



The Oceania Humpback Whale Recovery Plan

Discussion Paper

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Acknowledgements:

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This document has been prepared by the Steering Group of the Oceania Humpback Whale Recovery Plan with the aid of funding provided by the Australian Commonwealth Department of Environment, Water, Heritage and the Arts.

All comments in relation to this document or the Oceania Humpback Whale Recovery Planning process should either be directed to:

David Paton
South Pacific Whale Research Consortium
Scientific Coordinator and Outreach officer
Email: dave@blueplanetmarine.com Phone : + 61 431 664472

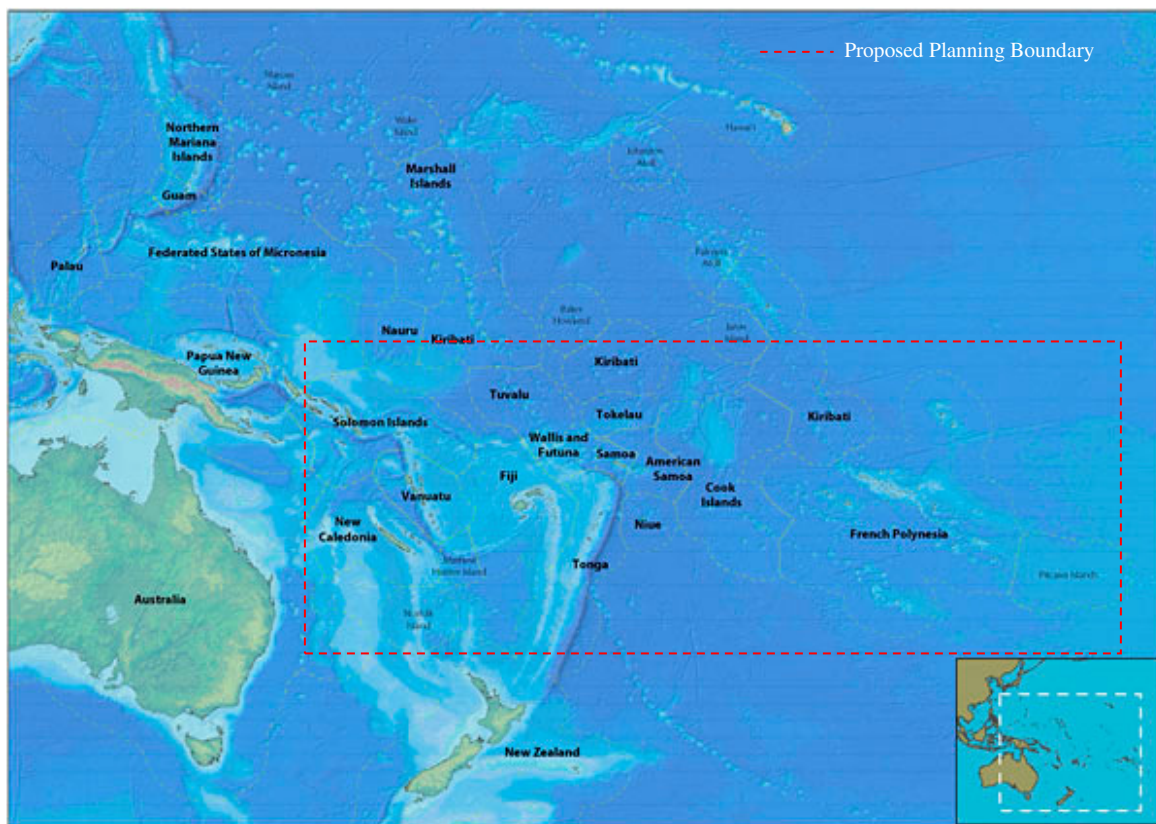
Lui Bell,
SPREP, Email: luib@sprep.org, Phone: +685 21929 Ext 281 or direct +685 66281:

Executive Summary

In 2008, the International Union for Conservation of Nature (IUCN) reviewed the conservation status of cetacean populations worldwide. As a consequence of this review, the Oceania population of humpback whales has been re-classified from “Threatened” to “Endangered”. This is in recognition that, although humpback whales in many parts of the world are showing encouraging signs of recovery from whaling, most of the small breeding populations in the South Pacific remain at extremely low levels and some remain vulnerable to extinction.

The Oceania region encompassed over 9,008,458 km² of ocean, 14 countries and 16 territories spread over both the South and North Pacific Oceans. However, for the purposes of this plan, the planning boundaries are proposed to be delineated by the known breeding range of the Southern Hemisphere humpback whale breeding stocks which were reclassified to “Endangered” recently by the IUCN (that is Breeding Stocks E(ii & iii) and F (i & ii)) and cover the Exclusive Economic Zones which fall within this boundary (see Figure 1).

Figure 1 Oceania Humpback Whale Recovery Plan, Proposed Planning Boundary.



Source of map SPREP

Working in close consultation with Pacific Island countries and territories (PICTs), institutions and NGOs within the Oceania region, the South Pacific Whale Research Consortium (SPWRC) in partnership with SPREP, with funding from Australian Government is proposing the development of an Oceania Humpback Whale Recovery Plan (OHWRP). This plan will provide a coordinated effort to identify threats (both current and potential) and prioritise them so that the most appropriate management measures can be developed and implemented to mitigate these identified impacts and ensure the recovery of this species within the Oceania region.

The summary of the general outline of the proposed steps in developing the recovery plan is as follows:

Stage One

- Development of a discussion paper (this document) by the Steering Group with input from a multidisciplinary recovery team;
- Submission of issues and option discussion paper for endorsement by CMS Cetacean MoU signatories at Meeting of Parties in Noumea, 27 July, 2009, and SPREP annual meeting in Apia, 1 Sep, 2009 and invite nominations of appropriate national officials to be included in the Recovery Team .

Stage Two

- Drafting of recovery plan by Steering Group in consultation with the Recovery Team;
- Circulation of a draft recovery plan to all members of the Steering Group and Recovery Team for comments;
- Two day recovery team meeting to review draft recovery plan (proposed for February 2010 in Auckland – date to be confirmed);
- Finalisation and submission of recovery plan for SPREP and CMS Cetacean MOU Party endorsement at 2010 annual meeting.

The result of this process will be a well designed Oceania Humpback Whale Recovery Programme under the auspices of the SPWRC and SPREP partnership and endorsed by parties to the CMS MoU on Pacific Cetaceans and SPREP member governments as part of the implementation of their Whale and Dolphin Action Plan. This will provide a strong foundation and set of partnerships to raise funding, resources and build capacity to implement this plan over the coming years.

Vision Statement

To promote the conservation and recovery of Oceania's humpback whales.

Background

Humpback whales (*Megaptera novaeangliae*) are found throughout the oceans of the world. In the Southern Hemisphere humpback whales undertake an annual migration during the austral winter months from their Antarctic feeding areas in higher latitudes to their low latitude tropical breeding areas, including a number of locations within the Oceania region (Chittleborough 1965). The IWC has identified a number of populations of Southern Hemisphere humpback whales based on breeding stocks. Within the Oceania region, there are currently five identified humpback whale breeding stocks which annually migrate to the South West Pacific to breed in the warm waters of this region.

During the 19th and 20th centuries, humpback whale populations throughout the Southern Hemisphere were subjected to both shore-based and pelagic hunting throughout their migratory range including intensive illegal pelagic whaling in the Southern Ocean. This whaling activity resulted in a major collapse of whale populations throughout the Southern Hemisphere with approximately 95% of humpback whales being killed. The International Whaling Commission (IWC) imposed a ban on humpback whaling in the Southern Hemisphere in 1963 and an international moratorium on commercial whaling came into effect in 1985-86. Although there are some signs of recovery for a number of populations in the Southern Hemisphere (i.e. Eastern Australia), recent research has shown that humpback whale populations in the Oceania region are showing limited, if any sign of recovery and are still well below their pre whaling numbers within the region.

In 2008, the International Union for Conservation of Nature (IUCN) reviewed the conservation status of cetacean populations worldwide. As a consequence of this review, humpback whales have been down listed on a worldwide basis from "Threatened" to "Least Concern". However, the Oceania population of humpback whales has been re-classified from "Threatened" to "Endangered". This is in recognition that, although humpback whales in many parts of the world are showing encouraging signs of recovery from whaling, most of the small breeding populations in the South Pacific remain at extremely low levels and some remain vulnerable to extinction.

Working in close consultation with Pacific Island countries, institutions and NGOs within the Oceania region, the South Pacific Whale Research Consortium (SPWRC) in partnership with SPREP, with funding from Australian Government Department of Environment, Water, Heritage and Arts is proposing the development of an Oceania Humpback Whale Recovery Plan (OHWRP). This plan will provide a coordinated effort to identify and address threats and issues for recovery of this species within the Oceania region.

The need for an Oceania Humpback Whale Recovery Plan

In most cases the need for the development of a recovery plan is driven either by scientific evidence which identifies the requirement for additional measures needed to conserve a species or a population, or in other cases it may be a requirement under

relevant legislation. In this case, the development of an OHWRP is the logical and necessary response to the change in the threat status for the Oceania populations of humpback whales.

Additionally it is important to note that:

- Humpback whales are also listed as a target species for Japan's scientific whaling programme in the Southern Ocean (JARPA II), although Japan has voluntarily agreed not to hunt humpback whales in the Southern Ocean while negotiations are in progress on the future of the International Whaling Commission (IWC). Concerns have been widely raised about the potential impact of the proposed JARPA II take of humpbacks on some of the vulnerable populations in the South Pacific.
- Humpback whales are an iconic species for the South Pacific; they also underpin the economic benefits derived from whale watching in many Pacific Island states. In Tonga, humpback whale watching was recently estimated to have grown by 20% per annum since 1998. Whale watching there now generates a total estimated tourist expenditure of almost USD\$ 1.2 million (IFAW, 2008a). A region-wide review of whale and dolphin watching tourism in 2008 found an increase of 45% per annum in the number of people going whale watching, and that this industry is now valued at more than USD \$21 million to the Pacific Islands region (IFAW, 2008b).
- Many cetaceans species have cultural and spiritual significance and are important to the legends, traditions and heritage of many Pacific Island peoples.
- Completion of an Oceania Humpback Whale Recovery Plan (OHWRP), which would be the region's first cetacean recovery plan, would significantly contribute to 8 of the 9 key theme areas of the regional SPREP Whale and Dolphin Action Plan 2008-2012 (WDAP) and more than 18 of the WDAP's key objectives. Capacity-building would also be enhanced in several Pacific Island states as part of the recovery planning process. In doing so, the OHWRP would significantly contribute to the implementation of the MoU on the *Conservation of cetaceans and their habitats in the Pacific Islands Region* concluded under the Convention on Migratory Species (CMS).
- The implementation of the OHWRP will also complement and support the existing whale management policies that PICs have in place throughout the Oceania region. The OHWRP could be developed as an example or model of 'Conservation Management Plans' for improved cetacean management under the auspices of the International Whaling Commission.

What is a Recovery Plan

A recovery plan is a document which outlines the framework for the conservation of a species or population. This process identifies threats (both current and potential) and

prioritises them so that the most appropriate management measures can be developed and implemented to mitigate these identified impacts. This process requires extensive knowledge, which may come from long term data sets on the species or population in question, so that the status and trends of the species or population can be determined. In many cases, data of this nature may be limited, therefore the recovery plan may need to identify additional scientific information required to improve the understanding of the species or population and allow a better evaluation of the threats (Donovan et al 2008). Where detailed data and long term data sets may be limited, the precautionary principle may be applied until further data become available upon which to base management decisions.

While a recovery plan must have objectives which relate to the conservation of the species or population, consideration also is needed to be given to the stakeholders involved in generating the threats. An integral part of a recovery plan is the monitoring programme which ensures that the management measures are being properly conducted and allows evaluation as to whether the recovery planning actions are in fact having a positive conservation outcome (Donovan et al 2008). A draft plan structure is attached in Appendix 1.

Purpose of the proposed Oceania Humpback Whale Recovery Plan

To develop a Recovery Plan for humpback whales in Oceania that will use best practice recovery planning to bring together governments, researchers, NGOs and stakeholders in a coordinated effort to identify and address threats and issues for the recovery of this species.

Draft Objectives

While it is not anticipated that the objectives for full recovery of humpback whale populations in the Oceania region will be achieved during the life of this recovery plan (2010 -2015), the objectives of a plan can be used to develop criteria to monitor the ongoing performance of this plan.

The draft objectives of this plan are to promote:

- the recovery of populations of humpback whales utilising waters of the Oceania region so that these populations can be considered at very low or no risk from human impacts;
- the recovery of the distribution and abundance of humpback whales utilising the Oceania region to their pre-exploitation levels;
- increased public awareness and Pacific Island stewardship of humpback whales and their habitat requirements within the Oceania region;
- the sustainable development of whale watching tourism for the socio-economic benefit of Pacific Island communities.

Significance of the OHWRP

Although there are five IWC identified Oceania humpback whale breeding sub-stocks (Breeding Stock E(i), those wintering off the Australian east coast, E(ii), those wintering

around New Caledonia, and E(iii), those wintering around Tonga, F(i) those wintering around the Cook Islands and F(ii) those wintering around French Polynesia (IWC, 2005; Olavarria *et al.* 2006)), the recent IUCN review of the Oceania humpback whale populations determined that only four of these breeding stocks (E(ii), E(iii), F(i) & F(ii)) are severely depleted (estimated in 2005 to be only at 26.6% of historical pre whaling levels) and were re-classified from “Threatened” to “Endangered”. In comparison the East Australian breeding stock (E(i)) which is showing strong signs of recovery has been down listed from “Threatened” to “Least Concern”. The Australian Government has implemented a recovery plan for this population (Breeding Stock E(i)). The OHWRP will complement this existing humpback whale recovery plan which is due for review in 2010.

To promote the recovery of the four identified populations of humpback whales within the Oceania region, a coordinated strategic approach will be required. This plan will build on the data collected through non-lethal research by the South Pacific Whale Research Consortium and other researchers, and be guided by the conservation management priorities of the SPREP Whale and Dolphin Action Plan and CMS MoU. National, regional and international conservation management outcomes would be achieved through the collaborative efforts across the Oceania region. It would aid Pacific Island Countries in delivering timely information on which to base management decisions for humpback whales within their waters.

Proposed Geographic Range for the OHWRP

Although the Oceania region of the south west Pacific includes a total of 14 countries (Australia, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu) and 16 dependencies or territories (American Samoa, Ashmore and Cartier Islands, Cook Islands, Coral Sea Islands, Easter Island, French Polynesia, Guam, Hawaii, New Caledonia, Rotuma, Niue, Norfolk Island, Northern Mariana Islands, Pitcairn Islands, Tokelau and Wallis and Futuna) (Wikipedia, 2009), the primary focus of this plan will be the known breeding range and migratory corridors for breeding stocks E (ii & iii) and F (i & ii) within the region.

The Oceania population of humpback whales is delineated by its breeding range, with approximate boundaries in the west at 160°E (between Australia and New Caledonia), in the east at 120°W (between French Polynesia and South America), in the north at the equator at 0°S, and in the south to approximately 30°S. Therefore the OHWRP is proposed to cover the Exclusive Economic Zones (EEZ) which fall within the breeding range of the Oceania population of humpback whales. See figure 1.

This includes the following Pacific Island countries and territories: American Samoa, Coral Sea Islands (Australia and France), Cook Islands, Fiji, French Polynesia (France), Republic of Kiribati, New Caledonia (France), Nauru, Niue, Norfolk Island (Australia), Pitcairn Islands, Samoa, Solomon Islands, Tokelau (NZ), Tonga, Tuvalu, Vanuatu, Wallis and Futuna (France).

Proposed Planning Process

It is proposed that the coordination of the development of the OHWRP process be managed through the South Pacific Whale Research Consortium in partnership with SPREP. For implementation of this recovery plan to be effective, it is essential that the development of the plan be endorsed by and involve PICTs from throughout the Oceania Region. Therefore there will be two primary stages to the development of the OHWRP and two groups will be formed to facilitate and provide directions as well as input and review of the recovery plan.

Stage 1 Development of OHWRP Concept and Framework for endorsement by CMS Pacific Cetacean MoU MoP and SPREP Annual Meeting

An OHWRP Steering Group will be formed to provide direction and facilitate the coordination of the OHWRP. Table 1 identifies the proposed OHWRP Steering Group members.

Table 1: OHWRP Steering Group

<i>Participant</i>	<i>Affiliations</i>
Lui Bell	SPREP
Rochelle Constantine	School of Biological Sciences, University of Auckland, New Zealand /SPWRC
Mike Donoghue	Department of Conservation, New Zealand
Aisake Batibasaga	Department of Fisheries, Fiji
Phil Clapham	National Marine Mammal Laboratory, Alaska Fisheries Science Center, USA/SPWRC
Scott Baker	Marine Mammal Institute, Oregon State University Molecular Ecology and Evolution, USA/ University of Auckland/SPWRC
Dominique Benzaken	Department of Environment, Water, Heritage and Arts, Australia
Sue Miller Taii	IFAW/CI/SPWRC/Pew Foundation
David Paton	Blue Planet Marine, Australia/SPWRC

The process of developing the OHWRP will rely on input and review of a multi disciplinary Recovery Team drawn from throughout the Oceania Region's range state for southern hemisphere humpback whales. It is proposed that SPREP send out a circular inviting SPREP members to nominate additional members to join the Recovery Team. In addition during the CMS MoP meeting proposed for July 2009, participation in the Oceania Region Humpback Whale Recovery Team will also be invited. At this stage the Recovery Planning Team is proposed to include (but not be limited to) the people listed in Table 2.

Table 2: Recovery Team

<i>Participant</i>	<i>Affiliations</i>
Lui Bell	SPREP
Aisake Batibasaga	Department of Fisheries, Fiji
Juney Ward	Ministry of Environment, Samoa/SPWRC
Olive Andrews	IFAW/SPWRC
Cara Miller	University of the South Pacific /WDCS, Fiji
Penina Solomona	WWF, Fiji
Dominique Benzaken	Department of Environment, Water, Heritage and Arts, Australia
Rochelle Constantine	School of Biological Sciences University of Auckland, New Zealand /SPWRC
Scott Baker	Marine Mammal Institute, Oregon State University Molecular Ecology and Evolution, USA/ University of Auckland/SPWRC
Phil Clapham	National Marine Mammal Laboratory, Alaska Fisheries Science Center, USA/SPWRC
Sue Tai	IFAW/CI/Pew Foundation/SPWRC
Claire Garrigue	Operation Cetaces, New Caledonia/SPWRC
David Paton	Blue Planet Marine, Australia/SPWRC
Nan Hauser	Center for Cetacean Research and Conservation, Cook Islands/SPWRC
Michael Poole	Marine Mammal Research Programme, French Polynesia & National Oceanic Society, USA /SPWRC
Mike Donoghue	Department of Conservation, New Zealand/SPWRC
Mike Noad	Cetacean Ecology and Acoustics Laboratory, School of Veterinary Science, The University of Queensland, Australia /SPWRC
Simon Childerhouse	Australian Marine Mammal Centre/SPWRC
Other PIC Members	Other PIC members as nominated by PICs following the CMS MoP and SPREP annual meeting.

Stage 2. Completion of OHWRP

Following endorsement for the proposed OHWRP by CMS MoP and SPREP, it is proposed that the list of the Recovery Team members (Table 2) be updated with the names of individuals nominated by PICs following the CMS MoP and SPREP meetings. Following consultation, input and review of the recovery plan discussion papers by the full Recovery Team, a draft recovery plan will be developed and circulated for further input, consultation and review, coordinated through the Recovery Planning Team and SPREP.

It is proposed that a full Recovery Plan Team meeting be held in Auckland in conjunction with the annual SPWRC meeting expected to be held in February 2010 (date to be confirmed). It is planned that this 2 day OHWRP meeting be attended by the full

Recovery Planning Team to review the draft plan and allow discussion, further input and consultation on the draft plan.

Following incorporation of comments and further information from the Auckland Recovery Planning Team meeting, the draft OHWRP will again be circulated for final comment prior to being submitted to the CMS MoU participants for consideration and endorsement prior to being submitted for consideration and endorsement by the SPREP Meeting.

Summary

The result of this process will be a well designed Oceania Humpback Whale Recovery Programme under the auspices of the SPWRC and SPREP partnership and endorsed by parties to the CMS MoU on Pacific Cetaceans and SPREP member governments as part of the implementation of their Whale and Dolphin Action Plan. This will provide a strong foundation and set of partnerships to raise funding, resources and build capacity to implement this plan over the coming years.

Background information on the current knowledge on population structure, distribution, abundance and trends of humpback whales within the Oceania region

Population structure

The International Whaling Commission (IWC) currently recognises four breeding stocks around the South Pacific and Australia based on Discovery mark recoveries, demographic isolation, and genetic differentiation (Olavarria et al. 2007):

- 1 north of feeding area IV (referred to as Stock D including Western Australia),
- 1 north of feeding Area V (referred to as Stock E including Eastern Australia, New Caledonia and Tonga),
- 1 north of feeding Area VI (Stock F including Cook Islands and French Polynesia), and
- 1 north of feeding Area I (Stock G including Colombia).

The IWC also recognises further stock sub-division of breeding stock E and F into sub-stocks supported by demographic isolation and genetic differentiation (Olavarria et al. 2006). Breeding stock E is sub-divided into E1 (Eastern Australia), E2 (New Caledonia) and E3 (Tonga) and breeding stock F into F1 (Cook Islands) and F2 (French Polynesia). These breeding stocks are shown in Appendix 2. We use the terminology breeding stock (e.g. D, E, F, G) to refer to breeding stocks based on demographic isolation and genetic differentiation, and sub-stock to refer to sub-divisions within these breeding stocks, as currently recognised by the IWC (e.g. E1, E2, E3, F1, F2).

Olavarria et al. (2007) found significant differentiation of maternally inherited mitochondrial (mt) DNA at both the haplotype and nucleotide level ($F_{ST} = 0.033$; $\Phi_{ST} = 0.022$), between breeding stocks D, G and four of the Oceania sub-stocks (E2, E3, F1, F2). When sub-stock E1 is included in this comparison (Olavarria et al. (2006)), the estimated differentiation among stocks by F_{ST} is ~ 0.02 . Based on standard population genetic models (e.g. Wright 1978, Waples & Gaggiotti 2006), F_{ST} values of 0.01 correspond to approximately 25 migrant individuals per generation (or less than one migrant individual per year in the case of humpback whales and other long lived mammals). These breeding stock boundaries, and the sub-stocks within them, are also supported by the analysis of movements by individuals based on photo-identification and microsatellite genotyping (DNA profiling).

An extensive comparison of photo-identification catalogues by sub-stock, found only four matches between the migratory corridor of East Australia (E1 represented by Hervey Bay and Byron Bay, with a catalogue size of 1,242 individuals) and breeding grounds in Oceania (E2, E3, F1 and F2, with a catalogue size of 679 individuals) (Garrigue et al. 2007). This level of interchange is surprisingly small, given the relatively large catalogues used in the comparison, and provides strong evidence for sub-division within Breeding Stock E (Garrigue et al. 2007).

An additional photo-identification comparison among regions of Oceania (E2, E3, F1 and F2 with a combined catalogue size of 679) documented 20 records of interchange, mostly

between neighbouring regions (Garrigue et al. 2006). Overall, the limited movement of individuals between adjacent sites within Oceania is consistent with the significant (but low) level of differentiation observed in mtDNA from these regions (Olavarria et al. 2007) and suggests that humpback whales wintering in E2, E3, F1 and F2 are demographically independent and should be recognised as individual management stocks (Garrigue et al. 2006).

Comparisons of historical sighting data and whaling records (Dawbin 1956, 1959, 1964) with recent sighting survey data from New Zealand, Fiji and Norfolk Island demonstrate a lack of (or at the very least a slow) recovery at these sites (Childerhouse & Gibbs 2006; Gibbs et al. 2006; Paton et al. 2006; Oosterman & Whicker 2008). These surveys returned to the same survey sites used by Dr. W. Dawbin and replicated his earlier surveys as closely as possible. Results from these re-surveys include (i) sighting rates in Fiji over the period 1956-58 were between 0.15-0.58 whales per hour and were significantly higher than equivalent sighting rates observed of between 0.01-0.03 in 2002-03 (Paton et al. 2006) and, (ii) surveys in New Zealand indicate that between 2004-2006 sightings were 29% of what there were in 1960 (Childerhouse & Gibbs 2006). It is important to note that the baseline data for these surveys in the 1950s and 1960s were from populations that had already been whaled for more than 50 years. It is not possible to directly assess the rates of increase for these sites but what is clear is that any population increases appear to be lacking or very low. In contrast, the East Australian stock is increasing at 10-11% per annum (Noad et al. 2006).

These indications of demographic independence are likely sufficiently strong to provide evidence for further sub-populations within Oceania, however, such partitioning presents difficulties in assessing population status (discussed below) that have not been overcome at present. Furthermore, problems with the allocation of commercial catches on the feeding grounds to the appropriate sub-stock breeding area make the assessment even more challenging. Given it is not possible to assess the status of each sub-stock, we have therefore used a model that can assess the South Pacific as though it is a single stock (i.e. E and F).

In conclusion, the presently recognised IWC stock and sub-stock boundaries are consistent with available evidence. With respect to the South Pacific, the relevant sub-stock divisions are East Australia (E1), New Caledonia (E2), Tonga (E3), Cook Islands (F1), French Polynesia (F2), and Colombia (G). The taxon assessed here is, therefore, called the Oceania sub-population, which consists of IWC breeding stocks E and F as a distinct sub-population of humpback whales. It should be identified separately based on population isolation and a demonstrated high level of depletion (see below). We propose this sub-population specifically for the purposes of the IUCN threat ranking process as it is consistent with the existing IWC recognised breeding stock boundaries

Geographic Range Information

Humpback whales have a global distribution. Individual humpbacks have been observed to travel more than 8000km between their high-latitude summer feeding grounds and low-latitude winter mating and calving range in tropical waters (Rasmussen et al. 2007).

The Oceania population is delineated by its breeding range, with approximate boundaries in the west at 160°E (between Australia and New Caledonia), in the east at 120°W (between French Polynesia and South America), in the north at the equator at 0°S, and in the south to approximately 30°S.

During the austral autumn and winter, humpback whales in Oceania are spread across lower latitudes from approximately 30°S northwards to the equator. The South Pacific is a vast area with thousands of islands and there has not yet been a comprehensive survey of the entire region. However, localised research by members of the South Pacific Whale Research Consortium (SPWRC 2008)) has identified many island groups whose waters are host to humpback whales. During austral spring and summer, humpbacks travel to Antarctic feeding grounds. These linkages have been demonstrated through Discovery tagging, photo-identification and, most recently, genotype matching and satellite telemetry (Mackintosh 1942; Chittleborough 1965; Dawbin 1966; Mikhalev 2000; Franklin et al. 2007).

Population Information

The following population estimates are available:

- (i) SPWRC (2006) provided a preliminary mark-recapture estimate from photo-identification of the combined population size for E2 (New Caledonia), E3 (Tonga) and F (French Polynesia) of 3,827 (CV = 0.12) for the period 1999-2004. There are no estimates of rate of increase available for this area but it was noted that there was little indication of trend in abundance over the survey period (SPWRC 2006).
- (ii) Noad et al. (2006) estimated from land-based sighting surveys that population size of E1 (Eastern Australia) was 7,090 (95% CI \pm 660) for 2004 with an annual rate of increase of 10.6 (95% CI \pm 0.5%) for 1987 – 2004.

The IWC is presently engaged in a Comprehensive Assessment of Southern Hemisphere humpback whales and research on the South Pacific breeding stocks of E1, E2, E3, and F are ongoing. The IWC (2007) Comprehensive Assessment of Southern Hemisphere Humpback workshop in 2006 agreed that, “the situation for Breeding Stocks E and F is complex and currently unresolved, and therefore that it was not possible to construct stock structure hypotheses for assessment modelling, particularly with respect to the assignment to Breeding Stocks of catches taken on the feeding grounds”.

For example, while east Australia and New Caledonia (E1 and E2) are within the longitudinal boundaries of Antarctic Area V, and French Polynesia and the Cook Islands (F) are within the longitudinal boundaries of Area VI, Tonga (E3) falls close to the boundary between the two Areas. Thus, in the current assessment, the approach of pooling demographically independent sub-populations was necessary for practical reasons to develop catch allocation scenarios. However, this approach is likely to be conservative in ignoring potential differences in variable rates of recovery from the regional impacts of whaling. Soviet whaling on the Antarctic feeding grounds in the early sixties was extremely intense, with over 27,300 whales taken during two summers (1959-1961) alone. Maternal site fidelity together with a hunt concentrated both in time and

space may have resulted in more extreme declines in some of the far-flung wintering stocks of the Southwestern Pacific.

Jackson et al. (2006) explored a number of catch allocation scenarios for the combined sub-stocks of Oceania and east Australia. In their combined assessment of sub-stocks E1, E2, E3 and F, median population recovery toward historical levels in 2005 was estimated at between 15.9-24.8% (95% probability intervals (PI) 11.1-30.5%; prior population growth rate mean = 6.7% after Branch et al. (2004)). The most appropriate interpolation between these two recovery estimates depended on the degree of interchange between east Australia and Oceania (15.9% is complete interchange, 24.8% is no interchange). Recent photo-identification surveys (Garrigue et al. 2007) indicate that interchange between these regions is relatively low, suggesting that the 'no interchange' scenario may be more appropriate for the region. Under this interchange scenario, estimated abundance in 1942 was 41,356 (95% PI 36,800-53,580). Recovery of the population three generations later (in 2005) is 26.6% (95% PI 18.2-33.5%) relative to 1942. This is using an estimate of 21.5 years/generation (Taylor et al. 2007).

Habitat and Ecology Information

Humpback whales have been recorded across most of the South Pacific, although densities vary from large numbers in East Australia to very low numbers in Fiji (in E3) and parts of French Polynesia. They are regularly found around island groups but are also observed in open water away from islands. Humpbacks have been recorded throughout the southern ocean including south to the ice edge and in the Ross Sea.

Little is known regarding life history parameters for the Oceania population of humpback whales, although it is assumed that these rates are similar to those described from whaling records in Australia and New Zealand (Dawbin 1956, 1964, 1966; Chittleborough 1965). One rate that has been preliminarily investigated in the region is calving interval, which is approximately 2-3 years (consistent with that reported from other oceans). The diet of these humpback whales consists mainly of krill, which they consume while in Antarctic waters. They are not known to feed while in tropical breeding grounds.

Gaps in knowledge

To understand the potential impacts of any current or future threats to humpback whale populations in the Oceania region, a detailed understanding of their historical abundance and distribution, life history, stock structure, current abundance, distribution and habitat requirements is essential. Although the SPWRC are starting to piece together some of this information, much of this vital knowledge is still lacking for humpback populations within the region.

In addition to the lack of the knowledge on the current population structure, distribution, abundance and trends of humpback whales within the Oceania region, information on the current impacts from many of the potential threats within the region are not known.

Therefore further research and monitoring are required to build on the current knowledge for the biological information for the Oceania populations of humpback whales and the current and potential threats to humpback whales within the region.

Threat

While populations of humpback whales are still at very low levels in the Oceania region, the current or potential impact of an action or an activity on these populations of humpback whales could be significant. A number of authors, such as Rice (1988), Reeves et al (2003) and IUCN (2006) have undertaken global reviews of cetacean status and threats while Miller (2006) has reviewed the cetacean status and threats within the Pacific Islands region. These reviews provide a good starting point to identify the current and potential threats to humpback whale populations in the Oceania region.

Current or potential threats to humpback whale population within the Oceania region include;

- climate change
- habitat degradation
- habitat modification
- pollution (both chemical and waste)
- disease
- noise
- whale watching
- fisheries interactions (including bycatch and entanglement)
- ship strike
- whaling (including 'scientific' whaling)
- depletion of prey species (Note: humpbacks predominantly feed outside of the Oceania region, however there is potential for impacts on the Oceania humpback whale population due to activities outside the Oceania region ie impacts on krill in the Antarctic)
- cumulative impacts.

Conservation Measures

Although humpback whales have been legally protected from commercial whaling since 1966, they can still be killed for the purposes of scientific research under Article VIII of the International Convention for the Regulation of Whaling. The IWC's Southern Ocean Whale Sanctuary (e.g. the northern boundary of this Sanctuary follows the 40°S parallel of latitude except in the Indian Ocean sector where it joins the southern boundary of that sanctuary at 55°S, and around South America and into the South Pacific where the boundary is at 60°S) provides an additional layer of protection to humpback whales while on their summer feeding grounds in Antarctica although whales inside the Sanctuary can still be killed under Article VIII.

At present, more than 12 million km of EEZs of more than a dozen South Pacific countries and territories have been designated as whale sanctuaries. This provides

protection from commercial whaling for humpback whales in some of their breeding areas.

Research and monitoring priorities

To address the requirements of further research and monitoring priorities, a strategic review of the current knowledge of humpback whales in the Oceania region will be conducted and gaps in knowledge will be identified. A review of existing data sets is also recommended to identify further information that could be gained without further field work. A prioritised list of research activities will be developed to address the key questions in relation to the biology and ecology of Oceania humpback whales.

In addition a programme will also be developed to monitor the plans implementation and evaluate whether the management measures are meeting the plans objectives and having a positive conservation outcome.

Strategic partnerships

The development and implementation of the OHWRP brings about opportunities for the development of strategic partnerships to be formed within the Oceania region. These partnerships will include close working relationships between PICs, intergovernmental agencies (i.e. SPREP), NGO's within the region (i.e. CI, IFAW, Whales Alive, WDCS WWF, among others), educational institutions (i.e. University of the South Pacific), research organisations (SPWRC) and community members with the Oceania region.

Capacity building

The development and implementation of the OHWRP brings about opportunities for capacity building within the Oceania region. The outcomes of the implementation of the OHWRP will result in a coordinated and strategic approach to whale conservation and research activities within the region. This will provide opportunities for Pacific Islanders (Government Officers, NGOs, students, community members) to become familiar with the skills and research techniques used for non lethal research and monitoring to gain a better understanding of the current status of cetacean population within the Oceania region.

An integral part of the recovery plan will be the monitoring programme which ensures that the identified management measures are being properly conducted. This will allow evaluation of the recovery planning actions to determine if in fact they are having a positive conservation outcome.

Traditional Knowledge and Customs

Many cetaceans species have cultural and spiritual significance and are important to the legends, traditions and heritage of many Pacific Island peoples.

There is limited evidence of traditional whaling activities in the South Pacific prior to the introduction of commercial whaling by Europeans in the 19th century. However whaling of humpback whales was undertaken by Tonga during the 20th century until a moratorium was implemented by a royal decree in 1978, and whales have remained protected in Tongan waters (Orams 2004).

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Appendix 2 International Whaling Commission recognised stock structure of humpback whales in the Southern Hemisphere. Reprinted from IWC 2005.

