

INSHORE FINFISH FISHERIES

Code	Title
BNS2008/01	Relative abundance of BNS 1, 2, 3, 7, and 8
HPB2008/01	Maturity and age structure of hapuka (<i>Polyprion oxygeneios</i>) stocks
INS2008/02	Approaches for determining in-season TAC increases for 2 nd Schedule stocks
INS2008/03	National stock relationships: SPO and SCH

Project: Relative abundance of BNS 1, 2, 3, 7, and 8

Project Code: BNS2008/01

Start Date: 1 October 2008

Completion Date: 30 September 2010

Vessel Use: Subject to tender

Overall Objectives:

1. To conduct a pilot survey to assess the feasibility of using hybrid surveys to determine the relative abundance and distribution of bluenose (*Hyperoglyphe antarctica*).

Specific Objectives:

1. To design and test methods that could be used for a hybrid survey to determine the relative abundance and distribution of bluenose (*Hyperoglyphe antarctica*) in BNS 1, 2, 3, 7, and 8. The target coefficient of variation (CV's) of the biomass estimates is 20-30%.
2. To collect biological information for bluenose caught during the testing phase and any relevant environmental information.
3. To provide information on stock structure and movements.

Note:

The design of the survey will be reviewed by the Inshore Fishery Assessment Working Group prior to testing. This project may require the allocation of a number of observer days to monitor the survey. It is not expected that testing of the approach will occur in all areas and the completion date will depend on the timing of the fishery in which the approach is tested.

Reporting Requirements:

Research Reporting

Objectives 1 to 3

1. To Present the Survey design and methodology to the Inshore Fishery Assessment Working Group for approval in March 2009 prior to commencing the first survey.
2. To submit to MFish a Voyage Programme as specified in Research Reporting form 2, one month before the beginning of the survey.
3. To submit to MFish a Voyage Report as specified in Research Reporting form 3, one month after the completion of the survey.

4. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2010.
5. To present the report in 5 to meetings of the Inshore Fishery Assessment Working Group in August-September 2010 in Wellington or Auckland. Presentations to more than one meeting may be required.
6. To submit to the Chief Scientist, MFish a draft revised Working Group Report as specified in Research Reporting form 8 for bluenose by 1 September 2010.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

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

Rationale:

At a workshop held in May 2005, which focused on inshore longline, species it was recommended that the use of commercial vessels to undertake a hybrid survey and conduct tagging of bluenose be implemented on a pilot basis. The workshop noted:

- Clusters of longline effort were defined, resulting in 15 clusters of more than 50 sets.
- A “hybrid survey” was simulated by resembling the catch and effort data within each cluster to determine the scale of the CV’s that would be obtained over a range of sets that would constitute a possible survey.
- The analysis suggested that CV’s of 20-30% were achievable for each cluster/stratum when the number of sets exceeded 8 (12 was the maximum in the analysis). Combining stratum CV’s over a number of clusters should produce even lower overall survey CV’s.
- Abundance indices derived from surveys using industry vessels held much promise and a pilot survey based on such a design should be progressed.
- Survey sets should be sufficiently simple for fishers to implement without observers.
- A high degree of sustained industry co-operation is necessary for such surveys to succeed in providing reliable indices of abundance.
- A pilot survey design should be developed and implemented using a subgroup of co-operative fishers in one of the major bluenose QMAs to test whether such a survey is feasible.

- A NZ-wide mark-recapture programme using detachable hooks as described by Horn (2003) should be undertaken to better understand bluenose movement/stock structure and to assist with the interpretation of survey results.

Objectives 1 and 2

The proposed survey should provide valuable time series of relative abundance indices for bluenose. Survey design should be based on cost benefit analysis incorporating the interplay between simulated CV, the power to detect change in relative biomass, and the cost. The tenderer will consult with industry representatives over the design and testing of the hybrid survey approach.

The survey design will be reviewed by the Inshore Fishery Assessment Working Group prior to testing and outputs from this project will include recommendations for future refinement of the approach and potential areas where it could be applied and the likely frequency of surveying.

Detailed catch and environmental information should be collected during hybrid survey testing. This will allow for better understanding of factors that might affect catchability of the fishing gears used.

Age, length, sex and maturity information should be collected as part of the biological sampling programme during the testing phase of this survey.

Objective 3

Tagging bluenose using the *in situ* methods described by Horne (2003) provides a relatively cheap opportunity to investigate movement patterns and stock structure. Under this objective some BNS will be tagged to support future analyses.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.8, 0.1, 0.1.

Project: Trends in age structure of hapuku (*Polyprion oxygeneios*) stocks

Project Code: HPB2008/01

Start Date: 01 October 2008

Completion Date: 30 September 2009

Vessel Use: None

Overall Objectives:

1. Document temporal and spatial trends in population age structure of hapuku.

Specific Objectives:

1. Utilize existing collections of biological samples from hapuku to document age and size structure throughout NZ waters and for various fishery sectors.
2. Utilize existing collections to develop age-at-maturity information for hāpuka that can be related to fishery selectivity for each nominal stock.
3. Design a fishery sampling plan to collect information from stocks or fishery sectors (including recreational fisheries) for hāpuka and bass that currently do not have sufficient samples to determine current age structure.

Reporting Requirements:

Research Reporting

Objectives 1 to 3

1. To submit to MFish a Progress report as specified in Research Reporting form 4 by 31 July 2009.
2. To present the report in 1 above to meetings of the Inshore Fishery Assessment Working Group in July-August 2009 in Wellington or Auckland. Presentations to more than one meeting may be required.
3. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 30 September 2009.
4. To submit to MFish a draft revised Working Group Report as specified in Research Reporting form 8 for groper by 1 September 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

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

Rationale:

General

Hapuku (*Polyprion oxygeneios*) and bass (*P. americanus*) comprise the HPB stock complex which has supported significant catches over a long period of time. It is an important target and bycatch in many inshore commercial fisheries and is also of considerable importance to recreational and customary fishers.

Presently there is no method to monitor the abundance of either of the species and attempts to estimate CPUE concluded that CPUE indices could not be developed for hapuku and bass either separately or in combination. Given the value of these species to all sectors, it is considered important to develop some type of monitoring tool to assess stock status.

The hybrid longline survey being developed for bluenose (BNS2008/01) could hold some promise for monitoring hapuku and bass, however, the focus of the current project is determining whether trends in size / age composition can be monitored for hapuku.

Hapuku are long-lived, with late age-at-maturity, caught in many fisheries and fishery sectors and they recruit to the fishery years before they are sexually mature. Hapuku are now only rarely encountered in shallow waters and, even in deeper waters, their size distribution is truncated. When temporal trends in size have been investigated, decreases in mean size were apparent throughout the early 90s in trawl fisheries (which mainly catch juveniles). Size range in line fisheries was also significantly smaller than that of unfished populations in the Kermadec Islands (Paul 2002b). Because their growth curve is very flat once mature, a significant shift in mean size likely indicates an even greater loss in the number of age classes.

Ageing methodology has been described and validated by Francis et al. (1999), but their work focused on validation and growth rates. No age-related population work has been done and no direct age-at-maturity studies exist. In addition, the only studies describing size structure, Paul (2002b) and Francis et al. (1999), stem from data now well over 20 years old and mostly from a small geographic area (Johnston 1983, Roberts 1989). Evidence of steady size truncation was already apparent in data from observer data collected in the early 1990's. Data from fisheries observers have been pooled spatially and are therefore confounded by potential effects of depth and gear selectivity, but large differences in size structure are suggested. Maturity is estimated solely from a study of Cook Strait hapuku in 1979 and based on size, not age (Johnston 1983). A quantitative assessment of trends in size and age of several stocks

of hapuku, along with a good understanding of the reproductive potential each stock is needed.

Objective 1

The objective is to integrate existing information from early studies, information from survey and fishery observer collections made since 1998 to determine the current age and size structure of several stocks of hapuku in New Zealand waters. Over 5000 length, sex and otolith samples have been collected. 2,506 are female, with good representation from Southland, South-east Coast, WCSI, Chatham Rise, and ECNI.

Objective 2

Most samples collected will contain reproductive stage information which will be pooled to create the best estimate of age- and size-at-maturity for each region.

Objective 3

It is likely that some regions will not have the sample density needed for a robust age structure and maturity ogive. For these areas, the project would develop a sampling plan to collect the information needed for future 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): 0.33, 0.33, 0.33.

Project: Approaches for determining in season TAC increases for 2nd Schedule stocks

Project Code: INS2008/02

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: None

Overall Objectives:

1. To examine approaches for managing Second Schedule stocks.

Specific Objectives:

1. To examine approaches for determining in-season TAC increases in FLA and RCO stocks.

Reporting Requirements:

Research Reporting

Objective 1

1. To submit to MFish a Progress report as specified in Research Reporting form 4 by 30 March 2009.
2. To present the report in 1 to meetings of the Inshore Fishery Assessment Working Group in March-April 2009 in Wellington or Auckland. Presentations to more than one meeting may be required.
3. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

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

Rationale:

FLA and RCO are included in the Second Schedule of the Fisheries Act (1996) as stocks whose abundance is highly variable. For such stocks, s13(7) of the Fisheries Act allows the Minister to implement an in-season increase to the TAC.

TACCs for all FLA stocks are well in excess of commercial landings and aside from RCO 7, TACCs have not been approached for any RCO stock since 1999/2000. Concerns regarding the sustainability of the current TACs led to reductions for RCO 7 and FLA 7 from on 1 October 2007. With these reductions it is possible that the TACC could be exceeded in good years and the TACC for RCO 7 was overcaught during the 2007/08 fishing year.

These issues highlight the need for criteria to allow for in-season increases in TACs for RCO and FLA stocks in instances where there are clear opportunities for increased utilisation while ensuring sustainability.

Presently there is no scientific basis for setting TACs and implementing in-season increases for these Second Schedule stocks. The goal of this project is to examine historical data for various RCO and FLA stocks to determine how fluctuations in abundance (in particular, increases in abundance) of these species can be predicted in sufficient time for the Minister to consult and implement an in-season increase. Ideally, such an approach, or decision rule, will also provide some guidance on the level of any increase. However, it will not be sufficient to just predict that catches could exceed the TACC without providing some information that sustainability will not be at risk.

Objective 1

Information to potentially inform development of a decision rule is available for FLA or RCO stocks. In addition to routine catch and effort data, data exists from trawl surveys (noting that there are some concerns regarding the utility of some of the survey series for monitoring abundance of flatfish), and environmental data may also be of use to help predict recruitment in these recruitment driven fisheries.

Due to recent catches and TAC decisions, the work should focus on FLA 3, RCO 3, and RCO 7, though it is expected that the principles of any decision rules should be easily applied to other stocks.

Any decision rules developed should indicate the opportunity for any increase and provide some guidance on the likely level of an increase. Given the time frames within which management occurs, predictions early in the fishing year are needed.

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: National stock relationships: SPO and SCH

Project Code: INS2008/03

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: None

Overall Objectives:

1. To determine the implications of the current QMAs for stock assessment and management of selected inshore fish species.

Specific Objectives:

1. To assess movement of rig (*Mustelus lenticulatus*) and school shark (*Galeorhinus galeus*) between FMA's throughout New Zealand and adjacent waters.
2. To assess life-history and fishery characteristics of rig and school shark throughout New Zealand.
3. To determine the implications of the current QMAs for stock assessment and management of these two species.

Note:

The intention is to review information on stock structure and potential mixing between QMAs for many important inshore stocks over time. This will be done by assessing two species per year.

Reporting Requirements:

Research Reporting

Objectives 1 to 3

1. To submit to MFish a Progress report as specified in Research Reporting form 4 by 30 March 2009.
2. To present the report in 1 to meetings of the Inshore Fishery Assessment Working Group in March-April 2009 in Wellington or Auckland. Presentations to more than one meeting may be required.
3. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 September 2009.

4. To submit to MFish a draft revised Working Group Report as specified in Research Reporting form 8 for the relevant species by 1 September 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

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

Rationale:

General

Many inshore stocks were introduced to the QMS in its early days, with QMAs based on the information available at that time. Since then, considerable information has been gained through biological studies and fishery characterisations and it has become apparent that some QMA are more appropriate than others.

As a result of this Fishery Managers are increasingly facing the difficult task of having to make management decisions for a QMAs which might comprise multiple biological stocks or may only comprise part of a biological stock. Advice on the levels and implications of mixing between adjacent QMAs is one of the most commonly asked questions by Fishery Managers of the Science team.

The aim of this series of projects will be to review all existing data that could provide information on stock structure and mixing between QMAs. An important output will be an assessment of the management implications of the current QMAs. Species/stocks that are considered for this work over time include:

- School shark
- Rig
- Tarakihi
- Bluenose
- Snapper (SNA 7 and SNA 8)

In this project work will focus on school shark and rig.

Rig are caught in coastal waters throughout New Zealand. Most of the catch is taken from water less than 50 m deep during spring and summer, when rig aggregate inshore. The AMP FAWG concluded that a major uncertainty in the preliminary SPO 7 stock assessment was the relationship of rig stocks between areas: is SPO 7 a unit stock? If not, what is the correct relationship of sub-areas within SPO 7 or with

SPO 3 or SPO 8? The Working Group agreed that there was uncertainty in this issue and that information should be collected to address this problem.

School shark has supported a variety of fisheries around New Zealand from the early 1940s onwards. In terms of stock structure the Plenary states “Although tagged fish movements suggest that there is a single biological stock, there are no definitive data on which to base changes to the stock boundaries used in previous assessment documents. The majority of recaptures have been within the same QMA. Stock boundaries are based on these QMAs, and are essentially in place to prevent localised depletion.”

Objectives 1 and 2

Stock mixing occurs in some species and some regional fisheries, therefore, exploit more than one stock. In addition, biological stock boundaries do not always coincide with QMA boundaries. Consequently, management by quota within Fishstocks is likely to be sub-optimal for individual stocks where high levels of mixing occur.

This project should review all existing data for school shark and rig, e.g. catch and effort data, any AMP fishery characterisations, CPUE series, biological information, and any relevant tagging data.

Objective 3

One of the important outputs of this work will be an assessment of the implications of current management areas.

If the current management areas are considered inappropriate (i.e. there are high risks to sustainability by using them), the research provider should suggest possible alternatives including alternative QMA boundaries. Also, any future research that might be needed to better clarify stock boundaries or levels of mixing should be recommended.

Weighting of Objectives:

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.33, 0.33, 0.33.

Project: Estimation of inshore fish abundance off the west coast South Island using trawl surveys

Project Code: INT2008/01

Start Date: 1 October 2008

Completion Date: 30 September 2009

Vessel Use: R.V. *Kaharoa*,

Overall Objectives:

1. To determine the relative abundance and distribution of inshore finfish species off the west coast of the South Island, and Tasman Bay and Golden Bay; focusing on red cod (*Pseudophycis bachus*), red gurnard (*Chelidonichthys kumu*), stargazer (*Kathetostoma giganteum*), tarakihi (*Nemadactylus macropterus*) and spiny dogfish (*Squalus acanthias*).

Specific Objectives:

1. To determine the relative abundance and distribution of red cod, red gurnard, stargazer, tarakihi and spiny dogfish off the west coast of the South Island from Farewell Spit to the Haast River mouth, and within Tasman Bay and Golden Bay by carrying out a trawl survey. The target coefficients of variation (CV) of the biomass estimates for these species are as follows: red cod (20-25 %), red gurnard (20 %), giant stargazer (20 %), tarakihi (20 %) and spiny dogfish (20%).
2. To collect the data and determine the length frequency, length-weight relationship and reproductive condition of red cod, red gurnard, giant stargazer, tarakihi and spiny dogfish.
3. To collect otoliths from red cod, red gurnard, giant stargazer, tarakihi and spines from spiny dogfish.
4. To collect the data to determine the length frequencies of all other Quota Management System (QMS) species.
5. To tag live skate, school shark and rig.
6. To determine stock affiliation of pre-recruit tarakihi in Tasman/Golden Bay nursery area using mark recapture.
7. To identify benthic macro-invertebrates collected during the trawl survey.
8. To review data collected by the WCSI series to determine for which species relative abundance trends and size composition information should be provided in each survey report.

Reporting Requirements:

Objective 1

1. To submit to MFish a Voyage Programme as specified in Research Reporting form 2, one month before the beginning of the survey
2. To submit to MFish a Voyage Report as specified in Research Reporting form 3, one month after the completion of the survey
3. To submit to MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 October 2009
4. To present the report detailed in 3 above to a meeting of the Inshore Fishery Assessment Working Group by 30 November 2009

Objectives 2 – 4

1. To submit MFish a Final Research Report as specified in Research Reporting form 5 or a draft Fishery Assessment Report as specified in Research Reporting form 7 by 1 October 2009.
2. To present the report detailed in 3 above to a meeting of the Inshore Fishery Assessment Working Group by 30 November 2009

Objectives 5 – 6

1. To present the report detailed in 3 above to a meeting of the Inshore Fishery Assessment Working Group by 30 November 2009

Objective 7 and 8

1. To submit 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 2009.
2. To submit to the Chief Scientist, MFish a draft revised Working Group Report as specified in Research Reporting form 8 for the relevant species by 30 November 2009.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

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

Data Reporting

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

Rationale:

The species covered by this survey time series include most of the major species in the inshore trawl fishery in QMA 7.

The R.V. *Kaharoa* has conducted trawl surveys off the west coast of the South Island since 1992 providing a time series of relative abundance and biological data for red cod, red gurnard, stargazer and tarakihi.

The WCSI survey also provides relative abundance indices for other commercially caught species, including barracouta, and pre-recruit spiny dogfish, hoki and hake, and data on biological parameters that can be used on the assessments of these species, including age/length frequency, length-weight relationships, and reproductive condition. Survey frequency was recently increased from once every third to once every second year.

Objectives 1, 2, 3 and 4

A long-term time series of fishery- independent relative abundance indices is a useful tool to monitor fish stocks and interpret fluctuations in abundance. The proposed WCSI trawl survey will maintain the valuable time series of relative abundance indices for red cod, red gurnard, stargazer and tarakihi and provide data that can be used in stock assessments. For STA 7, the survey biomass index is the major criterion in the decision rule for the STA 7 AMP. In 2005 the Inshore Fishery Assessment Working Group concluded that the ranking method of Francis *et al.* (2001) should be routinely used to determine the likelihood of each survey being anomalous.

Objective 5

Tagging lively chondrichthians caught during the survey provides a relatively cheap opportunity to investigate movement patterns and stock structure. SPO 7 is currently managed within a stakeholder lead fisheries plan. Although standardized CPUE in Tasman and Golden Bays indicates that abundance is declining, information on exchange between this area and the west coast is necessary for reliable stock assessment. New Zealand school shark are assumed to comprise a single biological stock. Quotas for SCH 3, 5, 7 & 8 were increased in October 2004 under AMP management. Information on movement patterns would inform standardized CPUE trends, particularly if those for the different Fishstocks are poorly correlated.

Objective 6

There are two tarakihi nursery areas in New Zealand: the Canterbury Bight and Tasman/Golden Bays. At this stage it is not clear which QMAs are serviced by each nursery area. Such knowledge is important for stock assessment and for the interpretation of abundance indices (e.g. CPUE). Pre-recruit tarakihi will be tagged

using dedicated short tows. Sample design, including tag reporting and numbers to be tagged, will be reviewed by the Inshore FAWG.

Objective 7

This objective will continue with the time series of information on the community structure of benthic invertebrates in the trawl survey area (initiated during the 2003 survey), as a means of monitoring the environmental effects of fishing.

Objective 8

At the RPG meeting in August 2005 it was agreed that FARs for each WCSI survey should include trends in relative abundance and size structure for all QMS species effectively monitored by the survey, and not just the target species. The purpose of this objective is to review data produced by the survey series for all non-target QMS species. This review will also provide information on the species to be used in the ranked analysis for each survey (see objectives 1-4).

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, 0.1, 0.05, 0.05, 0.05, 0.05, 0.05, 0.05