Editorial

This summary of the work of the Scientific Committee at the recent annual meeting follows the 2008 meeting of the International Whaling Commission held in Santiago, Chile. Details of the Commission meeting will be published in the next *Annual Report of the International Whaling Commission*. The full report of the Scientific Committee will be published in spring 2009 as *J. Cetacean Res. Manage.* 11 (Suppl.).

REVISED MANAGEMENT PROCEDURE

After the adoption of the moratorium on commercial whaling in 1982, the Committee spent over eight years developing the Revised Management Procedure (RMP) for baleen whales. In brief, the RMP is a generic management procedure designed to estimate safe catch limits for commercial whaling of baleen whales. This was adopted some time ago by the Commission, at the 1992 meeting. However, the Commission has stated that it will not set catch limits for commercial whaling for any stocks until it has agreed and adopted a complete Revised Management Scheme (RMS) which will include a number of non-scientific matters, including inspection and enforcement. The RMS has been the subject of a considerable amount of discussion within the Commission and this is ongoing in the context of a broader debate about the future of the Commission[1].

Process for revision of the *CLA*

The *CLA* (*Catch Limit Algorithm)* is used to determine safe removal limits under the RMP and was agreed in 1992. As a result of a request by Norway (IWC, 2006), the Committee reviewed the process for considering revisions to the *CLA* agreed in 1992 and clarified some issues. The result of the review was to:

(1) agree that comparison of any proposed revision will be for a 100 year time period;
(2) agree an appropriate range of maximum sustainable yield rates for trials;
(3) agree requirements for an appropriate set of trials including additional trials to model environmental degradation;
(4) agree requirements for an appropriate set of performance statistics.

This year, the Committee agreed to hold an intersessional Workshop on (2) with a view to making a decision on this at the 2009 Annual Meeting.

Implementation Simulation Trials

Implementation Simulation Trials are trials that are carried out before using the RMP to calculate a catch limit and involve investigating the full range of plausible hypotheses related to a specific species and geographic area, particularly with respect to issues of stock structure.

The process of developing *Implementation Simulation Trials* is not the same as identifying the 'best' assessment for the species/region, but involves considering a set of alternative models to examine a broad range of uncertainties with a view to excluding variants of the RMP that show performance that is not sufficiently robust across the trials. Account needs to be taken of the plausibility of the various trial scenarios when evaluating RMP variants.

In the light of difficulties experienced in recent years, particularly with respect to the North Pacific region (common minke whales and Bryde's whales), the Committee has spent some time discussing the general question of how best to ensure that the process of carrying out *Implementations* (or *Implementation Reviews*) is efficient and prompt, whilst taking into account the available information. To achieve this it agreed that they should be conducted at discrete intervals, using the data available at one point in time. In 2005, the Committee developed requirements and guidelines for the *Implementation* process (IWC, 2005). Some final details had required further analytical work and this was completed in 2007 (IWC, 2008c).

North Pacific Bryde's whales

In 2007, the Committee had successfully completed the *Implementation* for western North Pacific Bryde's whales. This was the first *Implementation* undertaken using the new requirements and guidelines and it had provided for the option of the 'variant with research' (IWC, 2008b). The Committee received documentation on how such an option may be implemented at this year's meeting but further work is required. Abundance estimates were agreed this year, with a total estimate of around 20,500 whales (approx 95% CI 10,700-39,200).

North Atlantic fin whales

At the 2005 Annual Meeting, the Committee initiated the *pre-Implementation Assessment* of North Atlantic fin whales (IWC, 2006, p.7). To progress this work, a co-operative intersessional Workshop was held in March 2006 with the NAMMCO scientific committee on general scientific issues of common interest, particularly with respect to stock structure, abundance and catch history (IWC, 2007b). The results of that workshop were discussed and endorsed at the 2006 Annual Meeting and it was agreed that the *pre-Implementation Assessment* was complete (IWC, 2007c, pp.11-12). For practical reasons, it was agreed that the *Implementation* would begin after the 2007 Annual Meeting. The *Implementation* process takes a two year period, encompassing three annual meetings and two intersessional workshops. The first Intersessional Workshop took place successfully in spring 2008 (IWC, 2009) and the results were reviewed in Santiago. In addition to reviewing and approving the results of the 'conditioning' specified intersessionally, the Committee completed its work with respect to the following:

(1) final specification and weighting (with respect to plausibility) of the *Implementation Simulation Trials*;
(2) discussion of what data/research may reduce the number of hypotheses and possible time-frames for this research/data collection;

[1] E.g. see *http://www.iwcoffice.org/commission/future.htm*

(3) updates/improvements to standard data sets (i.e. abundance, catches, bycatches) for use by the *CLA* in final trials and when evaluating the plausibility of hypotheses and hence assigning weights to trials (new data are not used when conditioning the trials);
(4) specification of operational features (geographical and temporal) and management variants;
(5) development of a timetable for the remaining work (including circulation of trial results and format); and
(6) initial discussion of the inputs for actual application of the *CLA* (catches, bycatches, estimates of abundance and projected future anthropogenic removals).

North Atlantic common minke whales

The Committee began an *Implementation Review* of North Atlantic common minke whales in Santiago – the last review occurred in 2003 (IWC, 2004a, pp.12-13). Progress was made and the review should be completed next year.

Bycatches of large whales and other sources of anthropogenic mortality such as ship strikes

The RMP estimates a limit for the number of non-natural removals, not simply a catch limit for commercial whaling. It is therefore important to estimate the numbers of whales removed from the population by indirect means. This year the Scientific Committee addressed mortality due to bycatch in fishery operations, ship strikes, marine debris (e.g. risk from entanglement and ingestion) and noise.

The Scientific Committee reviewed progress towards estimating bycatch using: (1) fisheries data and observer programmes; and (2) genetic data from market sampling. The Scientific Committee has been collaborating with FAO on collation of relevant fisheries and bycatch data with the aim of identifying fisheries where further monitoring would be valuable. With respect to market sampling, while recognising the differing views of various member governments over this issue, the Committee reaffirmed its view that availability of data from DNA registers will improve estimates of total take from market surveys and its ability to review papers containing the results of market sampling. The Committee requested that these be made available through the Committee's Data Availability Agreement.

With respect to ship strikes, the results from studies of collisions between whales and vessels off the Canary Islands and New Zealand and papers on modelling collision risk were reviewed. Substantial progress with the global IWC database of ship strikes has been made. The database design was agreed by the Scientific Committee last year and has also been approved by ACCOBAMS for its work. Subsequently, a small group of scientists have been populating the database. To date, 763 records, mainly from published sources, have been entered. Consideration is now being given to the best way to continue the data collection process, including ongoing maintenance and quality control of the database and the development of a web-based data entry system via IWC's website. Mortality due to ship strikes is a concern not only with respect to setting commercial and aboriginal subsistence catch limits, but also in evaluating threats to the survival of endangered populations.

With respect to noise, the Scientific Committee agreed that there is a need for internationally co-ordinated research to address gaps in knowledge on sonar-related cetacean strandings including improving the ability to conduct necropsies as quickly as possible, standardising data collection on the animal's environment at the time of the death/stranding, and co-ordinating with military or other government agencies so that all factors related to the stranding are examined. The impacts of noise are also addressed under Environmental Concerns (see below).

REGIONAL WORKSHOPS TO ADDRESS CETACEAN BYCATCH ISSUES

Outside the context of the RMP, the IWC Scientific Committee and others have identified the incidental capture of cetaceans in fishing gear as one of the most important threats to the conservation and management of their populations and it is known to be a significant threat to survival in certain cases (e.g. the North Atlantic right whale, the vaquita). In order to address the full management implications, reliable information is needed on bycatch numbers, stock identity and movements, the abundance of the affected population(s), and the population dynamics of the cetaceans.

In some areas, considerable advances have been made in the assessment and mitigation of cetacean bycatch since the pioneering IWC La Jolla Workshop held in 1990 (IWC, 1994). In other areas, however, little progress has been made and, as a result, a growing number of cetacean species (both large and small) face critical conservation problems as a result of fisheries bycatch. Rather than holding another large generic workshop, it was agreed that given the case- and area-specific nature of the problem, a series of broad-based regional workshops would be more effective, focusing on regions where bycatch problems have been given priority by the Scientific Committee and are not already being addressed.

The general objectives of such workshops will be to develop a short- and long-term approach to the successful management and mitigation of the cetacean bycatch problems in the region, building upon work already undertaken by the Committee. The Committee agreed a mechanism whereby this process can be facilitated. It also recommended collaboration with other organisations with an interest in this matter (e.g. the Convention on Migratory Species, the Committee on Fisheries of the UN Food and Agriculture Organisation, IUCN and relevant international and regional fishery organisations). Work to set up the first such workshop is continuing.

DEVELOPMENT OF AN ABORIGINAL WHALING MANAGEMENT PROCEDURE

With the completion of the RMP, the Commission asked the Scientific Committee to begin the process of developing a new procedure for the management of aboriginal subsistence whaling. Such a procedure must take into account the different management objectives for such whaling when compared to commercial whaling. This is an iterative and ongoing effort. The Commission will establish an Aboriginal Whaling Scheme that comprises the scientific and logistical (e.g. inspection/observation) aspects of the management of all aboriginal fisheries. Within this, the scientific component might comprise some general aspects common to all fisheries (e.g. guidelines and requirements for surveys and for data *c.f.* the RMP) and an overall AWMP within which there will be common components and case-specific components.

At the 2002 meeting, the Committee completed its work with respect to the Bering-Chukchi-Beaufort Seas stock of bowhead whales. It agreed a *Strike Limit Algorithm (SLA)* for bowhead whales and the scientific aspects of a Scheme;

this was adopted by the Commission. It noted that should the Commission decide, it would be possible to apply the *Bowhead SLA* at that meeting. After considerable work and two intersessional workshops, the Committee made a formal recommendation to the Commission for a *Strike Limit Algorithm* for gray whales in 2004. It believed that this *SLA* met the objectives of the Commission set out in 1994 and represented the best scientific advice that the Committee could offer the Commission with respect to the management of the Eastern North Pacific stock of gray whales. This was adopted by the Commission.

The situation for the Greenlandic fisheries for fin and minke whales is more difficult but considerable progress has been made in the last two years and high priority is being accorded to this work. In the meantime, the Scientific Committee developed a safe method to provide interim advice on catch limits for these whales for a limited period (10 years).

ASSESSMENT OF STOCKS SUBJECT TO ABORIGINAL SUBSISTENCE WHALING

Aboriginal subsistence whaling is permitted for Denmark (Greenland, fin and minke whales), the Russian Federation (Siberia, gray and bowhead whales), St. Vincent and The Grenadines (Bequia, humpback whales) and the USA (Alaska, bowhead and gray whales). It is the responsibility of the Committee to provide scientific advice on safe catch limits for such stocks.

The catch limits presently in force are:

- Bering-Chukchi-Beaufort Seas stock of bowhead whales (taken by native peoples of the USA and the Russian Federation): A total of up to 280 bowhead whales can be landed in the period 2008-2012, with no more than 67 whales struck in any year (and up to 15 unused strikes may be carried over each year).
- Eastern North Pacific gray whales (taken by native peoples of the USA and the Russian Federation): A total catch of 620 whales is allowed for the years 2008-2012 with a maximum of 140 in any one year.
- Caribbean humpback whales (taken by St. Vincent and The Grenadines): For the seasons 2008-2012 the number of humpback whales to be taken by the Bequians of St. Vincent and the Grenadines shall not exceed 20.
- West Greenland fin whales: The number struck shall not exceed 19 in each year.
- West Greenland common minke whales: The number struck shall not exceed 200 in each year (and up to 15 unused strikes may be carried over each year).
- West Greenland bowhead whales: The number struck shall not exceed 2 per year (and up to 2 unused strikes may be carried over each year). The quota for each year shall only become operative when the Commission has received advice from the Scientific Committee that the strikes are unlikely to endanger the stock.
- East Greenland common minke whales: The number struck shall not exceed 12 in each year (and up to 3 unused strikes may be carried over each year).

The Commission sets catch limits based on the scientific advice and a 'need' statement from the countries involved.

Eastern gray whales

In 2002, the primary assessment carried out was for the eastern gray whale population. New information on abundance, distribution, catches and ecology was presented. The population is believed to be close to carrying capacity. The Committee confirmed that the present catch limit was acceptable this year using the *Gray Whale SLA*. An *Implementation Review* will take place in 2009.

Bering-Chukchi-Beaufort Seas stock of bowhead whales

In addition to the work on the *Bowhead SLA*, the Committee has also been examining the status of the Bering-Chukchi-Beaufort Seas stock of bowhead whales. The most recent abundance estimate (for 2001) is 10,500 (95%CI 8,200-13,500) giving a rate of increase between 1978 and 2002 of 3.2% (95%CI 1.4%, 5.1%). After a thorough *Implementation Review* in 2007 the Committee agreed that the *Bowhead SLA* remains the most appropriate tool for providing management advice for this harvest (IWC, 2008a, p.18). In Santiago it was confirmed that the present catch limits will not harm the stock.

Minke and fin whales off West Greenland

In 2002, despite a lack of scientific advice, the Commission established the same catch limits as previously in force, agreed for the 2003-07 period, i.e. West Greenland minke whales – an annual limit of up to 175 strikes; East Greenland minke whales – an annual catch of up to 12 animals; West Greenland fin whales – an annual catch of up to 19 whales. The Committee had been unable to provide scientific advice on safe catch limits at that time and had stressed that its inability to provide any advice on safe catch limits was a matter of great concern.

In 2006, the Committee was pleased to receive and accept a new abundance estimate for the common minke whale (3,500, 95%CI 1,500-7,700) off West Greenland.

However, despite the considerable progress made in developing an assessment method based on the observed sex ratio in the catch, the Committee was not in a position to provide unequivocal advice on catch limits and recommended that the Commission exercise caution when setting catch limits, noting that the replacement yield was between around 170 and 230 whales if the lower bound of the abundance estimate is used. The Committee has also developed a workplan to finalise the development of an appropriate assessment method by 2009.

For the fin whale, the Committee accepted a new abundance estimate of 4,656 (CV 0.46; 95% CI 1,890-11,470). Using the method agreed for providing interim advice, it agreed that the current catch limit will not harm the stock.

Bowhead whales off West Greenland

The bowhead whales off West Greenland are probably part of a single eastern Arctic stock off Canada and West Greenland. It agreed that an abundance estimate of 6,344 (95%CI=3,119-12,906) for the single eastern Arctic bowhead stock is suitable for use in development of management advice for aboriginal harvest of bowheads off West Greenland. Using the agreed method for providing interim management advice, the Committee agreed that the current catch limit will not harm the stock. The question of stock structure will be reviewed again next year.

Humpback whales off St. Vincent and the Grenadines

The Committee has received positive confirmation that eastern Caribbean humpback whales are part of the West Indies breeding population (abundance in 1992/93 – 11,570, 95%CI 10,100-13,200) and agreed that the present catch limit set by the Commission will not harm the stock.

Humpback whales off West Greenland

Last year, the Committee had noted that the humpback whales found off West Greenland belong to a separate feeding aggregation whose members mix on the breeding grounds in the West Indies, with individuals from other similar feeding aggregations (IWC, 2008a, p.21). It therefore had agreed that the West Greenland feeding aggregation was the appropriate management unit to consider when formulating management advice.

HISTORIC ABUNDANCE ESTIMATION, GENETIC METHODS

In 2004, in the light of a genetic modelling paper published in 2003 (Roman and Palumbi, 2003), the Committee had considered the general methodological issue of estimating carrying capacity and/or pre-exploitation population size in the context of the Committee's assessment work. As a result of its discussions, the Committee agreed that while such genetic methods have the *potential* to be one of a suite of tools that can be used to examine pre-exploitation abundance, there are a number of limitations and uncertainties that must be considered when examining such data in a present-day management context. The estimates of historic abundance provided in the Roman and Palumbi paper for the initial pre-whaling population sizes of humpback, fin and common minke whales in the North Atlantic have considerably more uncertainty than reported, and cannot be considered reliable estimates of immediate pre-whaling population size. Particularly important in this regard is the mismatch between the time-period to which genetic estimates apply (i.e. the time period is difficult to determine and extremely wide) and the population sizes of whales immediately prior to exploitation. It also agreed that the paper provides no information to suggest that changes are required in either the RMP or AWMP approaches to management.

The Committee had identified further work necessary to assess whether genetically-based estimates of 'initial' abundance can provide useful information for the management of cetaceans; little progress has been made in this regard. The Committee will not consider this issue further until additional publications describing methodological and analytical progress become available.

STOCK IDENTITY

Of general concern to the assessment of any cetaceans is the question of stock identity. Examination of this concept in the context of management plays an important role in much of the Committee's work, whether in the context of the RMP, AWMP or general conservation and management. In recognition of this, the Committee has established a Working Group to review theoretical and practical aspects of the stock concept in a management context. The Committee has noted that it is important, in any application of stock structure methods, to examine the sensitivity of conclusions to different *a priori* decisions about the definition of initial units, and as to which population structure hypotheses to examine.

A specialist Workshop to examine the use of simulation testing to assess the performance of methods to identify population structure was held in January 2003 (IWC, 2004b) – known as TOSSM[2]. The Workshop developed a suitable simulation framework to allow evaluation of genetic methods used in inferring population structure both in general terms (the issue is of great relevance to conservation and management outside the IWC) and from a specifically IWC viewpoint (particularly in an RMP/AWMP context). Subsequently, progress has been made in the development and validation of a program to simulate realistic genetic datasets (IWC, 2007a) and the Committee has begun to receive papers that are beginning to test boundary setting algorithms in a management context. Work is continuing to develop this approach and it has now reached the point where it can be used to test more complex and realistic scenarios.

COMPREHENSIVE ASSESSMENT OF WHALE STOCKS

The 'Comprehensive Assessment' of whale stocks

The 'Comprehensive Assessment' can be considered as an in-depth evaluation of the status of all whale stocks in the light of management objectives and procedures; this would include the examination of current stock size, recent population trends, carrying capacity and productivity. Clearly, it is not possible to 'comprehensively assess' all whale stocks simultaneously, and the Committee has been working in an iterative manner towards this, initially concentrating on stocks that have recently or are presently being subject to either commercial or aboriginal subsistence whaling. Some of these stocks have already been discussed in the sections on the RMP and AWMP.

Antarctic minke whales

The Committee has carried out annual surveys in the Antarctic (south of 60°S) since the late 1970s. The last agreed estimates for each of the six management Areas for minke whales were for the period 1982/83 to 1989/90[3]. At the 2000 meeting, the Committee agreed that whilst these represented the best estimates for the years surveyed, they were no longer appropriate as estimates of current abundance. An initial analysis of available recent data had suggested that current estimates might be appreciably lower than the previous estimates.

Subsequently, considerable time has been spent considering Antarctic minke whales with a view to obtaining final estimates of abundance and considering any trend in these. This has included a review of data collection methods and analytical methodology. After considering many of the factors affecting abundance estimates, there is still evidence of a decline in the abundance estimates, although it is not clear how this reflects any actual change in minke abundance. Three hypotheses that might explain these results have been identified:

(1) a real change in minke abundance;
(2) changes in the proportion of the population present in the survey region at the time of the survey;
(3) changes in the survey process over time that compromise the comparability of estimates across years.

Completion of revised circumpolar abundance estimates for Antarctic minke whales continues to be a high priority as there is no agreed current estimate. Data from the IWC-IDCR/SOWER cruises are being used for this purpose. The cruises from 1978/79 to 2003/04 can be divided into three circumpolar series (the CPI, II and III). Standard analyses of minke whale abundance estimates from these surveys have shown an appreciable decline for CPIII. For some years now

[2] *http://swfsc.noaa.gov/TOSSM.aspx*

[3] *http://www.iwcoffice.org/conservation/environment.htm#sower*

the Committee has been trying to obtain abundance estimates from more sophisticated analyses as part of its examination as to whether the decreases represent a real decline in abundance or whether there are other explanations for the differences (e.g. changes in the number of whales in the pack ice which is outside the survey area). The Committee had hoped to present revised estimates this year using three new model approaches, but although considerable progress was made, this had not been possible. To ensure estimates that can be agreed upon are available next year, a detailed work plan and an intersessional Workshop have been scheduled.

Southern Hemisphere blue whales

The Committee is beginning the process of reviewing the status of Southern Hemisphere blue whales. An important part of this work is to try to develop methods to identify pygmy blue whales from 'true' blue whales at sea and progress is being made on this. Work on genetic and acoustic differentiation techniques is continuing and there is considerable progress with morphological methods. Good progress was made by the Committee in collating information on Southern Hemisphere blue whales as part of the Comprehensive Assessment process. Information received on pygmy blue whales confirmed that their presence in Antarctic waters is rare. Evidence was also received suggesting that the Chilean blue whales probably represent a discrete population or even subspecies.

Over 300 individual blue whales have been identified thus far from over 20,000 photographs taken during the IWC-IDCR/SOWER cruises. The Committee recommended that photographs taken during the Japanese scientific research programmes in the Southern Ocean should be added to those taken on IWC-IDCR/SOWER cruises and that analysis of the Japanese photos should be presented next year. The Japanese samples will increase the overall sample size and this greatly enhances the scientific value of both sets of photographs. A proposal to establish a central web-based catalogue of blue whale identification photographs, primarily for the Southern Hemisphere was endorsed. The system will be designed to facilitate the matching of blue whale photographs among a wide number of researchers and should result in a considerably increased capacity to understand some of the basic questions relating to Southern Hemisphere blue whale populations with respect to movements, basic biology and stock structure.

The Committee endorsed the results of a paper (Branch, 2008) that suggests a pre-exploitation abundance of Antarctic blue whales of some 256,000 animals (95% credibility interval of 235,000-307,000) and that the minimum population size reached was as low as only 395 whales (95% credibility interval of 235-804), i.e. only 0.15% of the pre-exploitation level. The positive news is that the population has recently been increasing at an estimated annual rate of 6.4% (95% credibility interval of 2.4-8.4%). (The estimated maximum rate of increase for blue whales is about 8.5%.) The most recent survey abundance estimate (for 1997/98) was about 2,300 blue whales (95% CI 1,150-4,500) – however, that is still less than one percent of the pre-exploitation abundance levels.

The Committee agreed that the circumpolar assessment for Antarctic blue whales is now complete.

Southern Hemisphere humpback whales

Considerable progress has been made in recent years in working towards an assessment of humpback whales. Attention has focussed both on data from historic whaling operations and on newly acquired photo-identification, biopsy and sightings data. Considerable progress has been made towards completing an assessment for three breeding stocks (A: off eastern South America, D: off western Australia and G: off western South America), particularly as a result of an intersessional Workshop held in Hobart, Australia in April 2006. The Committee has agreed that of the three stocks assessed, the most reliable results were those for Breeding Stock A. This is because there was trend information from surveys on the breeding grounds and less uncertainty about catch allocation from the feeding grounds. It agreed that there has been an increase in abundance in recent decades but that the stock remains well below initial unexploited levels. For Breeding Stock G, the only trend information available was for the feeding grounds and there was also uncertainty about possible stock structure within this stock. For Breeding Stock D, although there is breeding ground trend information and an absolute estimate of abundance, catch allocation is less certain and perhaps influenced by mixing with Breeding Stock E.

In Santiago, high priority was given to completion of the Comprehensive Assessment of Southern Hemisphere humpback whale Breeding Stocks B and C off the western and eastern African coasts respectively. Information presented to the Committee suggests that the stock structure for both stocks is complex; work to clarify this will continue intersessionally. Abundance estimates presented for Breeding Stock B off Gabon range from around 6,600 (95% CI 4,900-8,800) to 8,200 (95% CI 6,500-10,400). Estimates for Stock C3 (C stock comprises four sub-stocks, C1-C4) suggest numbers in the range 4,500-7,700. Work to complete the assessment will continue intersessionally.

The Committee reviewed information on other stocks of humpback whales including the stocks wintering off western South America and feeding from Isla Chiloe to the Antarctic Peninsula, humpbacks off eastern Australia, New Zealand and the South Pacific Islands and humpbacks off Oman. A study confirmed that the high growth rate of the east Australian humpback population has continued and yielded a long-term annual rate of increase of 10.9% (95% CI 10.5-11.4%). This population was estimated to number around 9,683 whales in 2007 (95% CI 8,556-10,959). Humpback whales off Oman in the Arabian Sea seem to be one discrete population and the Committee stressed the importance of increasing research on the status of, and threats to this geographically isolated population

North Pacific common minke whales

In light of the results of the RMP *Implementation* completed in 2003 (IWC, 2004a), the Scientific Committee began work on the in-depth assessment of western North Pacific common minke whales, with a special emphasis on the J-stock (found primarily in the Sea of Japan); that work continues. One of the difficulties facing this assessment is the apparent complexity of the population structure of common minke whales in the waters around Japan; there are at least four stock structure hypotheses and possibly more. The Committee hopes to clarify stock structure next year. Abundance estimates from sighting surveys in Russian Federation and Korean waters were reviewed but further analytical and field work is required before a final new abundance estimate for the area can be agreed. The Committee expressed concern about the continued high levels of reported bycatch of common minke whales from the J-stock and other coastal populations as well as recent suspicion of illegal catches from the J-stock.

Southern Hemisphere right whales

The Committee received a considerable amount of new information on southern right whales. Much of the information comes from long-term monitoring programmes; the Committee frequently notes the importance of such programmes to its work. Right whales off southern Australia have been increasing at around 8% annually (approx. 95% CI 4.5-11.8%). The value of satellite telemetry studies was illustrated by the information on feeding strategies and movements of animals tagged off South Africa. The Committee was pleased to receive information from South America and encouraged further work, noting the value of partnerships amongst local and national governments, researchers and other stakeholders. It was also pleased to receive the results of a Workshop held on the right whales found off Chile and Peru. That Workshop had concluded that the right whales in this region were critically endangered and that further work is needed to better understand their status and to enable measures to mitigate anthropogenic disturbance to be developed. The Committee recommended further international co-operation amongst researchers and increased photo-identification and biopsy sampling effort. It also encouraged research into the value of protected areas and the conduct of stock-specific assessments. This latter recommendation will be considered further next year.

North Atlantic right whales

The Committee has paid particular attention to the status of the North Atlantic right whale in the western North Atlantic in recent years and is extremely concerned about this population, which, whilst probably the only potentially viable population of this species, is in serious danger (*ca* 300 animals). By any management criteria applied by the IWC in terms of either commercial whaling or aboriginal subsistence whaling, there should be no direct anthropogenic removals from this stock.

This year, the Committee once again noted that individuals are continuing to die or become seriously injured as a result of becoming entangled in fishing gear or being struck by ships. It repeated that it is a matter of absolute urgency that every effort be made to reduce anthropogenic mortality in this population to zero. This is perhaps the only way in which its chances of survival can be directly improved. There is no need to wait for further research before implementing any currently available management actions that can reduce anthropogenic mortalities.

The Committee reviewed progress on a number of research and management recommendations concerning this stock.

Western North Pacific gray whales

The Committee and the Commission have expressed great concern over the critically endangered western gray whale on a number of occasions. It is one of the most endangered populations of large whales in the world with a population size of around 130 individuals and only about 23 breeding females. The primary feeding grounds lie along the north-eastern coast of Sakhalin Island, where existing and planned oil and gas developments pose potentially serious threats to the population, through habitat damage, ship strikes, noise pollution and oil spills. Entanglements in fishing gear throughout the range also pose a serious threat to the population.

The Committee welcomed a progress report on the valuable work undertaken since 1995 by a collaborative Russia-US programme, particularly with respect to photo-identification and genetic data. Information from that programme was incorporated into an updated assessment of the stock. It is encouraging that the population has been slowly increasing, at least up until 2005. However, its low absolute abundance and the news that five females had died in fishing gear during the past three years reaffirmed its critical status; projections incorporating this absolute number of additional mortalities indicate about a 25% probability of population decline and a substantial risk (about 10%) of extinction by 2050. The introduction by Japan of a new regulation in its 'Fisheries Resource Protection Law' aimed at reducing risk of incidental mortalities of gray whales in fisheries was welcomed.

The Committee made a number of recommendations with respect to the reduction of anthropogenic mortalities and disturbance. Development of efficient mitigation is greatly hampered by lack of information on migration routes and breeding destinations of the gray whales. The Committee noted the value of telemetry work in this regard, but also the need to exercise great care before undertaking such work on an endangered population. It will discuss this further next year. The Committee also reaffirmed its support for the IUCN Western Gray Whale Advisory Panel (WGWAP)[4] with respect to the Sakhalin area. It especially welcomed the work being undertaken by the WGWAP to: (1) prepare for a forthcoming seismic survey in 2009; and (2) compare the photo-identification data from the Russia-US programme and an industry-sponsored Russian programme. It strongly encouraged continued collaboration between these two complementary programmes. With respect to threats caused by fishing gear, the Committee recommended that range states make every effort to determine whether stranded or entangled whales match animals found in the photo-identification catalogues and/or genetic archive and to report such events (including photographs) as soon as possible. Identification of the causes of anthropogenic mortality is important in developing mitigation efforts.

The Committee reaffirmed the urgent need to reduce anthropogenic mortality to zero in this population. The work of the WGWAP towards the conservation of this population was endorsed and the participation of the Sakhalin Energy Investment Company in the Panel process was commended. It stressed the need for information on all activities and planned seismic surveys and urged all oil exploration companies to participate fully in the process of providing timely information.

Northeast Atlantic bowhead whales

About 20 bowhead whales were sighted at almost 81°N between Svalbard and Greenland in April 2006. There has been an apparent increase in observations of bowhead whales in these waters in recent years but it is not known if these few animals are stragglers from other populations or if they are survivors from the historic Spitsbergen population. If they are survivors of the Spitsbergen population, they are probably from one of the most endangered populations of the large whales in the world. The Committee recommended additional work to clarify their status as soon as practicable.

North Pacific bowhead whales

In the Okhotsk Sea, whaling on bowheads started in 1846 and was pursued intensively for two decades and then continued sporadically until 1913. Illegal catches resumed in 1967, but the numbers taken remain unknown. In light of

[4] *http://cms.iucn.org/wgwap/the_panel/index.cfm*

the small population size and recent catch history, the Committee expressed great concern and recommended that further work to investigate status be conducted as soon as possible.

EFFECTS OF ENVIRONMENTAL CHANGE ON CETACEANS

There is an increasing awareness that whales should not be considered in isolation but as part of the marine environment; detrimental changes to their habitat may pose a serious threat to whale stocks. The Committee has examined this issue in the context of the RMP and agreed that the RMP adequately addresses such concerns. However, it has also emphasised that the species most vulnerable to environmental threats might well be those reduced to levels at which the RMP, even if applied, would result in zero catches. Over a period of several years, the Committee has developed two multi-national, multi-disciplinary research proposals. One of these, POLLUTION 2000+, has two aims: to determine whether predictive and quantitative relationships exist between biomarkers (of exposure to and/or effect of PCBs) and PCB levels in certain tissues; and to validate/calibrate sampling and analytical techniques. The report of the first phase of the programme has been published (Reijnders *et al*., 2007). The other, SOWER 2000, is examining the influence of temporal and spatial variability in the physical and biological Antarctic environment on the distribution, abundance and migration of whales.

This year the Committee focussed on a number of environmental matters, including cetacean diseases, ecosystem modelling, climate change effects, pollution, anthropogenic noise and SOCER (State of the Cetacean Environment Report).

With respect to diseases, the Cetacean Emerging and Resurging Disease (CERD) group established last year prepared information on cetacean pathogens, biotoxins and disease reports. It also reviewed progress on disease identification and standardisation, case definition, diagnostic laboratories and data sharing. Given the paucity of available or targeted diagnostic laboratories and diagnostic tests specific for marine mammals, a list of laboratories and experts for specific or general diagnostic capabilities by country, continent and/or region will be compiled and maintained.

The Committee received a report from a two-day pre-meeting Workshop on skin diseases in cetaceans held in Santiago on 30-31 May. The Workshop reviewed the state of knowledge on the examination of, distribution of, and causes of skin diseases in cetaceans with a focus on cetaceans of South America. The potential for impacts of skin diseases in small populations in areas where there are high levels of environmental degradation was recognised and it was agreed that special action should be given to prevalence and impact of skin diseases in dolphins from southern and south-eastern Brazil. With respect to global action, recommendations were made for research, standardisation and on data sharing.

Due to time constraints, the POLLUTION+ Phase II modelling workshop planned for spring 2008 was not held. However, a new Steering Group has been assembled which is finalising plans for an intersessional workshop that will develop Terms of Reference for Phase II of the programme. Inter alia the workshop will establish a framework for modelling pollution effects, identify key cetacean populations to be studied, develop a protocol for validating the use of biopsy sampling techniques with respect to pollutant studies and then begin to apply this protocol to large whale species.

The Committee received new information on anthropogenic noise in relation to the potential impacts of seismic surveys on cetaceans, mid-frequency sonar and a cetacean stranding event. It noted a call by a recent International Workshop on Shipping Noise and Marine Mammals for global action to reduce the contributions of shipping to ambient noise with targets being set for the next 10 and 30 years.

Ecosystem modelling

The question of ecosystem modelling in the context of cetacean conservation is an important one and has been addressed by the Scientific Committee on a number of occasions before. This year the Committee has agreed to work collaboratively with both CCAMLR and FAO initiatives. The Committee agreed on the following with respect to the applicability of ecosystem models for the use of the Committee in providing advice to the Commission:

(1) spatial modelling is a valuable tool to explore possible effects of anthropogenic stressors;
(2) there is a great need for the proper incorporation of uncertainty in ecosystem models;
(3) there is a critical lack of data, in particular at the lower trophic levels, to evaluate the reliability of models;
(4) some models can be useful to generate hypothesis regarding trophic dynamics; and finally
(5) that there is a need for an increased collaboration between scientists designing field studies and those developing analytical models.

This year's focus was planning for a joint CCAMLR/IWC Workshop, to be held in August 2008, to review input data required for ecosystem models to provide advice on krill predators in the Antarctic marine ecosystem. Expert Working Groups for each of the key taxa were preparing for the Workshop. The Committee agreed that the approach taken by these groups, and the progress being made towards the Workshop, was appropriate.

The use of the ECOPATH with ECOSIM software to explore the potential impact of cetaceans on fishery yields was also discussed. The Committee agreed that simulation testing of multiple models is a valuable approach, reaffirming its conclusion of 2002 that at this stage, no single approach could be recommended to provide reliable information of value to consideration of cetacean dynamics in an ecosystem context. While this does not necessarily rule out the possibility that inferences could be drawn if a number of different approaches yield qualitatively similar results, the Committee agreed that it may be some time before this situation changes.

SMALL CETACEANS

Despite disagreement within the Commission over the management responsibilities of the IWC with respect to small cetaceans, it has been agreed that the Committee can study and provide advice on them. As part of this programme, the Committee has reviewed the biology and status of a number of species and carried out major reviews of significant directed and incidental catches of small cetaceans.

In 2001, the Government of Japan had indicated that it would no longer co-operate with the Committee on small cetacean related matters. In 2002, the Committee referred to the great value of the information provided by the Government of Japan on the status of small cetaceans in previous years and respectfully requested that the Government of Japan reconsider its position on this matter and resume the valuable contribution of Japanese scientists to its work on small cetaceans. Unfortunately, this has still not yet happened.

This year the Scientific Committee undertook a regional review of conservation issues regarding the (at least) 39 species of small cetaceans in the southeast Pacific (Columbia, Ecuador, Peru and Chile). The Committee noted that little is known about the distribution and abundance of many of the coastal species that are probably most impacted by anthropogenic activities, including Burmeister's porpoise, Peale's dolphin, bottlenose dolphin and the Chilean dolphin. A number of recommendations were made to improve the knowledge of the abundance, distribution, pattern of residency, population structure, life history and ecology of these and other small cetacean species. The Committee expressed concern with respect to both habitat degradation and the exclusion of small cetaceans from their habitat by aquaculture developments and recommendations were also made with respect to direct and incidental takes. A number of small coastal populations, including bottlenose dolphin, Peale's dolphin and spotted dolphins may be threatened by unregulated and undocumented takes for bait. It recommended that the impacts of such removals be assessed and the status of the affected populations be documented. The Committee also recommended that range states establish programmes for monitoring and reporting of bycatch of small cetaceans as part of their regular fisheries monitoring and that existing bycatch monitoring programmes be continued, particularly in relation to mitigation efforts. Recommendations for further research and regional collaboration (e.g. with IOC/UNESCO11) were made.

The Committee also reviewed progress on previous recommendations including those with respect to the vaquita, harbour porpoise (exposed to high bycatch throughout its range), franciscana (at risk from harbour development and bycatch), illegal takes of botos, the hand-harpoon hunts for Dall's porpoise in Japan (concern regarding sustainability) and Hector's dolphins (bycatch in gill net fisheries).

With respect to the vaquita, the Committee noted that the entire population is most likely to be no more than 150 animals and that there has been an extraordinary rapid decline of approximately 75% in a decade. It further noted that if the current mortality due to bycatch in fishing gear continues, it is likely that the species will be extinct in five years and probably less. The Committee therefore re-iterated its extreme concern about the conservation status of the vaquita which is the most endangered cetacean species in the world. It expressed its great frustration that despite more than a decade of warnings, this species has continued on a rapid path towards extinction due to a lack of effective conservation measures in Mexico (although it welcomed news that Mexico is taking measures to remove fishing gear that entangle these animals). It strongly recommended that, if extinction is to be avoided, all gillnets should be removed from the upper Gulf of California immediately. In the extremely unfortunate circumstance that this does not occur immediately, the Committee indicated that it must certainly occur within a three-year period starting in 2008. To meet this schedule, the Committee encouraged the international community including IWC member countries and non-governmental organisations (NGOs), to assist the government of Mexico in this task. In the Commission, Mexico confirmed that by Presidential Decree, over 50 million USD is being made available to remove gillnets throughout the range of the vaquita.

The Committee reaffirmed its concern over the conservation status of the boto and that directed killing of this species continues without restriction or catch limits. It recommended that immediate steps be taken by Brazil, Colombia, Peru and Venezuela to stop this hunt and that range states report to next year's meeting regarding progress made. In the Commission, Brazil reported that it has established a national working group of cetacean biologists, fisheries experts and environmental managers to devise better regulations for the fisheries that are the major cause of mortalities of the boto. The Committee re-iterated its concerns for stocks of Dall's porpoise and repeated earlier recommendations that catches should be reduced to sustainable levels, that the bycatch levels be quantified and that a full assessment of each of the affected populations be conducted as soon as possible.

Finally, the Committee repeated previous requests for all Governments to submit relevant information on direct and incidental catches of small cetaceans in their national progress reports and for improved information on stock identity and abundance.

SCIENTIFIC ASPECTS OF WHALEWATCHING

Over recent years there has been emerging evidence that disturbance from some whalewatching activities may have population-level effects in cetaceans. The Committee is therefore planning a large-scale whalewatching experiment to assist in describing such effects, to improve understanding of the mechanisms involved and to develop mitigation measures. Work will continue intersessionally and a final research proposal is expected to be available at next year's meeting. An overview of whalewatching in South America raised concerns that aerial whalewatching in Chile and Brazil using helicopters has the potential to disturb whales. The Committee reviewed aspects of short-term and long-term methods to assess biological impacts of whalewatching on cetaceans and gave advice on further developments.

With respect to guidelines and regulations for whalewatching, the Committee expressed some concern at the apparent trend of government agencies to use voluntary codes of conduct rather than legal regulations. The Committee recommended that in general, codes of conduct should be supported by appropriate legal regulations and modified if necessary as new biological information emerges. The world-wide compendium of whalewatching guidelines and regulations around the world was updated and is available on the IWC web site (*http://www.iwcoffice.org/conservation/whalewatching.htm#regulations*).

REVIEW AND COMMENT ON SCIENTIFIC PERMITS ISSUED FOR SCIENTIFIC RESEARCH

Improving the procedure for reviewing scientific permit proposals

An improved procedure to review special permit proposals as well as the periodic and final review of results from special permit programmes was agreed by consensus by the

Scientific Committee and endorsed by the Commission. In this approach, reviews will be undertaken at intersessional workshops of independent experts. A limited number of scientists associated with a proposal will be allowed to attend such workshops in an advisory role, primarily to present their proposal or results and to answer questions of clarification. To ensure that the composition of any expert group is considered balanced and fair, the experts will be chosen by the Chair and Vice Chair of the Scientific Committee and IWC's Head of Science in consultation with a Standing Steering Group representing a range of experience and expertise within the Scientific Committee.

Review of results from existing permits

The Scientific Committee reviewed results from Japan's current research programmes in the Antarctic (i.e. JARPA II) and North Pacific (JARPN II) and Iceland's programme in the North Atlantic.

JARPA II is a large-scale Antarctic programme that commenced with the first year of a two-year feasibility study during the austral summer of 2005/06. The objectives are defined by Japan as: (1) monitoring of the Antarctic ecosystem; (2) modelling competition among whale species and developing future management objectives; (3) elucidation of temporal and spatial changes in stock structure; and (4) improving the management procedure for Antarctic minke whale stocks. JARPA II will focus on Antarctic minke, humpback and fin whales and possibly other species in the Antarctic ecosystem that are major predators of Antarctic krill.

With respect to JARPA II, 2007/08 was the first year of the full-scale research programme. While permits were issued for minke, fin and, for the first time, humpback whales, Japan subsequently agreed to delay the taking of humpback whales at least until after the 2008 Annual Meeting. In the event, 551 Antarctic minke whales were taken and no fin whales.

JARPN II is a long-term research programme primarily aimed at feeding ecology in the context of contributing to the 'conservation and sustainable use of marine living resources in the western North Pacific, especially within Japan's EEZ.' The programme involves the taking of 150 minke whales, 50 Bryde's whales, 50 sei whales and 10 sperm whales annually in the western North Pacific.

In the JARPN II programme in 2007, a total of 207 (plus one lost) common minke, 100 sei, 50 Bryde's and 3 sperm whales were taken. A review of the first six years of JARPN II will take place intersessionally prior to next year's Annual Meeting following the new approach mentioned above.

Iceland's programme was primarily for feeding ecology studies and involved the proposed take of 100 common minke whales, 100 fin whales and 50 sei whales in each of two years. In the event, Iceland issued permits to take 38 common minke whales in 2003, 25 minke whales in 2004, 39 minke whales in 2005, 50 minke whales in 2006 and 39 minke whales in 2007. The total number of common minke whales taken has been 200, the last being taken in 2007. Currently the samples and data are being analysed and when this has been completed, the programme will be subject to an IWC review following the agreed new procedure.

Again, as in the past, different views on the value of these research programmes were expressed in the Scientific Committee and in the Commission. The deep division within the organisation regarding scientific permit whaling is one of the main reasons why a better approach to the review of proposals and results has been developed.

WHALE SANCTUARIES

In 2004, when reviewing the Southern Ocean Sanctuary (SOS), the Committee endorsed a number of recommendations that were to be implemented generically to the review of sanctuary proposals.

(1) The purpose(s) of IWC Sanctuaries should be better articulated through a set of refined overall objectives (e.g., preserving species biodiversity; promoting recovery of depleted stocks; increasing whaling yield). In particular, the relationships between the RMP and the Sanctuary programme should be articulated.
(2) Appropriate performance measures both for Sanctuaries in general, and the SOS in particular, should be developed. These performance measures should link the refined objectives of the SOS with monitoring programmes in the field.
(3) Systematic inventory and research programmes should be established or further developed so as to build the required information base for a Sanctuary management plan and subsequent monitoring programmes.
(4) A Sanctuary management plan should clearly outline the broad strategies and specific actions needed to achieve Sanctuary objectives.
(5) A monitoring strategy that measures progress toward achieving the Sanctuary objectives should be developed and subsequently implemented. A key component of this monitoring strategy would be the development of tangible indicators to monitor progress.
(6) Review criteria that reflect the goals and objectives of the Sanctuary (as described above) should be established.
(7) The Sanctuary management plan should be refined periodically to account for ecological, oceanographic and possible other changes in an adaptive fashion.

In previous years, the Committee has received requests to review proposals for a South Atlantic Sanctuary and a South Pacific Sanctuary. There has been disagreement within the Committee over whether such Sanctuaries were justified scientifically. This year no proposals were received for review.

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