**A brief note on future porbeagle shark research**

**New Zealand**

**July 2013**

***for ERSWG 10 Agenda Item 4.2.4***

**Executive Summary**

An approach to joint assessment of porbeagle shark stock status is proposed. Specific comment on approaches to assessment, sharing of data, joint work and timing of research is sought from Extended Commission for the Conservation of Southern Bluefin Tuna (CCSBT) members. It would be useful if CCSBT members were able to bring to the 2013 Ecologically Related Species Working Group (ERSWG) meeting a summary of data available to contribute to a joint assessment of porbeagle stock status.

**Introduction**

At the Ninth Meeting of the Ecologically Related Species Working Group (ERSWG) of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT)[[1]](#footnote-1) it was noted that the stock status of porbeagle shark in the Southern Hemisphere was unknown. Porbeagle was identified as a priority candidate for ecological risk assessment by the ERSWG for the following reasons: it has widespread capture in southern bluefin tuna (SBT) fisheries, a likely stock distribution across the boundaries of several regional fisheries management organisations (RFMOs), and the Southern Hemisphere population is subject to relatively limited attention in other RFMOs. The meeting discussed undertaking a stock assessment for porbeagle shark and agreed that data would be required from all Members and cooperating non-members (CNMs), and that such an assessment should be part of the future ERSWG work program. The meeting recommended that Japan, New Zealand and Australia work together to progress a stock assessment for porbeagle shark in advance of the next ERSWG meeting.

This brief note identifies how this work might be continued in future. It seeks input from Commission members to refine a research proposal, and it seeks support from Commission members to continue the research.

**Continuing porbeagle stock assessment research**

The stock status of porbeagle shark is generally poorly known (MPI 2012, Semba et al. 2013). A comprehensive summary of Southern Hemisphere distribution information is provided in Semba et al. (2013). A summary of current New Zealand information about porbeagle shark is provided in the Ministry for Primary Industries (2012) annual stock status summary report. New Zealand proposes undertaking a joint stock assessment for porbeagle shark. A draft research project proposal, to begin in late 2013, is outlined in Annex I. One of the key issues in completing assessment for porbeagle shark is the availability of key data sets. An indication of the data available from New Zealand is provided in MPI 2012 and Annex II. A checklist for data sets which are likely to be required for assessing stock status is provided in Annex II.

**Preparation for and discussion at ERSWG10**

An approach to joint assessment of porbeagle shark stock assessment is proposed. New Zealand seeks specific comment on approaches to assessment, sharing of data, joint work and timing of research from Commission members. In particular it would be useful if Commission members were able to bring a summary of data available to the ERSWG10 to contribute to a joint assessment of porbeagle stock status.

**References**

Ministry for Primary Industries. 2012. Fisheries Assessment Plenary, November 2012: stock assessments and yield estimates. Compiled by the Fisheries Science Group, Ministry for Primary Industries, Wellington, New Zealand. 531 p.

Semba, Y., Yokawa, K., Matsunaga, H., and Shono, H. 2013. Distribution and trend in abundance of the porbeagle (*Lamna nasus*) in the southern hemisphere. *Marine and Freshwater Research*, 64: 518–529

**Annex I – Draft New Zealand research proposal**

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| **Project Title:** | Stock assessment of porbeagle sharks |
| **Project Code:**  | POS2013-01 |
| **Start Date:**  | Late 2013, tbc |
| **Completion Date:** | 30 November 2014 |

**Management Objectives from the relevant fisheries plan (if applicable):**

Management Objective 6 – Maintain a sustainable fishery for HMS within environmental standards

**Operational-level Management Objective(s):**

Operational Objective 6.4 – Maintain the reproductive capacity of HMS shark populations.

**Management need:**

New Zealand has made an international commitment through the CCSBT to lead (along with Australia and Japan) the next stock assessment for porbeagle.

**Information need:**

This research will evaluate the current status of the domestic component of the stock and feed into the wider regional assessment.

**Overall Research Objective:**

To conduct a stock assessment for porbeagle shark (*Lamna nasus*) in the Southern Hemisphere, including estimating biomass and sustainable yields.

**Specific Research Objectives**

1. To collate and update catch histories for the catch in New Zealand fishery waters through to 2012-13 and all observational data series required for the porbeagle shark stock assessment.
2. To work with other Nations and institutions to develop a dataset adequate for inclusion in a porbeagle shark stock assessment.

**Note:**

This work will require co-operation with other Nations including Japan and Australia. Travel to these countries may be required to standardise the analyses.

**Reporting Requirements:**

*Objective 1:*

1. To submit a draft report by 30 September 2014.
2. To present the draft report to a meeting of the HMS Fishery Assessment Working Group in September 2014 in Auckland or Wellington. Presentations to more than one meeting may be required.
3. To submit a final report by 30 November 2014.

**Rationale:**

*General*

Porbeagles live mainly in the latitudinal bands 30–50oS and 30–70oN. They occur in the North Atlantic Ocean, and in a circumglobal band in the Southern Hemisphere. Porbeagles are absent from the North Pacific Ocean, where the closely related salmon shark, *Lamna ditropis*, fills their niche. In the South Pacific Ocean, porbeagles are caught north of 30oS in winter–spring only; in summer they are not found north of about 35oS. They appear to penetrate further south during summer and autumn, and are found near many of the sub-Antarctic islands in the Indian and South-west Pacific Oceans. Porbegle sharks are not found in the equatorial tropics.

Porbeagles are live-bearers (aplacental viviparous), and the length at birth is 58–67 cm fork length (FL) in the South-west Pacific. Females mature at around 170–180 cm FL and males at about 140–150 cm FL. The gestation period is about 8–9 months. In the North-west Atlantic, all females sampled in winter were pregnant, suggesting that there is no extended resting period between pregnancies, and that the female reproductive cycle lasts for one year. Litter size is usually four embryos, with a mean litter size in the South-west Pacific of 3.75. If the reproductive cycle lasts one year, annual fecundity would be about 3.75 pups per female.

A study of the age and growth of New Zealand porbeagles produced growth curves and estimates of the natural mortality rate. However, attempts to validate ages using bomb radiocarbon analysis were unsuccessful, but suggested that the ages of porbeagles older than about 20 years were progressively under-estimated; for the oldest sharks the age under-estimation may have been as much as 50%. Consequently, the growth parameters provided in Table 5 are probably only accurate for ages up to about 20 years. Males mature at 8–11 years, and females mature at 15–18 years. Longevity is unknown but may be about 65 years.

In New Zealand, porbeagle sharks recruit to commercial fisheries during their first year at about 70 cm FL, and much of the commercial catch is immature. Most sharks caught by tuna longliners are 70‑170 cm FL. The size and sex distribution of both sexes is similar up to about 150 cm, but larger individuals are predominantly male; few mature females are caught. Regional differences in length composition suggest segregation by size. The size and sex composition of sharks caught by trawlers are unknown.

Porbeagles are active pelagic predators of fish and cephalopods. Pelagic fish dominate the diet but squid are also commonly eaten, especially by the small sharks.

The stock structure of porbeagle sharks in the Southern Hemisphere is unknown. However, given the scale of movements of tagged sharks, it seems likely that sharks in the South-west Pacific comprise a single stock. There is no evidence to indicate whether this stock extends to the eastern South Pacific or Indian Ocean.

At the Ninth Meeting of the Ecologically Related Species Working Group (ERSWG) meeting of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) it was noted that the stock status of porbeagle shark in the Southern Hemisphere was unknown and that given its widespread capture in southern bluefin tuna (SBT) fisheries, likely stock distribution across the boundaries of several RFMOs, and its relatively low level of focus for the Southern Hemisphere population in other RFMOs, it was a priority candidate for ecological risk assessment by the ERSWG. The meeting discussed undertaking a stock assessment for porbeagle shark and agreed that data would be required from all Members and CNMs and that such an assessment should be part of the future ERSWG work program. The meeting recommended that Japan, New Zealand and Australia work together to progress a stock assessment for porbeagle shark in advance of the next ERSWG meeting (August 2013).

*Objectives 1 and 2*

Stock assessments of this species have not previously been undertaken in the Southern Hemisphere, as a result of this a lot of effort will be required to collate the various datasets that are available. Under these objectives the research provider will be required to collate the data that are available from New Zealand fishery waters and the New Zealand fleet fishing on the high seas. Once this is complete it is envisaged that the research provider will work with others to standardise the datasets and analyses to develop indices of abundance for the assessment. This should include catch histories, catch distribution maps, biomass distribution maps, CPUE histories by fleet and region. This would require co-ordination with others who have relevant data holdings such as government agencies in Japan and Australia and possibly others, as well as other RFMO data bases such as the SPC. Travel to these countries may be required to co-ordinate the analyses. Initially MPI would likely be required to assist with the relevant introductions and set up the initial meetings with the appropriate individuals.

**References**

Clarke, S. (2011) A status snapshot of key shark species in the western and central Pacific and potential mitigation options. WCPFC‐SC7‐EB‐WP‐04.

Rice, J and Harley, S. 2012. Stock assessment of oceanic whitetip sharks in the western and central Pacific Ocean. Unpublished report to the Western and Central Pacific Fisheries Commission Scientific Committee, WCPFC‐SC8‐2012/SA‐WP‐06. Pp53.

**Annex II –** **DRAFT DATA INVENTORY CHECKLIST FOR PORBEAGLE SHARK STOCK ASSESSMENT**

A suggested format for data inventory is:

1. Identification of stock unit

2. Fisheries description

* Location
* Type of vessels, number, sizes, fishing technology and fishing operation
* Catch and effort data (month, year)
* Observer coverage and data collected

3. Removals

* Catch by fleet (month, year)
* Discards

4. Catch in numbers by size and/or age

* By fishery
* By fleet

Is information available on gear selectivity?

Brief description of sample design

5. Weight at size and age

* Mean size at age
* Mean weight at age
* Length-weight relationship
* If by size then a growth function is necessary

How is the fish size measured? Class interval? Fork length?

6. Maturity schedule

* by age
* by size
* stock-recruit relationship assumptions

7. Indices of abundance

Consider if the indices are absolute or relative, sampling design, standardization, linearity between the index and stock abundance, what portion of the stock is indexed (spawning stock, exploitable biomass, recruitment, etc.). Brief description of the method used.

* CPUE
* Other
* Evaluation of uncertainty
1. Note that all references to the Commission can be read as references to the Extended Commission. [↑](#footnote-ref-1)