

Aquatic Environment

BEN2009-02	Monitoring change in benthic communities in Spirits Bay
BEN2009-04	Spatial overlap of scallop dredging and benthic habitat
ENV2009-07	Habitats of particular significance for fisheries management: Kaipara Harbour
PRO2009-01A	Abundance, distribution and productivity of Hector's (and Maui's) dolphins
PRO2009-04	Development and efficacy of seabird mitigation measures

Project: Monitoring change in benthic communities in Spirits Bay

Project Code: BEN2009-02

Start Date: 1 October 2009

Completion Date: 30 September 2011

Vessel Use: Subject to tender

Overall Objective:

1. To monitor changes in the benthic invertebrate communities in Spirits Bay following closure of an area to bottom trawling and dredging.

Specific Objectives:

1. To survey Spirits Bay and Tom Bowling Bay benthic invertebrate communities according to the monitoring programme designed in ENV2005/23.
2. To assess changes in benthic communities inside and outside of the closed area since 1997.

Reporting Requirements:

Specific Objectives 1 and 2

1. To submit to MFish, a Research Progress Report as specified in Research Reporting form 4 by 31 July 2010.
2. To submit to MFish, a draft Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 31 July 2011.
3. To present the report in Reporting Requirement 2 to a meeting of the Aquatic Environment Working Group by 30 August 2011. Presentations to more than one meeting in Wellington may be required.
4. To submit to MFish a revised draft Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 30 September 2011.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting (form 13) is required for this project in accordance with the Conducting Research with the Ministry document.

Data Reporting

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

Rationale:

General

Spirits Bay (Piwhane) is at the northern-most tip of the North Island of New Zealand, between North Cape and Cape Reinga. Ngati Kuri have been the kaitiaki of these waters for at least the last 700 years, but the area is of great cultural and spiritual significance to all Maori, as the pathway to the spiritual world of their ancestors. The area also supports several commercial fisheries including (but not restricted to) an important part of the Northland scallop fishery and some bottom trawling for snapper and trevally, and recreational fishing interests.

Concerns over sponge bycatch in the area lead to a voluntary closure to scallop dredging in Spirits Bay and the adjacent Tom Bowling Bay in 1997. The foliose nature and large size of much of the colonial, filter-feeding fauna in Spirits Bay suggested that, not only was the community unique, but it was also likely to be susceptible to damage through suffocation and burial during the course of bottom dredging for scallops.

Because of concerns over the effects of fishing on benthic communities in the area, the Ministry of Fisheries commissioned research to examine the nature and extent of the sponge- and bryozoan-dominated community between North Cape and Cape Reinga (ENV9805, conducted between October 1998 and September 2000). This was seen as a first step in assessing the extent to which mobile bottom fishing gear affected benthic community structure in the area. A combination of spatial, temporal, and a priori information on likely sensitivity strongly suggests that there had been a substantial change in the benthic community in the most intensively fished part of Spirits Bay. As a second step, therefore, the Ministry funded project ENV2005-23 (recently completed) to design a more focussed programme to monitor the changes in the benthic communities in the area. This project would provide for the second focussed survey in a time series to monitor changes in benthic communities in the area. Additional information is available from the wider area survey conducted under ENV9805 but direct comparisons with that study will be complicated by differences in sampling approaches and scale.

Strategic Relevance

This project forms a part of the programme to determine direct and indirect effects of fishing on benthic biodiversity, habitats of particular significance for fisheries management, and maintenance of biological diversity in the marine environment. This project is therefore consistent with the *Marine Environment Research* section of the *Ministry of Fisheries Strategic Research Directions* document. This project contributes to Objective 3.1 (d), (e), and (f) and 3.4 (a) to (d) of the *Biodiversity Strategy* (for which the Ministry of Fisheries was identified as lead organisation) in that it will provide for an assessment of the threat of fishing to biodiversity, the development of an environmental monitoring system, increased community

awareness of the effects of our activities on marine biodiversity, the identification of species and habitats at risk from fishing, and improved environmental impact assessment of fishing. This work is, therefore, strongly supportive of the *Biodiversity Strategy* and will lead to greatly improved tools for better management of the incidental effects of fisheries. In particular, this project will enable the identification of the species or habitats most at risk from dredge fishing (as mandated by the Ministry's *Strategy for Managing the Environmental Effects of Fishing*), and contribute to the Ministry's priority (in the *Statement of Intent*) of improving the environmental performance of fishing through an ability to assess and monitor levels of modification of the aquatic environment relative to specified standards. Consistent with the 2005 Strategy for Managing the Environmental Effects of Fishing (SMEEF), the information will also be used to develop and refine standards for the effects on benthic habitat through better understanding of the rate of recovery of specific habitats. The 2008/13 Statement of Intent (SOI) states "Effective management requires environmental fisheries standards to be set and achieved. Standards should help achieve this outcome by defining the acceptable level of risk to the aquatic environment from fishing impacts, and the acceptable level of impacts of fishing on stocks." The SOI also establishes a priority work area of "Progressing development of environmental fisheries standards", to which this study would contribute. Therefore, this research is of a high priority.

Weighting of Objectives

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.85: 0.15.

Project: Spatial overlap of scallop dredging and benthic habitat

Project Code: BEN2009-04

Start Date: 1 October 2009

Completion Date: 30 September 2010

Vessel Use: Subject to tender

Overall Objective:

1. To assess the spatial overlap of scallop dredging and benthic habitats in the Northland and Coromandel scallop fisheries.

Specific Objectives:

1. To use existing information on substrate, flora, fauna, and environmental drivers of habitat type to estimate the distribution of benthic habitats off the north-east coast of the North Island (10–60 m depth).
2. To rank the vulnerability to fishing disturbance of habitat classes developed in Objective 1.
3. To describe the spatial pattern of dredge fishing for scallops and assess overlap with each of the habitat classes developed in Objective 1.

Reporting Requirements:

Specific Objectives 1–3

5. To submit to MFish, a draft Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 31 July 2010.
6. To present the report in reporting requirement 1 to a meeting of the Aquatic Environment Working Group by 31 August 2010.
7. To submit to MFish a revised draft Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 30 September 2010.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting (form 13) 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

Scallop dredging occurs in the Northland and Coromandel scallop fisheries in various bays and coastal areas between Spirits Bay in the north and Motiti Island in the south. Scallops are widespread off the north-east coast in silty to gravely habitats, but many areas where scallops are abundant are closed to scallop dredging, especially enclosed harbours and areas of high non-commercial interest. It is thought that dredging is spatially focussed in the areas where it does occur, but the fine-scale distribution of fishing relative to habitats of different sensitivities has not been well-documented, especially in the Northland fishery. Thus, although dredging for shellfish is known to have the greatest benthic impacts of the common fishing methods, the system-wide effects of such fishing are less well understood.

Objective 1

A previous project designed to provide information to underpin the development of a “proof of concept” Fisheries Plan for the Coromandel Scallop Fishery (ZBD2005/15) developed proxy habitat classes and estimated their overlap with an estimated “footprint” of the commercial fishery. That study generated a hierarchical spatial classification for the fishery area using continuous data on depth, tidal current, and mean orbital velocity at the seabed. The 10-class classification from this model was combined with categorical data from existing sediment charts by dividing each model class into sediment-type components. This procedure produced 34 relevant class-sediment combinations that were assumed to represent 34 different habitat types. This relatively ad hoc procedure was the best that could be done at the time, given the general-purpose nature of the marine environment classification approach then available (the 2005 MEC), but better methods and more data are now available, including a “benthic-optimised MEC” nearing completion under project BEN2006/01A. It is anticipated that these newer approaches should provide a substantially better classification of benthic habitats throughout the northeast coast of the North Island to a depth of about 60 m, including both the Northland and Coromandel scallop fisheries. This objective would collate and extend all the habitat class information for both the Northland and Coromandel scallop fisheries.

Objective 2

Concerns over heavy bycatch of sponges and other structure-forming colonial taxa in Spirits Bay and Tom Bowling Bay lead to a voluntary closure to scallop dredging there in 1997 and, eventually, to a regulated closure. These types of fauna are recognized as being sensitive to disturbance by fishing gear, and some taxa are slow to recover from such disturbance. Horse mussels are also known to be sensitive to dredge disturbance, but increasingly we are becoming aware of their importance as nursery habitat for highly valued species of fish like snapper and trevally. They also provide an important structural focus for biodiversity on otherwise moderately-structured soft-sediment habitats, and play other important roles in system productivity. Horse mussels are

important to tangata whenua and impacts on them by dredging would be a particular concern for them. This objective will provide for a risk-based assessment of the likely sensitivity of the different habitat types identified in Objective 1 using existing empirical information, published sensitivity rankings where appropriate, and ecological first principles.

Objective 3

Dredging for scallops is reported on CELR forms, almost always using statistical reporting areas rather than latitudes and longitudes. This low reporting resolution makes it impossible to assess the overlap between fishing and habitats accurately. However, many scallop dredgers use stored recollections, logbooks and/or sophisticated GPS plotters to record and guide their fishing activity. With the cooperation of the skippers, this information could form the basis of a cost-effective approach to describing the distribution of fishing effort at a resolution that will enable comparisons with the distribution of habitat types developed in Objective 1. For the Coromandel fishery, it was provisionally concluded in project ZBD2005/15 that all but two habitat classes likely to be sensitive to dredge disturbance (c.f. the rankings in Objective 2) had not been fished over more than two-thirds of their extent in the past 10 years. The remaining two habitat classes had been fished over 65 and 80% of their extent. This approach can, therefore, be used to identify which, if any, habitat classes and areas might need closer scrutiny.

Strategic Relevance

This project forms a part of the programme to determine direct and indirect effects of fishing on benthic biodiversity, habitats of particular significance for fisheries management, and maintenance of biological diversity in the marine environment. This project is therefore consistent with the *Marine Environment Research* section of the *Ministry of Fisheries Strategic Research Directions* document. This project contributes to Objective 3.1 (d), (e), and (f) and 3.4 (a), (b), and (d) of the *Biodiversity Strategy* (for which the Ministry of Fisheries was identified as lead organisation) in that it will provide for an assessment of the threat of fishing to biodiversity, the development of an environmental monitoring system, increased community awareness of the effects of our activities on marine biodiversity, the maintenance of associated fauna, the identification of species and habitats at risk from fishing, and improved environmental impact assessment of fishing. This work is, therefore, strongly supportive of the *Biodiversity Strategy* and will lead to greatly improved tools for better management of the incidental effects of fisheries. In particular, this project will enable the identification of the species or habitats most at risk from dredge fishing (as mandated by the Ministry's *Strategy for Managing the Environmental Effects of Fishing*), and contribute to the Ministry's priority (in the *Statement of Intent*) of improving the environmental performance of fishing through an ability to assess and monitor levels of modification of the aquatic environment relative to specified standards. This project will generate information to meet objectives developed for the Coromandel scallop "proof-of-concept" fisheries plan and analogous environmental objectives being developed for the Northland scallops fisheries plan. Consistent with the 2005 Strategy for Managing the Environmental Effects of Fishing (SMEEF), the information will also be used to develop and refine standards for the effects on benthic habitats. The 2008/13 Statement of Intent (SOI) states "Effective management requires environmental fisheries standards to be set and achieved. Standards should help achieve this outcome by defining the acceptable level of risk to the aquatic environment from

fishing impacts, and the acceptable level of impacts of fishing on stocks.” The SOI also establishes a priority work area of “Progressing development of environmental fisheries standards”, to which this study would contribute. Therefore, this research is of a high priority.

Weighting of Objectives

Weightings indicate the relative importance of each of the objectives. The weightings for the objectives in this project are (in order): 0.3; 0.2; 0.5

Project: Habitats of particular significance for fisheries management: Kaipara Harbour

Project Code: ENV2009-07

Start Date: 1 October 2009

Completion Date: 30 September 2011

Vessel Use: Subject to tender

Overall Objectives:

1. To identify and map areas and habitats of particular significance in the Kaipara Harbour that support fisheries, and assess potential fishing and land-based threats to their function.

Specific Objectives:

1. Collate and review information on the role and spatial distribution of habitats in the Kaipara Harbour that support fisheries production.
2. Assess historical, current, and potential anthropogenic threats to these habitats that could affect fisheries values, including fishing and land-based threats.
3. Design and implement cost-effective habitat mapping and monitoring surveys of habitats of particular significance for fisheries management in the Kaipara Harbour.

Reporting Requirements:

Specific Objectives 1 and 2

8. To submit to MFish, a draft Aquatic Environment and Biodiversity Report as specified in Research Reporting form 6 by 31 August 2010.
9. To present the results of reporting requirement 1 to a meeting of the Aquatic Environment Working Group by 30 September 2010.
10. To submit to MFish, a revised draft Aquatic Environment and Biodiversity Report as specified in Research Reporting form 6 by 31 October 2010.

Specific Objective 3

11. To submit to MFish, a Research Progress Report as specified in Research Reporting form 4 proposing a habitat mapping and monitoring survey by 31 August 2010.

12. To present the results of reporting requirement 4 to a meeting of the Aquatic Environment Working Group by 30 September 2010.
13. To submit to MFish, a draft Aquatic Environment and Biodiversity Report as specified in Research Reporting form 6 by 31 August 2011.
14. To present the results of reporting requirement 6 to a meeting of the Aquatic Environment Working Group by 30 September 2011.
15. To submit to MFish, a revised draft Aquatic Environment and Biodiversity Report as specified in Research Reporting form 6 by 30 September 2011.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting (form 13) 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 2011.

Rationale:

General

Recent work (Biodiversity Project ZBD200408, and FRST-funded studies) suggests that biogenic structure can be extremely important for coastal fisheries production. Research to support management of the combined impacts of bottom-fishing and land-use on biogenic structure is a high priority because such structure seems to be disproportionately both important and vulnerable. A review of non-fishing effects (including sedimentation) that might have important impacts on fisheries values has been commissioned to raise awareness among fisheries and land managers. However, no comprehensive appraisal has been made of any particular area. The Kaipara Harbour is emerging as a vital component of west coast North Island fisheries, and recent work suggests that virtually all snapper on this coastline can be sourced back to biogenic habitat nursery grounds inside the harbour, at least for one yearclass. West coast harbours are also known to support important nursery habitats for trevally, yellow-belly and sand flounders, kahawai, rig, and school shark and be important for grey mullet. Particular structural habitat types include seagrass meadows (intertidal and subtidal), mangrove forests, horse mussel beds, sponge gardens, oyster reefs, and areas of invasive date mussels as well as less-structured habitats such as un-vegetated mud flats, sands and coarse gravels.

With increasing human usage of the harbour and its surrounding catchment, pressures on these habitats and their associated fisheries production are thought to be increasing. These include in particular issues around sedimentation, along with eutrophication and cascades of effects generated by their combination (e.g., increased turbidity, suspended sediment loads, and smothering of benthic plants and animals). An assessment of these threats to important fisheries habitats in the Kaipara Harbour would be timely. Given the role of land-based management in addressing these threats, interactions with regional and district councils are likely to be extremely important. Current indications are that there is very strong support, and potential for collaborations (including co-funding), from DOC and both regional and district Councils as well as from northern MFish Operations teams. Tenderers should specify in their tenders any synergies or collaborations that could increase the cost-effectiveness of their proposed studies.

Objectives 1 and 2

These objectives will provide for a review of available information on the role and spatial distribution of habitats of the Kaipara Harbour that are important for fisheries, and of historical, current, and potential anthropogenic threats to these roles (both fisheries and land-based). Sources will include science publications, grey literature, and local and traditional knowledge. As wide a range of information as possible should be investigated, including knowledge of past and current land-use patterns (and changes to these), and linkages via physical processes to the harbour environment. This research should build on the risk assessment approach to assessing cumulative (and disparate) impacts in the coastal zone commissioned under project BEN2007/05.

Objective 3

Based on the first two objectives, a habitat mapping survey of Kaipara Harbour should be designed. This should identify the most cost effective mapping technologies available, and their relevance to mapping features directly or indirectly important as fish habitat. For instance, intertidal and sub-tidal sea-grass areas have significantly different roles, so methods that are able to incorporate bathymetry into their mapping assessment would be critical. Following review of the design by AEWG, baseline mapping surveys should be completed of one or more habitats critical for fisheries production thought to be most at risk of decline or degradation. Outputs should be in a spatial format easily used in Geographic Information Systems (GIS), and compatible with central and local government systems.

Strategic Relevance:

This project forms a part of the programme to determine direct and indirect effects of fishing on benthic biodiversity, habitats of particular significance for fisheries management, and maintenance of biological diversity in the marine environment. This project is therefore consistent with the *Marine Environment Research* section of the *Ministry of Fisheries Strategic Research Directions* document. This project contributes to Objective 3.1 (d), (e), and (f) and 3.4 (a) to (d) of the *Biodiversity Strategy* (for which the Ministry of Fisheries was identified as lead organisation) in that it will provide for an assessment of the threat of fishing to biodiversity, the development of an environmental monitoring system, increased community awareness of the effects of our activities on marine biodiversity, the identification of

species and habitats at risk from fishing, and improved environmental impact assessment of fishing. This work is, therefore, strongly supportive of the *Biodiversity Strategy* and will lead to greatly improved tools for better management of the incidental effects of fisheries. In particular, this project will enable the identification of the species or habitats most at risk from fishing (as mandated by the Ministry's *Strategy for Managing the Environmental Effects of Fishing*), and contribute to processes that reduce impacts not caused by fishing (as foreshadowed in the *2008/13 Statement of Intent*). The SOI also establishes a priority work area of "Progressing development of environmental fisheries standards", to which this study would contribute. Therefore, this research is a high priority.

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; 0.2; 0.6

Project: Abundance, distribution and productivity of Hector's (and Maui's) dolphins

Project Code: PRO2009-01A

Start Date: 1 July 2009

Completion Date: 31 August 2010

Vessel Use: Subject to tender

Overall Objectives:

1. To estimate critical aspects of the biology, abundance and distribution of Hector's and Maui's dolphin populations to assess the effects of fishing-related mortality on these populations.

Specific Objectives:

1. To estimate the distribution of the South Coast South Island Hector's dolphin sub-population in both summer and winter.

Reporting Requirements

Research Reporting:

Objective 1

1. To submit to MFish a Research Progress Report as specified in Research Reporting Form 4, detailing methods to be used throughout this project to meet the requirements of Specific Objective 1, with a coversheet as specified in Research Reporting Form 10, by 31 October 2009. Electronic and hard copy formats of reports are required.
2. To present the report in Reporting Requirement 1 to a meeting of the Aquatic Environment Working Group by 31 November 2009 in Wellington. Presentations to more than one meeting may be required.
3. To submit to MFish a draft Final Research Report as specified in Research Reporting Form 5 or a draft Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6, detailing distribution and sightings for both summer and winter, by 30 September 2010.
4. To present the report in Reporting Requirement 3 to a meeting of the Aquatic Environment Working Group by 31 October 2010 in Wellington. Presentations to more than one meeting may be required.
5. To submit to MFish a final Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 30 November 2010.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting (form 13) 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

Knowledge of protected species mortalities and their consequences is required if the Minister is to exercise his/her powers under section 15 of the Fisheries Act 1996 and to be in a position to take into account the purpose and environmental principles set out in sections 8 and 9. For some species, the risk posed by fishing mortalities, and the nature and extent of these interactions is difficult to quantify, because of the nature of the fisheries concerned and the characteristics of the species themselves. For species where adverse effects of fishing are suspected it is important to review existing information and identify potential approaches to managing any adverse effects of fishing.

Recent research carried out under projects MOF2002-03D and IPA2006/05 included modelling of Hector's and Maui's dolphin population trajectories under a number of management scenarios. These modelling approaches have highlighted the need for better information on the distribution, abundance and key biological parameters, including survival and productivity.

This research will gather new data in order to improve knowledge about the Hector's and Maui's dolphin population dynamics which will enable better monitoring of populations trends, allow more accurate analysis of population viability and assessment of management options to reduce fishing related threats to the populations.

The Ministry notes that there may be opportunities to collaborate with the Department of Conservation (through both Head and Conservancy offices) to fund and coordinate research on Hector's and Maui's dolphins. It will be important that any research done on these dolphin species is complementary and, ideally, part of a coordinated research plan. This project will target key risks and information gaps first and will develop so as to complement other work being done.

Objective 1

The research will, over time, determine the distribution and abundance of Hector's and Maui's dolphins throughout their range in New Zealand waters. Emphasis will be placed on achieving precise and accurate results for population estimates, and to assessing the sampling error of any technique used. Methods adopted should be those that can be repeated with sampling effort that is achievable on a medium term basis to

allow for comparison of results and monitoring changes in population size through time. A variety of study techniques may be applied to assessing population size and trend, including aerial surveys, genetic analysis and photo identification programmes.

Determining Hector's and Maui's dolphin distribution provides a mechanism to examine whether management is focused at an appropriate spatial scale and to determine if there is any expansion or contraction in distribution of the four subpopulations and Hector's and Maui's dolphin stocks within the subpopulations. Initially this research will focus on determining the distribution of sub-populations most at risk, in order to better inform managers and allow identification of areas where distribution of fisheries and Hector's dolphins overlap.

Research to date has shown that Hector's dolphins are a relatively shallow water species, rarely found in waters deeper than 100 m. In order to help identify the management threats to Hector's dolphins, there is merit in confirming the depth and offshore limits of the dolphins' range on a seasonal basis. If the currently recognised distribution is confirmed, there would be no need to undertake abundance surveys beyond the continental shelf. Currently, there seems to be strong merit in surveying out to 100 m depth, irrespective of the distance offshore.

Ideally, any surveys to determine distribution and abundance estimates should be undertaken according to internationally recognised protocol. Aerial surveys are preferred, as Hector's dolphins are attracted to boats, leading to potential bias in survey results. While a distribution-wide survey undertaken during the winter and again during the summer would be ideal, it may be possible to identify a selection of groups to survey on a regular basis (e.g., Banks Peninsula, Clifford/Cloudy Bays, Te Waewae Bay, Buller River region). Research into the distribution of Hector's dolphins will tie in closely with abundance surveying and, particularly, monitoring the movement of Hector's dolphins on a seasonal and individual basis.

The relatively long time-frames between previous abundance surveys and differences in methodology make it difficult to assess the current state of the populations. Focused research using consistent methodology over a five year period to determine baseline information will enable ongoing monitoring to determine trends in population size and, consequently, whether threats to the populations are being managed effectively.

MFish considers that estimates of population size either should be made during both summer and winter (as there may be a seasonal shift in distribution and accompanying population size), or consistently during one time of year to identify any relative changes in population size over time. Genetic analysis could also supplement systematic aerial surveying, in that it provides some indication of past trends in abundance (for example, a reduction in genetic diversity signals that the population may have undergone a decline in abundance). Photo-ID also can be used to obtain population estimates, particularly from a relatively small and highly resident group such as that found in Porpoise Bay.

During 2009/10, the research will focus on the distribution of South Coast South Island sub-population of Hector's dolphin, as this sub-population's distribution is least well understood and the distribution is important for assessing the overlap with

fishing effort and therefore potential risk to the Hector's dolphins. When further funding is available, this project will shift its focus to the other sub-populations and research topics as is appropriate.

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: Development and efficacy of seabird mitigation measures

Project Code: PRO2009-04

Start Date: 1 July 2009

Completion Date: 30 September 2010

Vessel Use: Subject to tender

Overall Objectives:

1. To test the efficacy of a variety of configurations of mitigation techniques at reducing seabird mortality (or appropriate proxies for mortality) in longline fisheries.

Specific Objectives:

1. To test the efficacy of a variety of configurations of streamer lines at reducing seabird mortality in pelagic longline fisheries.
2. To test the efficacy of a variety of line weighting configurations at reducing seabird mortality in demersal longline fisheries.

Reporting Requirements

Research Reporting:

Objective 1

1. To conduct collaborative discussions on the design of methods with the Mitigation Technical Advisory Group by 30 September 2009.
2. To submit to MFish a Research Progress Report as specified in Research Reporting Form 4, detailing methods to be used throughout this project to meet the requirements of Specific Objective 1, with a coversheet as specified in Research Reporting Form 10, by 31 October 2009. Electronic and hard copy formats of reports are required.
3. To present the report in Reporting Requirement 1 to a meeting of the Aquatic Environment Working Group by 30 November 2009 in Wellington. Presentations to more than one meeting may be required.
4. To submit to MFish a draft Final Research Report detailing distribution and sightings for both summer and winter as specified in Research Reporting Form 5 or a draft Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 30 June 2010.
5. To present the report in Reporting Requirement 3 to a meeting of the Aquatic Environment Working Group by 31 July 2010 in Wellington. Presentations to more than one meeting may be required.

6. To submit to MFish a final Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 31 August 2010.

Objective 2

7. To conduct collaborative discussions on the design of methods with the Mitigation Technical Advisory Group by 30 September 2009.
8. To submit to MFish a Research Progress Report as specified in Research Reporting Form 4, detailing methods to be used throughout this project to meet the requirements of Specific Objective 7, with a coversheet as specified in Research Reporting Form 10, by 31 October 2009. Electronic and hard copy formats of reports are required.
9. To present the report in Reporting Requirement 1 to a meeting of the Aquatic Environment Working Group by 30 November 2009 in Wellington. Presentations to more than one meeting may be required.
10. To submit to MFish a draft Final Research Report detailing distribution and sightings for both summer and winter as specified in Research Reporting Form 5 or a draft Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 30 June 2010.
11. To present the report in Reporting Requirement 3 to a meeting of the Aquatic Environment Working Group by 31 July 2010 in Wellington. Presentations to more than one meeting may be required.
12. To submit to MFish a final Aquatic Environment and Biodiversity Report as specified in Research Reporting Form 6 by 31 August 2010.

Project Update Reports

No Project Update Reporting is required for this project.

Work In Progress Reports

Monthly Work In Progress Reporting (form 13) 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

Seabird bycatch in New Zealand fisheries is a well known problem, and considerable resources are spent on policy and management solutions. However, the fundamental requirements of empirical information on which to define optimum mitigation configurations is lacking in New Zealand fisheries, and are known as information gaps on a global scale. The Ministry of Fisheries recently implemented a suite of mandatory mitigation measures to reduce the bycatch of seabirds in its domestic demersal and pelagic longline fisheries, including use of night setting, line weighting, and streamer lines.

Within New Zealand and in International Fisheries forums, debate continues about which mitigation measures are the most effective at reducing seabird mortality in specific fishery situations, and which configurations of key measures (e.g. line weighting, streamer lines) are optimal.

Melvin (2007) states “*Streamer lines are the most widely prescribed seabird mitigation tool in pelagic and demersal fisheries, but controlled studies demonstrating their effectiveness in pelagic fisheries in the context of production fishing are non-existent.*” New Zealand took up the opportunity recently to collaborate with Dr Melvin to conduct observations of pelagic mitigation measures, but due to the short time available for the study, and various logistical difficulties, little new information was gathered in the collaboration about the relative efficacy of different tori line configurations. This experience indicated that a more carefully considered, locally based, and longer term research project, perhaps in collaboration with researchers such as Dr Melvin, but which has specific objectives that meet the needs of New Zealand, is the best way to approach this kind of study.

In recent developments in the WCPFC fishery for tunas and sword fish, a variety of streamer line configurations have been proposed, and scientific testing of these remains equivocal, highlighting the need for clear information their efficacy and optimum configurations. In the WCPFC forum, Japanese research supports the use of lightweight streamer lines, consisting of a backbone on which streamers of less than 30 cm are threaded (Yokota et al. 2008). Streamer lines with multiple short streamers threaded onto one branch streamer have been observed on Japanese vessels operating in the NZ area (Melvin and Walker 2008, Brouwer and Walker 2008). The testing of alternative configurations of streamer lines and their attachment positions, and other mitigation devices, such as line weighting configurations or new and developing measures is required to allow clear scientific advice to be developed on the most appropriate measures to consider for management of New Zealand’s seabird bycatch problem on pelagic longline vessels.

Recent regulations introduced by the Ministry for demersal longline fishing in New Zealand waters include a line weighting configuration option to night setting that approximates those used in other fisheries (e.g. CCAMLR) to achieve sink rates that remove the baited hooks from within diving depths of seabirds quickly. Research detailing sink rates for relatively thick longline main lines (or back bones) set in deep water (e.g. Robertson 2000, Robertson *et al.* 2001, Smith 2001, Melvin and Wainstein 2006). However New Zealand demersal longline vessels also set in shallow water

with back bones as thin as 1.8mm. It is considered desirable to investigate the line weighting configurations that would be required to achieve adequate sink rates using various back bone diameter and materials.

Research programmes of this type are best conducted as collaborative studies with the fishing industry and in many instances have benefited from the involvement of independent scientists who are specialists in mitigation studies. This research is proposed to enable a working-group reviewed, and collaborative study to be conducted to enable New Zealand to advance its knowledge of optimum streamer configuration and to allow development of line weighting regimes that are suitable for use in New Zealand pelagic longline fisheries.

The research will undertake practical, on-board testing of one or more mitigation techniques for each pelagic and demersal longline vessels, and will make use of MFish observers, specially trained researchers, and overseas experts in mitigation research, as available and practical. The researchers conducting the study should seek advice from the Seabird Mitigation Technical Advisory Group (key contact, D. Middleton, SeaFIC). The study may be conducted on one or more fishing vessels operating in the New Zealand EEZ, and be conducted as part of normal fishing operations or under special conditions as required. Collaborative approaches are likely to be most effective.

Initially this project will consider the two higher priority specific objectives discussed at the RCC; efficacy of streamer line designs for reducing seabird mortality during pelagic longlining; and, efficacy of line weighting configurations for reducing seabird mortality during demersal longlining. The remaining specific objectives may be tendered at a later stage: efficacy of line weighting configurations for reducing seabird mortality during pelagic longlining; and, efficacy of streamer line designs for reducing seabird mortality during demersal longlining.

Weighting of Objectives

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