working Group in October 2009.

2. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 October 2010.

3. To present the report in 3 above to meetings of the Inshore Fishery Assessment Working Group in November 2010 in Wellington or Auckland. Presentations to more than one meeting may be required.

4. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 March 2011.

5. To present the report in 4 above to meetings of the Inshore Fishery Assessment Working Group in March 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 April 2011.

Rationale:

General

Commercial fishing for grey mullet occurs predominantly in the GMU 1, where annual landings increased from approximately 420 t in 1974 to a maximum of 1142 t in 1983–84. Marked changes in fishing effort occurred during this period through the development of more efficient fishing techniques and an increase in the market demand for this species. Before the introduction of the QMS, total domestic catches declined from the maximum (1160 t) in 1983–84 to 901 t in 1985–86. The TACC was consistently under caught after GMU 1 was introduced into the QMS. The Minister of Fisheries therefore reduced the TACC for GMU 1 to 925 t, beginning in 1998–99. The reduction in TACC had little effect on the annual catches, and it has only ever been reached in GMU 1 in 2004–05. Although catches declined slightly in 2006–07 from the previous year, they were still above the average catch for the last 15 years.

Objective 1

Results of the characterisation will be used to determine the fisheries and spatio-temporal sampling effort required to obtain representative samples for catch-at-age analyses. The characterisation will also provide valuable input for the fisheries plan that is presently being developed.

Objectives 2

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

Under this objective, three primary tasks are envisaged:

- estimation of the age structure of the populations;
- estimation of total mortality (Z) from catch composition data; and
- estimation of spawning biomass per recruit reference points.

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

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

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

Weighting of Objectives:

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

Project: Fishery characterisation and CPUE analysis of GUR 1

Project Code: GUR2009/01

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: None

Overall Objectives:

1. To characterise the red gurnard (*Chelidonichthys kumu*) fishery and undertake a CPUE analysis in GUR 1.

Specific Objectives:

1. To characterise the GUR 1 fishery.

2. To analyse existing commercial catch and effort data to the end of 2008/09 fishing year and undertake a CPUE standardisation.

Note:
Research providers should also take cognisance of recent progress made in data grooming for CPUE standardization for inshore finfish including methods used to reconcile landings with estimated catch. Potential science providers are referred to the Kendrick and Walker (2004) and Starr et al. (2007) reports for further details.

Reporting Requirements:

Research Reporting

Objectives 1 & 2

1. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

2. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

3. To present the report in 2 above to meetings of the Northern Inshore Fishery Assessment Working Group in March – April 2011. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 November 2010.

Rationale:

General

Red gurnard are a major bycatch of inshore trawl fisheries in most areas of New Zealand, including fisheries for red cod in the southern regions, and flatfish on the west coast of the South Island (WCSI) and in Tasman Bay. They are also directly targeted in some areas. Some minor target fisheries for red gurnard are known in Pegasus Bay, off Mahia and off the west coast South Island. Red gurnard is also a minor bycatch in the Jack mackerel trawl fishery in the South Taranaki Bight. Up to 15% of the total red gurnard catch is taken by bottom longline and setnet.

Annual landings of GUR 1 have been relatively stable since 1986–87, generally ranging between 900 and 1300 t; substantially lower than the 2287 t TACC. About 60% of the GUR 1 total is taken from FMA 1, as a bycatch of a number of fisheries including inshore trawl fisheries for snapper, John dory and tarakihi. The remaining 40% is taken from FMA 9, mainly as a bycatch of the snapper and trevally inshore trawl fisheries.

MFish does not have a tool with which to monitor the abundance of GUR 1 stock. In order to assess the stock the GUR 1 fishery needs to be characterised and a CPUE standardization attempted.

This research is necessary because:

- red gurnard support important commercial, recreational, and customary fisheries;
- current stock status of GUR 1 is unknown, no formal stock assessments are undertaken for this species; and
- the project has been identified as integral to the red gurnard component of the New Zealand Inshore Fisheries Medium Term Research Plan;

Within this context, this research project is considered a **high** priority.

Objective 1

Results of the characterisation will be used to determine the data grooming procedures for the CPUE analysis and which fisheries need to be assessed and the spatio-temporal analyses required in order to ensure the CPUE analysis is reflective of the fishery. The characterisation will also provide valuable input for the fisheries plan that is presently being developed.

Objective 2

Red gurnard are taken as a target and bycatch. Research providers should also take cognisance of recent progress made in data grooming for CPUE standardization for inshore finfish including methods used to reconcile landings with estimated catch. Potential science providers are referred to the Kendrick and Walker (2004) and Starr et al. (2007) reports for further details.

Kendrick, T.H.; Walker, N. (2004). Characterisation of the GUR 2 red gurnard (*Chelidonichthys kumu)* and associated inshore trawl fisheries, 1989-90 to 2000-01 New Zealand Fisheries Assessment Report 2004/21. 83p.

Starr P.J., Kendrick T.H., Lydon G.J. and Bentley N. 2007. Report to the Adaptive Management Fishery Assessment Working Group: Full term review of the GUR 3 Adaptive Management Programme. AMP-WG-07/11v2. (Unpublished manuscript available from the NZ Seafood Industry Council, Wellington).

Weighting of Objectives:

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

Project: Characterisation of FMA 2 fisheries

Project Code: INS2009/03

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: None

Overall Objectives:

1. To characterise the inshore fisheries in FMA 2 and identify abundance indices for the key species.

Specific Objectives:

1. To characterise the FMA 2 inshore fisheries.
2. To analyse existing commercial catch and effort data to the end of 2008/09 fishing year and undertake CPUE standardisations.

Note:
Research providers should also take cognisance of recent progress made in data grooming for CPUE standardization for inshore finfish including methods used to reconcile landings with estimated catch. Potential science providers are referred to the Kendrick and Walker (2004) and Starr et al. (2007) reports for further details.

Reporting Requirements:

Research Reporting

Objectives 1 & 2

1. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

2. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

3. To present the report in 2 above to meetings of the Northern Inshore Fishery Assessment Working Group in March - April 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 September 2010.

Rationale:

General

Fisheries Management Objective: Identification of suitable abundance indicators for low knowledge species in the Area 2 Inshore Fishery to support TAC/TACC setting.

The Area 2 inshore fishery (A2IF) catches tarakihi, bluenose, flatfish and blue moki (the main target species); gurnard, snapper, häpuku and bass, gemfish, trevally, red cod, blue warehou, (target and bycatch species); john dory, kahawai, kingfish, sea perch, school shark, rig, spiny dogfish and other (bycatch species). Abundance indicators exist or are being investigated for BNS 2, GUR 2, TAR 2, MOK 1, SNA 2, and SKI 2. We have no abundance indicators for the rest of the A2IF stocks.

Many of the A2IF species without abundance indicators are bycatch species (or bycatch with some targeting). Commercial landings of bycatch species are largely determined by activity in, and operation of, the target fisheries. Consequently landings are not considered a good indicator of abundance. Many of the species have characteristics that make them vulnerable to overfishing and therefore careful management is needed. However, from a commercial sector perspective, conservative management (ie, TAC/TACC setting) arising from a lack of accepted abundance indicators is affecting their ability to maximise value from the A2IF, either by constraining catch of target species or through payment of deemed values.

MFish does not have a cost effective tool with which to monitor the abundance of these stocks. In order to assess the stocks the fisheries need to be characterised and, CPUE standardization should be attempted.

This research is necessary because:

- these fisheries support important commercial, recreational, and customary fisheries;
- current stock status is unknown and no formal stock assessments are undertaken for these stocks; and
- the project has been identified as integral to the management of the FMA 2 fisheries;

Within this context, this research project is considered a **high** priority.

Objective 1

This characterisation should assess the spatio-temporal trends in catch (including species proportions) and effort (including gear changes) for the inshore fisheries in FMA 2. This analysis should include spatio-temporal analyses of species composition, of the target and bycatch fisheries. This information should include at least GUR 2, JDO 2, HPB 2, POR 2, RCO 2, SCH 2, SNA 2, SPE 2, SPO 2, TAR 2, TRE 2 and WAR 2. This investigation should include interactions between species complexes and fisheries.

Results of the characterisation will be used to determine which species can be reliably assessed using CPUE analysis as well as the data grooming procedures for this analysis in order to ensure the resulting data accurately reflects the populations concerned. The characterisation will also provide valuable input for the fisheries plan when developed.

These species are taken as both target and bycatch. Research providers should be cognisant of recent progress made in data grooming for CPUE standardization for inshore finfish including methods used to reconcile landings with estimated catch. Potential science providers are referred to the Kendrick and Walker (2004) and Starr et al. (2007) reports for further details.

For species where CPUE is not either possible or a reliable index of abundance the research provider should make recommendations as to the type of analyses that could be undertaken to determine stock status and inform decision making for developing B_{MSY} biomass proxies for reference points based management.

Objective 2

Under this objective research providers should determine if enough data exists to undertake CPUE analyses for these species. For stocks that CPUE analyses are possible these should be undertaken and recommendations made as to the reliability of the resulting analysis as indices of abundance.

Kendrick, T.H.; Walker, N. (2004). Characterisation of the GUR 2 red gurnard (*Chelidonichthys kumu)* and associated inshore trawl fisheries, 1989-90 to 2000-01 New Zealand Fisheries Assessment Report 2004/21. 83p.

Starr P.J., Kendrick T.H., Lydon G.J. and Bentley N. 2007. Report to the Adaptive Management Fishery Assessment Working Group: Full term review of the GUR 3 Adaptive Management Programme. AMP-WG-07/11v2. (Unpublished manuscript available from the NZ Seafood Industry Council, Wellington).

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.6 and 0.4.

Project: Trawl survey for FMA's 1 and 9

Project Code: INT2009/01

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: Subject to tender

Overall Objectives:

1. To estimate the relative abundance of red gurnard, John dory and tarakihi in FMA's 1, 8 and 9.

Specific Objectives:

1. To undertake an analysis to determine where the FMA 8 strata should be located.

2. To undertake a trawl survey in FMA's 1, 8 and 9 to estimate the relative abundance of red gurnard (*Chelidonichthys kumu*), John dory (*Zeus faber*) and tarakihi (*Nemadactylus macropterus*).

Note: Include FMA 8 only if time and cost allow.

Reporting Requirements:

Research Reporting

Objectives 1 & 2

1. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

2. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

3. To present the report in 2 above to meetings of the Northern Inshore Fishery Assessment Working Group in March/Apil 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 October 2010.

Rationale:

Owing to the importance of the FMA's 1 and 9 inshore finfish fisheries and problems associated with alternative abundance indices for trawl caught red gurnard, John dory and tarakihi, the northern New Zealand "hot spot" trawl survey was suggested as a fishery independent measure of abundance. As a result of this recommendation for the Northern Inshore Working Group a project INS2005/02 was developed to:

1. Identify the main spatial areas of catch for GUR, JDO, TAR and other selected species around northern New Zealand.
2. Determine weather cost-effective abundance indices could be derived for these species by sampling only higher abundance sub-areas.

The Inshore Working Group received a presentation on INS2005/02 and suggested that the feasibility study was encouraging but is awaiting the final report.

The original surveys stopped due to high costs for JDO and GUR. The survey may not yield a good result for TAR.

This research is necessary because:

- the stock status of these species is uncertain and the impact of catches in New Zealand waters on the stock are unknown; and

- an abundance index is required, but it is not known if a cost effective fishery independent survey for these stocks is possible.

For these reasons this project has a **high** priority.

Objective 1
Under this objective research providers should undertake an analysis to determine where an FMA 8 survey should be focused in order to achieve acceptable CV's while saving cost. This analysis should expand on the work undertaken to assess the suitable strata for FMA's 1 and 9.

Objective 2

Using the date provided in objective 1 and previous work a survey should be undertaken to provide time series of relative abundance indices for red gurnard, tarakihi, John dory and other target species in FMAs 1, 8 and 9.

Survey design should be based on a cost benefit analysis incorporating the interplay between simulated CV and the power to detect change in relative biomass.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.2 and 0.8.

Project:	Feasibility of using the Danish seine catch to monitor of John dory in JDO 1
Project Code:	JDO2009/03
Start Date:	1 October 2009
Completion Date:	30 September 2010
Vessel Use:	Subject to tender

Overall Objectives:

1. To assess the feasibility of using Danish seine catch to monitor the John dory fishery in JDO 1.

Specific Objectives:

1. To characterise the JDO 1 fishery by analysing existing commercial catch and effort data;
2. To assess if CPUE can be used as a measure of abundance and to attempt to standardize CPUE for the JDO 1 Danish seine fishery (if feasible).

Note:
Research providers should also take cognisance of recent progress made in data grooming for CPUE standardization for inshore finfish including methods used to reconcile landings with estimated catch. Potential science providers are referred to the Kendrick and Walker (2004) and Starr et al. (2007) reports for further details.

Reporting Requirements:

Research Reporting

Objectives 1 & 2

1. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

2. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

3. To present the report in 2 above to meetings of the Northern Inshore Fishery Assessment Working Group in March/Apil 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 September 2010.

Rationale:

John dory are taken mainly as a bycatch of the trawl and Danish seine fisheries. In recent years, around 50-65% of the total reported catch has been taken in JDO 1. The increase in JDO 1 landings since 1986–87 is largely attributed to increased targeting of John dory by trawl and Danish seine. The TACC in JDO 1 was exceeded (slightly) in 1994–95, but in the following years landings steadily decreased, reaching a low of 440 t in 2002–03. Landings have increased in recent years, with 544 t being caught in 2006–07. It is estimated that during the 1990s about 10–20% of the annual JDO 1 landings were taken in QMA 9, mainly as bycatch in fisheries targeting snapper and trevally. Landings from the eastern part of JDO 1 (QMA 1) are taken primarily in target fisheries for John dory and snapper. However, since 1990 there has been a steady trend of increased target fishing directed at John dory and decreased landings of this species from the snapper fishery.

To date there has been no attempt to assess the Danish seine catch as a measure of abundance.

This research is necessary because:

- John dory support important commercial, recreational, and customary fisheries;
- current stock status is unknown, no formal stock assessments are undertaken for this species; and
- the project has been identified as integral to the John dory component of the New Zealand Inshore Fisheries Medium Term Research Plan;

Within this context, this research project is considered a **high** priority.

Objective 1

Results of the characterisation will be used to determine the data grooming procedures for the CPUE analysis and which fisheries need to be assessed and the spatio-temporal analyses required in order to ensure that any CPUE analysis is reflective of the fishery. The characterisation will also provide valuable input for the fisheries plan that is presently being developed, by exploring spatio temporal trends in the fisheries utilising this resource to further our understanding as to how this stock is being exploited.

Objective 2

A long-term time series of CPUE is a useful tool to monitor fish stocks and interpret fluctuations in abundance. The proposed analysis should assess if there are enough data to undertake a CPUE analysis and if so develop a CPUE time series for this fishery, if successful, the research provider should provide time series of relative abundance indices for John Dory and determine if these represent a reliable biomass index.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.2 and 0.8.

Project Title: Catch-at-length of the commercial landings of school shark in SCH 1 and 2

Project Code: SCH2009/01

Start Date: 1 October 2009

Completion Date: 30 April 2012

Vessel Use: Nil

Overall Objective

1. To analyse catch-at-length and age for the commercial catch of school shark (*Galeorhinus galeus*) in SCH 1 and 2.

Specific Objectives:

1. To characterise the SCH 1 and 2 fisheries.

2. To conduct representative sampling to determine the length, age and sex structure of the commercial catch of school shark in SCH 1 and 2 in 2009/10 and 2010/11. The target coefficient of variation (CV) for the catch-at-length is 30% (mean weighted CV across all length classes).

Note:
The sampling design will be reviewed by the Inshore Working Group prior to the sampling commencing using the criteria set out in the "Guidelines to the design, implementation and reporting of catch sampling programmes". This contains details of what is expected in relation to designing and implementing a catch sampling programme and reporting the subsequent results back to a working group.

Reporting Requirements:

Research Reporting

<u>Objectives 1 & 2</u>

1. To present the proposed sampling design for specific objective 1 to the Northern Inshore working Group in April 2009.

2. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 October 2010.

3. To present the report in 2 above to meetings of the Inshore Fishery Assessment Working Group in October/November 2010 in Wellington or Auckland. Presentations to more than one meeting may be required.

4. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 April 2011.

5. To present the report in 4 above to meetings of the Inshore Fishery Assessment Working Group in October/November 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 April 2011.

Rationale:

General

School sharks are distributed across the shelf, generally being inshore in summer and offshore in winter. They extend in smaller numbers near the seafloor down the upper continental slope, to at least 600 m. The capture of school sharks by tuna longliners shows that their distribution extends well offshore, up to 180 nm off the South Island, and 400 nm off northern New Zealand towards the Kermadec Islands. They feed predominantly on small fish and cephalopods (octopus and squid).

Commercial landings rose steeply from the late 1970s until 1983 with the intensification of setnetting targeting this and other species, and a general decline in availability of other, previously more desirable, coastal species. However, because of the earlier discarding and under-reporting, this recorded rise in landings does not reflect an equal rise in catches. After a small decline in 1984–85, catches decreased by about 50% from 1986 onwards because of reduced quotas within the QMS. From 1987–88 to 1991–92 total reported landings were around 2200–2500 t. In 1995–96 total landings increased markedly to 3387 t and the total TACC (3107 t) was exceeded for the first time. From the 1st October 2007 the TACC for SCH 1 was increased to 689 t, at that time a TAC was set for the first time at 893 t with 102 t, 68 t and 34 t being allocated to customary, recreational and other sources of motility respectively.

Length data were being collected by the various AMP programmes, however, these two stocks have never been part of any AMP. These data are considered by the Inshore Working Group to be important for monitoring these fisheries.

This research is necessary because:

- school shark support important commercial, recreational, and customary fisheries;

- current stock status is unknown, no formal stock assessments are undertaken for this species; and

- the project has been identified as integral to the school shark component of the New Zealand Inshore Fisheries Medium Term Research Plan;

Within this context, this research project is considered a **high** priority.

Objective 1
Results of the characterisation will be used to determine spatio-temporal sampling effort and which fisheries need to be sampled in order to obtain representative samples. The characterisation will also provide valuable input for the fisheries plan that is presently being developed.

School shark are typically processed at sea, therefore observer coverage is necessary to obtain, age, length and sex data on the fishery. The working group suggest that this forms part of the observer programme and this study is moved as a high priority into the MTRP. If the characterisation reveals that at-sea sampling will be necessary the observer programme will be informed as to the type of data that need to be colleted, from which fisheries and in which areas.

The characterisation should also include a risk analysis, for presentation to the Inshore Working Group, which will investigate the implications of the setnet ban that may restrict incoming data making the work impractical to achieve.

Objective 2

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

- estimation of the length structure of the populations; and

- estimation of sex ratio from the fisheries sampled;

Under this objective, three primary tasks are envisaged:

- estimation of the length and age structure of the populations;

- estimation of total mortality (Z) from catch composition data; and

- estimation of spawning biomass per recruit reference points.

Age structure provides a tool with which exploitation rate can be measured, allowing for both temporal and spatial comparisons. Monitoring age structure also provides a

means to better evaluate the response of a population to changes in regulations. Some outputs from this objective will include:

- estimates of total fishing mortality that incorporate uncertainty in key parameters (e.g. age at full recruitment and other selectivity issues) and the different properties of regression and Chapman-Robson estimators; and

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

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.4 and 0.6.

Project: SNA 2 Stock Assessment

Project Code: SNA2009/01

Start Date: 01 October 2009

Completion Date: 30 September 2010

Vessel Use: None

Overall Objectives:

1. To conduct an assessment for snapper (*Pagrus auratus*) in SNA 2, including estimating biomass and sustainable yields.

Specific Objectives:

1. To characterise the SNA 2 fishery and update the CPUE analyses for trawl fisheries in each area of SNA 2 using data up to the end of 2008-09.

2. To conduct an assessment for snapper (*Pagrus auratus*) in SNA 2, including estimating biomass and sustainable yields.

Note:

Research providers should also take cognisance of recent progress made in data grooming for CPUE standardization for inshore finfish including methods used to reconcile landings with estimated catch. Potential science providers are referred to the Kendrick and Walker (2004) and Starr et al. (2007) reports for further details.

Reporting Requirements:

Research Reporting

Objectives 1 & 2

1. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

2. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

3. To present the report in 2 above to meetings of the Northern Inshore Fishery Assessment Working Group in March/Apil 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 October 2010.

Rationale:

- The MTRP states:
  - "*It is assumed that the stock will be monitored using standardized CPUE (updated every three years) and annual catch at age until the 2012 assessment. However the SNA RPG may wish to plan an interim assessment based on these data*."
- Three additional years of CPUE and shed sampling data will likely be available.

General

The snapper fishery is New Zealand's largest inshore finfish fishery by value. SNA 2 is the thrid largest snapper fishery, with a current TACC of 315 t. Snapper also support important fisheries for recreational fishers and Maori, but the annual catch is not known reliably.

The stock assessments for snapper rely mainly on the absolute abundance estimates from tagging programmes. An assessment of SNA 2 was developed in 2002. Standardized CPUE series, updated every three years, are used to provide crude indices of relative abundance in the periods between tagging programmes. The SNA 2 CPUE index was last updated to the end of the 2006/07 fishing year (SNA 2006/09).

The stock assessment of SNA 2 is the first to be based on a fitted population model. The model used has similar structure as the Tasman Bay/Golden Bay (SNA 7) assessment and is based on Harley & Gilbert (2000). The data used for model fitting does not include any abundance estimate but includes a small number of recent proportions at age datasets. This limited the number of free parameters for which good estimates can be obtained.

The assessment model for SNA 2 was fitted to four years of proportions at age data in 2002. As there are no indices of biomass available, model estimates must be treated with caution. For almost all runs, the current biomass was estimated to be near to or somewhat below B_{MSY} but was projected to increase towards B_{MSY} by 2006 at the current catch level (436 t).

In the SNA 2 fishery, the bycatch of snapper in the tarakihi, gurnard and other fisheries has resulted in overruns of the snapper TACC in all years from 1987–88 up

to 2000–01 and in subsequent years to 2006/07. From 1 October 2002, the TACC for SNA 2 was increased from 252 to 315 t, within a total TAC of 450 t.

This research is necessary because:

- Snapper supports important commercial, recreational and customary fisheries and the stock is currently under a rebuilding plan; and
- three yearly updates of CPUE are planned under the snapper MTRP
- High value shared fishery.
- TACC regularly over caught.
- Fishery operations highest priority

For these reasons this project has a **High** priority.

Objective 1

As snapper, fisheries continue to change in response to market forces, fisheries characterisations should be completed with each CPUE update. Fishery characterisations provide important information for managing fisheries and also inform CPUE analyses.

Objective 2

Under this objective the research provider will undertake a catch-at-age analysis. Using the CPUE and catch-at-age the research provider will assess the feasibility of undertaking a quantitative assessment for SNA 2. The research provider should be cognisant of the fact that the previous assessment was rejected by the Inshore Working Group. As a first step the research provider should assess the reasons that the pervious assessment was rejected and develop methods to resolve those issues. If a stock assessment is not possible for this stock then the research provider should explore alternative assessments to develop biological reference points that will be informative for the management of this stock.

Weighting of Objectives:

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

Project Title: Catch-at-age and CUPE of snapper in SNA 7

Project Code: SNA2009/02

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: Nil

Overall Objective

1. To determine the catch-at-age of snapper (*Pagrus auratus*), and develop abundance trends for SNA 7.

Specific Objectives:

1. To characterise the SNA 7 fishery and update the CPUE analyses for trawl fisheries in each area of SNA 7 using data up to the end of 2009-10.

2. To conduct representative sampling to determine the length, sex and age structure of the commercial catch of snapper in SNA 7. The target coefficient of variation (CV) for the catch-at-age is 30% (mean weighted CV across all age classes).

3. To age snapper otoliths collected during the above sampling programme.

4. To analyse catch-at-age for the SNA 7 commercial catch in Tasman/Golden Bay.

Note:
The sampling design will be reviewed by the Inshore Working Group prior to the sampling commencing using the criteria set out in the "Guidelines to the design, implementation and reporting of catch sampling programmes". This contains details of what is expected in relation to designing and implementing a catch sampling programme and reporting the subsequent results back to a working group.

Research providers should also take cognisance of recent progress made in data grooming for CPUE standardization for inshore finfish including methods used to reconcile landings with estimated catch. Potential science providers are referred to the Kendrick and Walker (2004) and Starr et al. (2007) reports for further details

Reporting Requirements:

Research Reporting

Objective 1-4

1. To present the proposed sampling design for specific objective 1 to the Southern Inshore working Group in April 2009.

2. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

3. To present the report in 2 above to meetings of the Southern Inshore Fishery Assessment Working Group in April 2010 in Auckland or Wellington. Presentations to more than one meeting may be required.

4. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

5. To present the report in 4 above to meetings of the Southern Inshore Fishery Assessment Working Group in November 2010 in Auckland or Wellington. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 September 2010.

Rationale:

General

The snapper fishery is New Zealand's largest inshore finfish fishery by value. SNA 7 supports a small commercial fishery in Tasman and Golden Bays with a TACC of 200t. Four telephone/diary surveys conducted from 1993 to 2001 estimated recreational take in this area to be between 125-184 t. The boat ramp and aerial over flight surveys undertaken in 2005/06 estimated the recreational harvest for the area to be 43 tonnes. Snapper in Marlborough Sounds are believed to comprise a separate biological stock that, because of its small size, is only of recreational significance.

CPUE does not provide a reliable index of abundance with the result that the stock is monitored using age structure of the catch. Owing to the present small size of the fishery age structure is measured every three years. A stock assessment, based on catch-at-age and a single tag-based biomass estimate (for 1987) was completed in 2001, but the results were untenable.

SNA 7 experiences highly variable recruitment. Catch-age-age was last measured in 2006/07 (SNA 2006/05) and results indicate that a strong year class(es) is entering the fishery. An assessment was completed in 2002 for this stock. Model results indicated that the stock should have rebuilt substantially since the low levels of the early 1980s. However, there are no current indices of abundance for this stock to verify the results from the assessment model; only catch at age data is available for recent years.

The MLEs for B_{2001} for the base case and all of the sensitivity runs are well above B_{MSY}. The large reduction in catches from the mid-1980's and the long period that cohorts persist in the recent catch at age data are reflected in model estimates of a rebuilding stock. The results indicate the stock would continue to increase even if future catches were substantially larger than those currently being taken.

This research is necessary because:

- SNA 7 catch-at-age was last determined for the 2006/07 fishing year. According to the Medium Term Research Plan for snapper it should be measured every three years.

- The 2009/10 catch-at-age will provide additional information for the stock assessment and will be used in conjunction with the mark-recapture data to determine population biomass-at-age.

- There are no current indices of abundance for the SNA 7 stock to verify the results from the assessment model; only catch at age data is available for recent years.

For these reasons this project has a **high** priority.

Objective 1 to 4

Results of the characterisation are to be used to determine spatio-temporal sampling effort and which fisheries need to be sampled in order to obtain representative samples. The characterisation will also provide valuable input for the fisheries plan that is presently being developed. A catch-at-age analyses of snapper will be undertaken.

Under this objective, the primary tasks are to estimate the age structure of the populations and assess how they have changed over time; and undertake a CPUE analysis and determine if CPUE is reflective of abundance. It is thought that detailed information on changers in fishing practices over time may inform the CPUE analysis. The research provider will be expected to determine if CPUE is reflective of abundance and weather it will be informative for a future stock assessment model.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.1, 0.3, 0.3 and 0.3.

Project Title: Identification of major SNA 1 nursery areas and the quantification of their relative contribution to SNA 1 annual recruitment

Project Code: SNA2009/03

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: Subject to tender

Overall Objectives:

1. To identify major nursery areas within SNA 1 using otolith microchemistry

Specific Objectives:

1. To identify major east Northland juvenile snapper areas and collect representative otolith samples for future microchemistry analysis.

Reporting Requirements:

Research Reporting

Objective 1

1. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

2. To present the report in 1 above to meetings of the Northern Inshore Fishery Assessment Working Group in March/April 2010 in Wellington or Auckland. Presentations to more than one meeting may be required.

3. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

4. To present the report in 3 above to meetings of the Northern Inshore Fishery Assessment Working Group in March/April 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 October 2010.

Rationale:

In stock assessment terms the fundamental productivity SNA 1 is encompassed in the SA model parameter R0 or mean (virgin) recruitment. Because the variation in annual recruitment seen in commercial catch sampling and juvenile trawl surveys is large (up to a factor of 10) current thinking is that environmental processes are more important that spawning stock biomass in mediating SNA 1 stock productivity, and as a consequence no stock-recruit relationship is assumed for SNA 1. Given the importance of environmental variability to snapper stock productivity it follows that our ability to manage the SNA 1 fishery would be greatly enhanced through better understanding of environmental factors governing recruitment. Identifying key SNA 1 nursery areas and quantifying the importance of these areas in terns of their overall contribution to the annual recruitment of the stock would have three fundamental management uses:

1. The estimation of year class strength (up to five years) prior to its subsequent entrance into the commercial fishery.
2. Estimation of stock boundaries and mixing rates (based on the adult distributions in relation to natal origin).
3. The protection and management of critical juvenile snapper habitats.

Sampling in east coast harbours with significant sea-grass meadows, in particular with sub-tidal elements, has found very strong juvenile snapper associations (along with other species such as trevally, parore, spotties, and garfish). For example, sampling of Rangaunu Estuary as part of Ministry of Fisheries project ZBD2004-08 returned densities of 160 ± 100, and 23 ± 3 0+ snapper per 100 m^2 at two shallow sub-tidal sites. With the harbour being 100 km^2 in size, and supporting 27 km^2 of seagrass, it's probable juvenile fish population is large. A similar story holds for Parengarenga Harbour to the north, which is ecologically very similar. Other habitats such as horse mussel beds are also important, and although snapper densities are around an order of magnitude less, they may cover extensive areas in the coastal zone.

The relative importance of 'coastal nurseries', such as the Bay of Islands, other sheltered coastal embayments, and around islands, versus 'estuarine' nurseries, is not known. Potentially important habitat types in these areas include horse mussels and sponges (known to be important from snapper-habitat work in the inner Hauraki Gulf), and potentially also other biogenic habitats including maerl beds and bryozoan mounds. To understand their relative importance in providing recruitment to the SNA 1 fishery, we need to systematically sample them with appropriate sampling methods, and also to use new techniques such as otolith chemistry. We suggest that as part of this proposed project we a) systematically sample different areas and habitats for their juvenile snapper nursery values, within a predefined environmental stratification and b) collect and store otoliths, for future work linking juvenile nurseries to their relative

contribution to adult stock, which means waiting until these fish have grown large enough to have recruited to the fishery (3–5 years).

This research is necessary because:

- SNA 1 supports important commercial, recreational and customary fisheries;
- recruitment variability is poorly understood; and
- identifying key habitats as nursery areas is important for spatial management of this resource.

For these reasons this project has a **High** priority.

Objective 1

Under this objective the research provider will identify major east Northland juvenile snapper areas and collect representative otolith samples for future microchemistry analysis. This work should be comprehensive and include all possible nursery areas. The otoliths should be collected and stored for future analysis under a separate project.

Weighting of Objectives:

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

Project Title:	Catch-at-age of the commercial catch of tarakihi in TAR 2
Project Code:	TAR2009/01
Start Date:	1 October 2009
Completion Date:	30 April 2011
Vessel Use:	Nil

Overall Objective

1. To determine the catch-at-age for the TAR 2 commercial catch.

Specific Objectives:

1. To characterise the TAR 2 fisheries.

2. To conduct representative sampling to determine the length, sex and age structure of the commercial catch of tarakihi in TAR 2. The target coefficient of variation (CV) for the catch-at-age is 30% (mean weighted CV across all age classes).

3. To age tarakihi otoliths collected during the above sampling programme.

Note:
The sampling design will be reviewed by the Inshore Working Group prior to the sampling commencing using the criteria set out in the "Guidelines to the design, implementation and reporting of catch sampling programmes". This contains details of what is expected in relation to designing and implementing a catch sampling programme and reporting the subsequent results back to a working group.

Reporting Requirements:

Research Reporting

Objectives 1 - 3

1. To present the proposed sampling design for specific objective 1 to the Northern Inshore working Group in April 2009.

2. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 March 2011.

3. To present the report in 2 above to meetings of the Inshore Fishery Assessment Working Group in March 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 April 2011.

Rationale:

General

The TAR 2 fishery has provided fairly stable harvests of over 1 000t since the 1950s, and catches around 1 600t to 1 700t since the 1970s. Current catches (1 729t in 2006–07) are most likely sustainable. However, CPUE should be monitored to see whether the recent declines in CPUE from the target fishery continue.

The state of the TAR 2 stock in relation to B_{MSY} is not known. Long periods of sustained catches around 1 600t to 1 700t indicate a flat yield curve for the stock, and suggest that the stock is probably close to B_{MSY}.

All attempts to date to establish a logbook programme for TAR 2 have been unsuccessful, and no biological information has been collected from this fishery. The Working Group emphasised the importance of implementing appropriate programmes (whether logbooks, observers or shed sampling) for collection of spatially and temporally representative biological information for TAR 2.

This research is necessary because:

- Logbook coverage of TAR 2 is very low; and
- CPUE for this fishery is low.

For these reasons this project has a **High** priority.

Objective 1

Results of the characterisation will be used to determine spatio-temporal sampling effort and which fisheries need to be sampled in order to obtain representative samples. The characterisation will also provide valuable input for the fisheries plan that is presently being developed.

Objective 2&3

Under this objective, three primary tasks are envisaged:

- estimation of the age structure of the populations;
- estimation of total mortality (*Z*) from catch composition data; and
- estimation of spawning biomass per recruit reference points.

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

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

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

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.2, 0.4 and 0.4.

Project Title: Catch-at-age of the commercial catch of tarakihi in TAR 3

Project Code: TAR2009/02

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: Nil

Overall Objective

1. To determine the catch-at-age for the TAR 3 commercial catch.

Specific Objectives:

1. To characterise the TAR 3 fisheries.

2. To conduct representative sampling to determine the length, sex and age structure of the commercial catch of tarakihi in TAR 3. The target coefficient of variation (CV) for the catch-at-age is 30% (mean weighted CV across all age classes).

3. To age tarakihi otoliths collected during the above sampling programme.

Note:
The sampling design will be reviewed by the Inshore Working Group prior to the sampling commencing using the criteria set out in the "Guidelines to the design, implementation and reporting of catch sampling programmes". This contains details of what is expected in relation to designing and implementing a catch sampling programme and reporting the subsequent results back to a working group.

Reporting Requirements:

Research Reporting

Objective 1-3

1. To present the proposed sampling design for specific objective 1 to the Southern Inshore working Group in April 2009.

2. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

3. To present the report in 2 above to meetings of the Southern Inshore Fishery Assessment Working Group in November 2010 in Wellington or Auckland. Presentations to more than one meeting may be required.

4. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2010.

5. To present the report in 4 above to meetings of the Southern Inshore Fishery Assessment Working Group in March 2011 in Wellington or Auckland. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 September 2010.

Rationale:

General

A standardised bottom trawl CPUE index for TAR 3 indicated that abundance in 2006 was near its lowest point across the series, having declined steadily from a peak in 1999–00. However, the Working Group noted that the bottom trawl fishery tends to catch smaller fish, and will provide a mixed signal, tending towards a recruitment index. It is therefore difficult to interpret to what extent this is an index of abundance. The setnet fishery is indexing a migrating adult spawning population, and this index is flatter, but still shows a declining trend since 2001–02, similar to that in the trawl index. CPUE should be monitored to see whether the CPUE decline observed in these two fisheries continues to decline. The 2007 index for tarakihi from the reinstated winter survey off the east coast of the South Island was the second-highest in the series.

The status of the TAR 3 Fishstock in relation to B_{MSY} is not known. It is not known if the current TACC and recent catch levels will allow the stock to move towards a size that will support the maximum sustainable yield.

This research is necessary because:

- Logbook coverage of TAR 3 is very low; and

- CPUE for this fishery is low.

For these reasons this project has a **High** priority.

Objective 1

Results of the characterisation will be used to determine spatio-temporal sampling effort and which fisheries need to be sampled in order to obtain representative samples. The characterisation will also provide valuable input for the fisheries plan that is presently being developed.

Objective 2&3

Under this objective, three primary tasks are envisaged:

- estimation of the age structure of the populations;
- estimation of total mortality (Z) from catch composition data; and
- estimation of spawning biomass per recruit reference points.

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

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

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

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.2, 0.4 and 0.4.

Project Title: Monitoring the length and age structure of commercial landings of trevally in TRE 7

Project Code: TRE2009/02

Start Date: 1 October 2009

Completion Date: 30 September 2012

Vessel Use: None

Overall Objective:

1. To determine the length and age structure of the commercial catch trevally in TRE 7.

Specific Objectives:

1. To characterise the TRE 7 fishery by analysing existing commercial catch and effort data to the end of 2008/09 fishing year.

2. To conduct representative sampling to determine the length, sex and age composition of the commercial catch of trevally (*Pseudocaranx dentex*) in TRE 7 during the 2009/10, 2010/11, 2011/12 fishing years. The target coefficient of variation (CV) for the catch-at-age is 30 % (mean weighted CV across all age classes) combined across sexes.

3. To explore the times series of catch sampling data, in particular, for any significant changes in the length and age composition of commercial catches.

Note:
The sampling design will be reviewed by the Inshore Working Group prior to the sampling commencing using the criteria set out in the "Guidelines to the design, implementation and reporting of catch sampling programmes". This contains details of what is expected in relation to designing and implementing a catch sampling programme and reporting the subsequent results back to a working group.

Reporting Requirements:

Research Reporting

<u>Objective 1-3</u>

1. To present the proposed sampling design for specific objective 1 to the Southern Inshore working Group in April 2009.

2. To submit to the Chief Scientist MFish a Progress report as specified in Research Reporting form 4 by 14 March 2010.

3. To present the report in 2 above to meetings of the Southern Inshore Fishery Assessment Working Group in November 2010 in Wellington. Presentations to more than one meeting may be required.

4. To submit to the Chief Scientist MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 November 2013.

5. To present the report in 4 above to meetings of the Southern Inshore Fishery Assessment Working Group in March 2014 in Wellington. Presentations to more than one meeting may be required.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

To submit any data generated, collected or modified during the course of this project to the Research Data Manager, MFish by 30 September 2012.

Rationale:
The recent trawl catch sampling series for TRE 7 commenced in 1997-98 and continued annually until 2000-01 fishing year (4 year series). A review of TRE 7 catch sampling results was conducted but Walsh and McKenzie in 2006 (FAR in press). Walsh and McKenzie found that, although strong and weak age cohorts were evident within sampling years, the TRE 7 series lacked clear continuity in age structure between years. Walsh and McKenzie found evidence of spatial differences in length composition within TRE 7 and suggested that a failure to account for spatial heterogeneity in TRE 7 age structure may explain the lack of clarity in the TRE 7 catch at age time series. Catch sampling in TRE 7 was reinstated for the 2006-07 and 07-08 fishing years and for the first time three spatial areas (90 mile beach; Kaipara/ Manukau; South Taranaki Bight) were recognised in the design. Results recently available for the 2006-07 fishing year show Walsh and McKenzie's hypothesis was correct, i.e. clear spatial differences in age composition within TRE 7 were apparent.

In light of this, the 2009 stock assessment proposed for TRE 7 stock will need to take into account the observed spatial difference in age composition and with only two years of spatial catch-at-age information available a spatially disaggregated model is likely to have poor precision. It is proposed to recommence TRE 7 catch sampling in 2009/10 and sample for a further two years though to 2011/12.

This research is necessary because:

- No stock assessment information, or any other form of monitoring, is available to determine the status of TRE 7; and

- interdependence of commercial catches on available quota for other trawled species.

For these reasons this project has a **High** priority

Objective 1

Results of the characterisation will be used to determine spatio-temporal sampling effort and which fisheries need to be sampled in order to obtain representative samples. The characterisation will also provide valuable input for the fisheries plan that is presently being developed.

Objective 2&3

Under this objective, three primary tasks are envisaged:

- estimation of the age structure of the populations;

- estimation of total mortality (Z) from catch composition data; and

- estimation of spawning biomass per recruit reference points.

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

- estimates of total fishing mortality that incorporate uncertainty in key parameters (e.g. age at full recruitment and other selectivity issues) and the different properties of regression and Chapman-Robson estimators; and

- Discussion of the consistency of signals over time and space should be included e.g. is the progression of cohorts apparent and are estimates of Z stable between years.

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

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.2, 0.4 and 0.4.