

## **SUMMARY OF UPDATED HOKI ECOLOGICAL RISK ASSESSMENT**

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An Ecological Risk Assessment (ERA) of New Zealand's hoki fisheries has recently been completed. The final report is attached to this memo. This ERA was undertaken in response to a Condition of the MSC Certification for hoki requiring an update of the 2002 hoki risk assessment.

This memo is to advise stakeholders, science service providers and interested parties of the key findings from this updated ERA and of the proposed plan to implement these.

### **1. Background and Method**

A Risk Assessment is simply a strategic, systematic and transparent process that identifies the likelihood and the consequence of any event. The risks posed by any event can be determined by an assessment of both the likelihood and the consequence of its occurrence. As an example - for a helicopter, the likelihood and consequence of either paint coming off or of the main rotor coming off clearly pose different risks to its continued operation. The likelihood of paint coming off might be high, but the consequence to flight would be negligible (i.e. low risk). The likelihood of the main rotor coming off might be moderate, but the consequence to flight would be catastrophic (i.e. very high risk). As a result, the management response to rotor blades is extensive, detailed and prescriptive (in order to reduce the likelihood to be as low as possible); while that for paint is low and less prescriptive (as, even at high likelihood, no management response may be required).

For an Ecological Risk Assessment the process is the same but, as ecosystems are more complicated than rotor blades and much less is known about their 'operational performance', there is less information and more unknowns and, therefore, many more uncertainties.

An ERA evaluates the risks posed by fishing activities at the population level, not at the individual level. For example, persistent but infrequent interactions between a fishery and a protected species would be considered to be of high risk if this species was rare (i.e. the impact of the fishery may be of high consequence to the population) and of low risk if this species was abundant (i.e. the impact of the fishery would be of low consequence to the population).

DWG contracted Rick Boyd of Boyd Fisheries Consultants Ltd to undertake this risk assessment, including:

- Develop methodology, in conjunction with DWG, the Ministry and participants
- Select and invite Expert Panel members and other participants
- Compile and circulate documentation to inform the ERA to all participants prior to the workshop
- Hold the ERA workshop, acting as facilitator
- Produce a Report of the findings

This ERA assessed the risks posed by hoki fishing in five broad ecological components:

- Target species (hoki)
- By-catch species (including sharks and non-fish by-catch)
- Protected species (e.g. seabirds, New Zealand fur seals, other marine mammals, certain corals)
- Benthic habitats
- Trophic interactions and wider effects on ecosystem structure and function

These risk assessments were undertaken by an Expert Panel (the Panel) in a workshop with representatives from the industry, the Ministry and others present. The Panel members, each of whom were selected to provide expertise in each of the five ecological components, were:

- Laura Boren – *Scientist, Marine Conservation Unit, Department of Conservation*
- Clinton Duffy - *Scientist, Marine Conservation Unit, Department of Conservation*
- Jeremy Helson - *Senior Policy Analyst, Ministry of Fisheries*
- Rosie Hurst - *Chief Scientist (Fisheries) NIWA*
- Craig Loveridge - *Research Data Management, Ministry of Fisheries*
- Aoife Martin - *Deepwater Fisheries Manager, Ministry of Fisheries*
- David Middleton - *Chief Scientist, SeaFIC*
- Richard O’Driscoll - *Group Manager, Middle Depth Fisheries, NIWA*
- Matt Pinkerton - *Scientist (Ecosystem modelling) NIWA*
- Ian Tuck - *Principal Scientist (Fisheries) NIWA*
- Richard Wells - *Fisheries Specialist, Deepwater Group Limited*
- Bob Zuur - *Marine Advocate, WWF NZ*

The Panel evaluated the possible sources of risk to each of the four hoki fisheries: Chatham Rise; Sub-Antarctic; West Coast South Island (WCSI), and Cook Strait. They assessed and quantified risk with a ‘consequence score’ and a confidence rating of each of its assessments with a ‘confidence score’ as shown in the tables below:

**Consequence Scores**

<b>Level</b>	<b>Descriptor</b>
0	Negligible
1	Minor
2	Moderate
3	Major
4	Severe
5	Catastrophic

**Confidence Scores**

<b>Confidence rating</b>	<b>Score</b>	<b>Rationale for confidence score</b>
Low	1a	Data exists but are considered poor or conflicting.
	1b	No data exist
	1c	Agreement between experts, but with low confidence
	1d	Disagreement between experts
High	2a	Data exist and are considered sound.
	2b	Consensus between experts
	2c	High confidence - exposure to impact cannot occur (e.g. no spatial overlap of fishing activity and species distribution)

## 2. Key Findings

The Panel agreed that the boundary between what they considered an ‘acceptable level of consequence’ and an ‘unacceptable level of consequence’ lay between a score of 2 (Moderate) and 3 (Major).

The Panel’s assessment of the risks posed by hoki fisheries to ecological components within New Zealand waters were found to be of negligible to moderate consequence, with two exceptions (for which they recommended further analyses):

- Risks to the benthic environment within BOMECE Class 9 particularly for Chatham Rise and,
- Risks to trophic interactions for Chatham Rise and potentially for Sub-Antarctic)

In addition, the Panel recommended more information be obtained and existing information be compiled to better assess risks to two further components:

- Risks to New Zealand fur seals for WCSI and Cook Strait, and
- Risks to protected corals

## 3. Summary of the ERA Findings for each of the Five Broad Ecological Components

### 3.1. Target species (hoki)

The Panel gave a consequence score of 2 (Moderate) for each of the hoki fisheries, recognising that both stocks are fully exploited, that government observer coverage in each of the four hoki fisheries is high (at least 10% for Cook Strait and ~20% for the other hoki fisheries) and that “*current management measures are ensuring the long-term recruitment and that the dynamics of hoki populations are not adversely impacted.*”

The Panel gave hoki a confidence score of 2c (High) recognising that there is a good understanding of hoki life-history and population dynamics.

### 3.2. By-catch species (including sharks and non-fish by-catch)

Risks to by-catch species were assessed as 0-2 (Negligible to Moderate) as most of these species are managed under the QMS.

The Panel gave the deepwater species hake, ling and silver warehou consequence score of 2 (Moderate), due primarily to the relatively higher by-catch. Recognising changes to management measures for hoki may impact on hake, ling and silver warehou stocks and noting that these species are managed within the QMS, each was given a confidence score of 2c (High).

Some macrourid species (i.e. rattails) have relatively low productivity and these were therefore considered by the Panel to be vulnerable to impacts from the hoki fishery. For this reason, a consequence score of 2 (Moderate) was assigned to this group of species in each of the four hoki fisheries.

Spiny dogfish was considered separately. In New Zealand, spiny dogfish are abundant and comprise only about 1% of the observed catch of hoki target fishing. The Panel gave spiny dogfish a consequence score of 1 (Minor) and a confidence score of 2c (High) given that there is good information about this species in New Zealand.

The Panel highlighted other non-QMS species of note: deepwater dogfish, and deepwater skates and rays. Deepwater dogfish were given a consequence score of 0-1 (Negligible-Minor) for Cook Strait and WCSI, and a consequence score of 2 (Moderate) for the other two fisheries.

A confidence rating of 1a (Low) was given because, while data exist, these are considered to be conflicting. The consequence score for the pale ghost shark is 0-1 (Negligible-Minor), and as there is more certainty of the risk posed by the hoki fisheries, the confidence score is 2c (High).

It was noted in session that the observed by-catch of invertebrates (including corals) from all hoki fisheries is very small (less than 0.05% of total observed catch). The total observed protected coral bycatch over the three year period 2006-07 to 2008-09 was 325 kg, with 310kg from Chatham and 15 kg from Sub Antarctic. No protected coral bycatch was observed from Cook Strait or from WCSI in this 3 year period. However, the Panel noted that these data may be inadequate to assess risks as records of corals have not been systematically collected by observers and trawls are not good 'sampling tools'. The Panel therefore recommended that more information is required in order to accurately assess risks to corals that might be posed by hoki fishing.

#### **4. Protected species (e.g. seabirds, fur seals, marine mammals, certain corals)**

##### **4.1. Seabirds**

The Panel agreed that it could add little to the two Seabird Risk Assessments already undertaken by the Ministry and the Department of Conservation. These include assessment of the risks posed to seabird populations by hoki fisheries, along with those from all other New Zealand fisheries.

In these Risk Assessments, because of the reasonable level of knowledge for those seabird populations which most frequently interact with hoki fisheries, coupled with the relatively high levels of observer coverage, no significant risks were found.

##### **4.2. New Zealand fur seals**

The risks the hoki fisheries pose to New Zealand fur seal populations was scored with a consequence of 1 (Minor), except for Cook Strait where it was given a score of 2 (Moderate) due to a lack of information on fur seal population sizes in this area. However, the Panel determined that "*there was no indication that captures are affecting recruitment of New Zealand fur seals in the Cook Strait area.*"

The Panel gave Cook Strait fishery a confidence score of 1a (Low) because of the lack of robust information on interactions. They recommended further data collection for Cook Strait and collation of existing data from WCSI.

##### **4.3. New Zealand sea lions**

The Panel scored the risks the hoki fisheries pose to the New Zealand sea lions with a consequence score of 0 (Negligible) for Chatham Rise, WCSI and Cook Strait fisheries. The risk to New Zealand sea lions for Sub- Antarctic was scored as 1 (Minor), because the Panel recognised that hoki fishing there very occasionally captures a New Zealand sea lion. The panel gave a confidence score of 2a (High).

##### **4.4. Basking sharks**

As basking sharks are of conservation concern elsewhere in the world and have low productivity and fecundity, they were given special attention by the Panel. Stock structure is uncertain, with evidence suggesting either one global population, or two (one in each of the northern and southern hemispheres). In New Zealand there is anecdotal information that basking shark interactions are becoming less frequent and there is also less fishing in several of the areas where the highest levels of interactions occurred in the past. The Panel gave basking sharks a consequence score of 2 (Moderate) and a confidence score of 1a (Low) given that there are plenty of data but these are considered to be poor or conflicting. The Panel agreed that further information may be needed.

##### **4.5. Cetaceans**

No cetacean captures have been reported by government observers and cetaceans are considered not to be at any risk from the hoki fishery, accordingly the Panel gave cetaceans a consequence score of 0 (Negligible).

#### 4.6. Protected corals

The Panel determined that the fisheries targeting mid water hoki aggregations “*will have lesser impact on protected corals, than fisheries targeting hoki near [or on] the bottom, and therefore the Cook Strait and WCSI fisheries are likely to have a lesser impact on corals than the Sub-Antarctic and Chatham Rise hoki fisheries.*”

The Panel was provided with GIS analyses of the hoki target trawl locations in relation to the BOMECE classes noting that the BOMECE analysis is not necessarily a robust indicator of the spatial distribution of any particular species of benthic invertebrates or of protected corals, in particular. In order to assess the risks of impact by hoki fisheries on protected corals in Sub-Antarctic and Chatham Rise, the Panel recommended the collation of existing information on protected coral distributions and an assessment of these distributions in relation to the hoki fishing grounds.

#### 5. Benthic habitats

The Panel assessed hoki fishing as not having any major consequences to benthic habitats except potentially to one benthic environment category, based on the aerial proportion of each BOMECE class that has been contacted by hoki target trawls once or more during the period 1988-89 to 2008-09.

All BOMECE classes apart from Classes 8 and 9 were given a consequence score of 0-1 (Negligible–Minor) in all four hoki fisheries. BOMECE Class 8 was given a score of 2 (Moderate) in all four hoki fisheries. For BOMECE Class 9 the Panel gave consequences score of 0 (Negligible) for the WCSI and Cook Strait fisheries; a consequence score of 2 (Moderate) for the Sub-Antarctic fishery; and a consequence score of 3 (Major) for the Chatham Rise fishery.

The consequence score of 3 for Chatham Rise is primarily due to the relatively high percentage of this BOMECE Class that has been trawled by the target hoki fisheries over the past 20 years. In BOMECE Class 9 this was assessed to be 66%.

The Panel noted that the trawl grounds of the present hoki fishery cover a much smaller area than the total are fished once or more for hoki during the period 1988-89 to 2008-09. In the fishing year 2008-09, 16.6% of BOMECE Class 9 was contacted by bottom trawls targeting hoki on one or more occasions, and 1.5% of the NABIS distribution range of hoki was contacted by bottom trawls targeting hoki on one or more occasions.

The Panel agreed that, due to the inability of BOMECE to identify differences in benthic environments that may exist within any particular BOMECE Class, further analyses of the hoki trawl grounds in BOMECE Class 9 for Chatham Rise and Sub-Antarctic fisheries were needed to confirm their assessment.

#### 6. Trophic interactions and wider effects on ecosystem structure and function

The Panel did not reach agreement on whether trophic (ecosystem) consequences from the hoki fisheries were 2 or 3 (Moderate or Major) for Chatham Rise and Sub-Antarctic fisheries.

The Panel considered the preliminary results from ecosystem modelling presently under development, together with information from research trawl surveys, commercial catches and fish dietary studies, to determine whether or not there are any changes occurring in the Chatham Rise ecosystem due to hoki fishing.

These preliminary results suggest changes may have occurred in the Chatham Rise ecosystem over the past 20 years along with a reduction in the mean trophic level. While there is no trophic model for the area in which the hoki fishery occurs in the Sub-Antarctic fishery, trawl survey data indicate there may also have been changes in the ecosystem there. Whether or not there may be causal linkages between changes in trophic levels or ecosystem structure and functioning and hoki target fishing *per se* is not known.

Acceptance of the methodologies and completion of the trophic modelling for Chatham Rise together with additional analyses of trawl survey and ecosystem indicator data, are required for both Chatham Rise and Sub-Antarctic fisheries in order to better understand whether or not risks are posed to ecosystems in these areas from the hoki fisheries.

## 7. Management Responses

### 7.1. High Level Review of the 2010 Ecological Risk Assessment of the New Zealand Hoki Fisheries

In the 2010 Surveillance Audit, Moody Marine Ltd (the auditors) recommended that DWG undertakes a “*brief independent high level review of the adequacy of the ERA specifically (1) address stakeholder concerns about the process and (2) establish whether the process was adequate to identify key risks*”.

The DWG has commissioned Jane Gunn, of Enfocus Consulting Ltd, to undertake this review during April-May 2011.

A final draft report is due on 3 June 2011 and this will be made available to stakeholders, research service providers and interested parties.

### 7.2. Hoki ERA Response Plan

Deepwater Group Ltd (DWG) and the Ministry of Fisheries (the Ministry) have developed and implemented an ERA Response Plan to implement the findings and recommendations of the Expert Panel. The key components are:

#### 7.2.1. Benthic habitats

Undertake further GIS analyses of hoki target trawl grounds in relation to BOMECE classes:

- Within BOMECE Class 9:
  - For each of the four hoki fisheries (Chatham Rise, Sub-Antarctic, WCSI, and Cook Strait), and
  - For each of the three main areas that Class 9 occurs (viz. Bounties, Sub-Antarctic, and Chatham Rise), and
  - Assess the likely types and distributions of benthic communities found within BOMECE Class 9 overall and whether or not there are any differences between the Chatham Rise and the Sub-Antarctic
- Within BOMECE Classes overall:
  - Assess hoki target trawl grounds within each BOMECE Class for each of the four hoki fisheries (Chatham Rise, Sub-Antarctic, WCSI, and Cook Strait), and
  - Assess data from Ocean Survey 20/20 to determine whether or not these could be used to assist with the ‘ground-truthing’ of BOMECE categories of interest in hoki fisheries.

#### 7.2.2. Trophic interactions

Further assessment of the risks to trophic levels or ecosystem structure and functioning posed by interactions from Chatham Rise and Sub-Antarctic hoki fisheries using the outcomes from the following projects:

- “*Coasts & Oceans OBI, Intermediate Outcome 2 – Marine food-web dynamics*”. Matt Pinkerton, NIWA, leads this project, which has the objective of developing trophic models that predict bottom-up and top-down trophic effects on the population dynamics of key species. The expected date of completion for the preliminary Chatham Rise trophic model is 2008, with the final results from this modelling approach being due by December 2014.
- “*Development of a suite of ecosystem and environmental indicators for deepwater fisheries*” (MFish Project DEE2010/05). The objective is to develop a suite of ecosystem and environmental indicators suitable for monitoring the environmental performance of deepwater fisheries. Specifically this project will:
  - Review the literature and hold a workshop to recommend a suite of ecosystem and environmental indicators that will contribute to assessing the performance of deepwater fisheries within an environmental context; and
  - Examine available data and design a data collection programme to enable future calculation of the indicators identified in specific objective 1.

Results are scheduled for delivery in 2010-11

- Review the results in recent reports including those by Tuck, I (AEBR 42), and Dunn, M (FRR w/MFish)

### **7.2.3. Interactions with New Zealand Fur Seals**

In response to the moderate Consequence and the low Confidence scores given in the ERA, the Panel recommended more information is needed in relation to New Zealand fur seals in Cook Strait and WCSI.

In response, the Ministry and DWG have implemented:

- An increase in observer coverage in Cook Strait for 2011-12 fishing year from 180 days to 250 days (the Ministry).
- Deliver a pre-season operational briefing to all owner/operators/skippers/and crew who are fishing in the 2011 Cook Strait hoki season in order to:
  - Increase awareness around the nature of fur seal captures
  - Increase knowledge the conditions which increase the likelihood of capture events
  - Increase awareness of the need to fully report fur seal capture events
  - Seek engagement of those at sea in the development and deployment of additional mitigation measures to further reduce capture events
  - Monitor progress throughout 2011 hoki season and offer real-time advice and assistance, where required
  - Provide in-season reports and an end-of-season summary report of outcomes and recommendations (DWG)
- Collate existing information on New Zealand fur seal populations in Cook Strait area to form a basis to assess the impacts of the hoki fishery on fur seal populations in this area (the Ministry).
- Collate and review existing information on fur seals in the WCSI region (the Ministry in conjunction with the Department of Conservation and DWG).

### **7.2.4. Protected corals**

There is insufficient information available on the distribution of corals for a risk assessment to be undertaken with any confidence. Data from the observer programme are inadequate to assess risks because these have not been systematically collected. Trawls are not a good method for sampling corals and data collected provide only an occurrence of records, not information on distribution or abundance.

As a first step a desktop review of the information obtained from Ocean Survey 20/20 will be undertaken, as this may provide further records on the distribution of corals (the Ministry in collaboration with research service providers).

As a second step existing information on protected coral distributions and their correlation with BOMECS classes will be collated (the Ministry in collaboration with research service providers).

G Clement  
CEO  
Deepwater Group Ltd  
2 June 2011

### 7.3. Timeline for Updated ERA and Management Responses

Milestones	Tasks
14 Dec 2009	Workshop to assess ERA Methodological Options – facilitated by E-Systems Pty Ltd
19 Feb 2010	Final Workshop report received from E-Systems Pty Ltd
Feb-Jul 2010	Proposals to update hoki ERA invited from service providers, proposals considered, ERA process revised to align with proposed methodologies and costs.
Aug 2010	Boyd Fisheries Consultants Ltd contracted to undertake Level 1 ERA of hoki fisheries
Aug-Nov 2010	Preparatory work, finalising methodologies, assessing and compiling relevant documentation, and inviting key participants and organising workshop
30 Nov 2010	Notification of ERA workshop dates, invitations to participants, documentation provided
13-14 Dec 2010	ERA workshop held to identify risks of impacts of hoki fishing on target species, by-catch species, seabirds, marine mammals, benthic habitats and trophic/ecosystem functioning – facilitated by Boyd Fisheries Consultants Ltd
23 Dec 2010	ERA workshop record and draft of assessments provided to Panel members for review
31 Jan 2011	ERA Draft Report provided to Panel Members for review
17 Mar 2011	Final ERA Report provided to DWG, proposed management response plan developed
8 Apr 2011	Independent high level review of ERA process and adequacy commissioned from Enfocus Consulting Ltd
13 May 2011	Draft Review Report received by DWG for review
May 2011	Invite key participants for consultation meeting on ERA outcomes
7 Jun 2011	DWG Board to consider outcomes of hoki ERA and proposed management response plan.
30 June 2011	Consultation meeting on ERA outcomes with stakeholders, key science advisors and interested parties.
July 2011	Finalise and implement Operational Plan to achieve agreed objectives
1 Sep 2011 to 30 Oct 2012	Ongoing review and monitoring of Operational Plan results, periodic and annual reports to Ministry and to DWG Board.

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