Editorial

This summary of the work of the Scientific Committee at the recent annual meeting follows the 2007 meeting of the International Whaling Commission held in Anchorage, Alaska. 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 2007 as *J. Cetacean Res. Manage.* 10 (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. The Commission had received a proposal by the Chair of the Commission for an RMS package of measures that he believed was a fair and balanced approach to move to the rapid completion of the RMS (IWC, 2005a). However, this was not accepted as a package by the Commission, and despite further work, the Commission agreed that it was at an impasse at the 2006 meeting in St Kitts and Nevis. Whilst no progress was made at the Anchorage meeting on this issue it was agreed that an intersessional meeting of the Commission on the future of the IWC would be held.

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, 2006b), 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 2008 Annual Meeting

Implementation Simulation Trials

Implementation Simulation Trials are trials that are carried out before using the RMP to calculate a catch limit; they 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, 2005c). Some final details had required further analytical work and this was completed at Anchorage.

North Pacific Bryde's whales

This year, the Committee successfully completed the *Implementation* for western North Pacific Bryde's whales. This was the first *Implementation* undertaken using the new requirements and guidelines.

North Atlantic fin whales

At the 2005 Annual Meeting, the Committee initiated the *pre-Implementation Assessment* of North Atlantic fin whales (IWC, 2006c). To progress this work, a co-operative intersessional Workshop was held in March 2006 with the NAMMCO[1] 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, 2007d). For practical reasons (i.e. so that it did not conflict with the completion of the Bryde's whale *Implementation*), it was agreed that the North Atlantic fin whale *Implementation* would begin after the 2007 Annual Meeting. The process for beginning this *Implementation* was reviewed in Anchorage and the First Intersessional Workshop is scheduled for April 2008.

Bycatches of large whales

The RMP calculates 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, such as bycatches in fishing gear and ship strikes.

[1] North Atlantic Marine Mammal Commission.

In reviewing this issue, the Scientific Committee agreed that priority should be given to those areas where the RMP *Implementations* had been or were likely to be completed and implemented – such as the northwestern Pacific and the northeastern Atlantic. Four steps are required to estimate bycatches: (1) identification of the relevant fisheries; (2) description and categorisation of those fisheries to allow a sampling scheme to be devised; (3) identification of a suitable sampling strategy or strategies; and (4) design and implementation of the sampling scheme to enable estimation of the total bycatch.

The Committee has reviewed general methods for estimating bycatches. These fall under two headings: (1) those based on fisheries data and observer programmes; and (2) those based on genetic data. The former have been used successfully for several small cetacean populations. The Committee agreed that independent observer schemes are generally the most reliable means of estimating bycatch rates in a statistically rigorous manner, but that they may not always be practical and will require careful design. It is reviewing progress by the European Union in addressing sampling strategies. The Committee received information on bycatches and entanglement of large whales from Massachusetts, Hawaii, Alaska and Scotland and considered relevant information from ACCOBAMS[2].

Genetic approaches potentially represent a relatively new way of estimating bycatches. In 2005, a Workshop was held to examine genetic methods based on market sampling (IWC, 2006a). As a result of that Workshop, the Committee agreed that the market sampling approach provided a potentially useful method to supplement bycatch reporting schemes. Any such bycatch estimates would be improved considerably if carried out in conjunction with the use of data from DNA registers on whales entering the market. In 2006, a list of requirements as a pre-requisite to holding a second workshop was agreed (IWC, 2007e); at the 2007 meeting it was agreed that further work was required before holding a second workshop. The Committee requested information on Japanese regulations related to bycatches. The Committee also discussed issues related to risks of entanglement and the fate of entangled whales.

Other sources of anthropogenic mortality: vessel strikes

The Committee spent some time considering issues related to ship strikes. It received reports on estimation methods and results from Massachusetts, Hawaii and Alaska, as well as progress on previous recommendations from Italy, the Canary Islands and mainland Spain. It was pleased to receive a progress report on the development of a database which is being developed to incorporate ship strike data from around the world in a consistent manner.

DEVELOPMENT OF AN ABORIGINAL WHALING MANAGEMENT PROCEDURE

With the completion of the RMP in 1994, the Commission asked the Scientific Committee to begin the process of developing a new procedure for the management of aboriginal subsistence whaling that took 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. The Committee has developed a proposal for aspects of the scheme (IWC, 2003).

In 2002, 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 this was adopted by the Commission (IWC, 2003) and has subsequently been used to provide catch advice. In 2004, the Committee agreed an *SLA* for the eastern stock of gray whales (IWC, 2005d); this was adopted by the Commission and has been used to provide management advice.

The situation for the Greenlandic fisheries for fin and minke whales is more difficult. A considerable amount of research, especially concerning stock identity, is required and to this end, the Committee has developed a research programme in cooperation with Greenlandic scientists. High priority is being accorded to this work and a Workshop on progress with respect to Greenlandic fisheries will be held in March 2008.

ASSESSMENT OF STOCKS SUBJECT TO ABORIGINAL SUBSISTENCE WHALING

Up to 2007, aboriginal subsistence whaling was 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 (bowhead and gray whales). It is the responsibility of the Committee to provide scientific advice on safe catch limits for such stocks, where possible using appropriately developed *SLA*s. Where *SLA*s have not yet been developed, the Committee provides advice on a more *ad hoc* basis, carrying out major reviews according to the needs of the Commission in terms of establishing catch limits and the availability of data. It also carries out brief annual reviews of each stock.

At the 2007 meeting, the Committee had to provide management advice for all of the stocks considered. It had also been asked by Denmark to consider the status of all large whale species off West Greenland and in particular the bowhead and humpback whales. The Commission sets catch limits based on a 'need statement' from the countries involved and scientific advice on whether that need is sustainable. The Committee stressed to the Commission its view that the appropriate way to provide long-term management advice is using specially developed *SLA*s; it emphasised the difficulties associated with providing interim *ad hoc* advice.

Eastern gray whales

Based on the submitted need statement, the Committee confirmed the *Gray Whale SLA* was in accord with a total for the 2008-12 seasons of 620 with a maximum of 140 in any one year, which the Commission set. An *Implementation Review* for eastern gray whales is scheduled for 2007.

Bering-Chukchi-Beaufort Seas stock of bowhead whales

This year the Committee completed the first *Implementation Review* for bowhead whales; the review had begun in 2005 as a result of discussions at the in-depth assessment

[2] Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area.

undertaken in 2004 (IWC, 2005b). 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%). A major component of the *Implementation Review* was to complete work on the re-evaluation of stock structure for the bowhead whales found in the Bering, Chukchi and Beaufort Seas. This has been a major undertaking and has involved three intersessional workshops since 2005 as well as considerable field, laboratory and analytical work. As a result of this extensive work, the Committee agreed that the available evidence supports the existing single stock hypothesis for these whales. In addition, it noted that simulation testing had shown that the *Bowhead SLA* was robust to the several single and multiple stock structure hypotheses examined. The results from the *Bowhead SLA* revealed that the existing catch limits remain acceptable. In view of this, the Commission agreed a catch limit for the 2008-2012 period of a total of not more than 280 landed whales, with no more than 67 strikes in any one year.

Common minke and fin whales off West Greenland

The Committee had previously stressed that its inability to provide any advice on safe catch limits was a matter of great concern.

This year, the Committee was extremely pleased to receive and accept new abundance estimates for the common minke whale (10,800, 95%CI 3,600-32,400) and fin whale (3,200, 95%CI 1,400-7,200) off West Greenland, based on a traditional aerial survey carried out in 2005.

For the common minke whale, in addition to the new abundance estimate, progress has been made on incorporating the sex ratio data into an assessment. It is hoped that a final decision on whether a suitable assessment method can be designed will be made at the 2008 Annual Meeting. Despite progress made, the Committee agreed that the Commission should exercise caution when setting catch limits for this stock and set an interim 1-year catch limit. It noted that depending on assumptions made, the estimated replacement yield based on the lower confidence interval of the abundance estimate ranges from 170-230 animals.

For the fin whale, in addition to a new abundance estimate (see above), the Committee was also pleased, for the first time, to have an acceptable assessment method for this stock and it used this to provide interim management advice for this stock. For the preferred estimate of productivity, the Committee agreed that the population lay between 75% and 97% (lower 5% credibility and estimated posterior median values, respectively) of its unexploited abundance and that catches of between 14 and 26 would still allow the population to grow. The next priority for this stock is to determine an appropriate *SLA*.

After considerable discussion at the Commission meeting, the following catch limits were adopted:

(i) no more than 19 fin whales struck annually for the years 2008-2012;
(ii) no more than 200 common minke whales struck annually for the years 2008-2012 with an annual review by the Scientific Committee.

Common minke whales off East Greenland

Catches from East Greenland are believed to come from the Central Stock of common minke whales that numbers well over 60,000 animals. The Committee agreed that the present catch of 12 animals from East Greenland pose no threat to this stock. The Commission set a catch limit of up to 12 common minke whales struck annually for the years 2008-2012.

Bowhead whales off West Greenland

The Committee has agreed that whilst a comprehensive review of the available stock structure is required, the present working hypothesis is that there is a single East Canada-West Greenland stock. The agreed estimate for part of this stock off West Greenland is 1,230 (95%CI 500-2,490). On occasions in the past the Committee has provided interim management advice on the basis of the lower 1% confidence interval, in this case five whales. The Commission agreed to a strike limit of two bowhead whales for the years 2008-2012, subject to annual advice from the Scientific Committee.

Humpback whales off St Vincent and the Grenadines

In 2002, after considerable debate in the Commission, a catch of up to 20 whales for the period 2003-07 was agreed. 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 catch limit set by the Commission would not harm the stock. The Committee agreed that renewal of the present catch limit would not harm the stock. The Commission agreed a catch limit of up to 20 humpback whales off St Vincent and The Grenadines for the years 2008-12.

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 such genetic methods have the potential to be one of a suite of tools that can be used to examine pre-exploitation abundance but that there are a number of limitations and uncertainties that must be considered when examining such data in a present-day management context. The Committee had agreed that 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 (IWC, 2005b).

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 had been made in this regard and at the 2006 meeting the Committee agreed that it should not consider this issue further until additional publications describing methodological and analytical progress are available (IWC, 2007c). No new information was presented in Anchorage.

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, 2004). 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).

This is a complex project that must proceed in an iterative fashion. Great progress was made on the most challenging module, i.e. the development and validation of a program to simulate realistic genetic datasets, at an intersessional workshop in March 2006 (IWC, 2007a). In particular, it led to completion of the computing work needed to simulate datasets and complete the control program that generates genetic samples, passes the samples to the boundary setting methods, runs the management algorithms, and collates the performance statistics. At the same time the technical specifications for the initial TOSSM trials (demographic structure, genetic structure, initialising the population matrix, harvesting and catch control, sampling and trials) were completed.

In Anchorage, the Committee received the results of exploratory runs for two commonly used population genetics models (STRUCTURE and BayesAss) for particular plausible, albeit difficult, scenarios. Interestingly both methods performed poorly in terms of estimating the quantities they were designed to estimate and consequently performed poorly in a management setting. The Committee has identified three future tasks: (1) broaden the suite of methods to be tested; (2) move from exploratory testing to an initial set of performance trials; and (3) further develop the control program.

The Committee also considered a new statistical method for estimating genotyping error rates based on mother-foetus pairs. Particular attention was paid to developing a set of guidelines for the use of genetic data in RMP and AWMP work. Initial discussions in Anchorage considered: (1) experimental design (quality control for samples, data and analysis); (2) procedural implementation of data quality checks; (3) presentation of data and associated errors; and (4) assessment of error rates. It is hoped to complete this work at the 2008 annual meeting.

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. 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.

A considerable amount of work has been undertaken and further work is ongoing. The final part of the Third Circumpolar Survey undertaken as part of the IWC's SOWER research programme has been completed and preliminary work suggests that the estimated abundance may be down to about 40% of the estimates from the Second Circumpolar Survey. Experimental work to examine possible causes has been undertaken on the cruises since 2004/05. Work to finalise an assessment of Antarctic minke whale is continuing in a number of ways and as a minimum it is hoped to agree abundance estimates at the 2008 meeting. In order to achieve this, a specialist Workshop will be held in early 2008.

Southern Hemisphere blue whales

The Committee is beginning the process of reviewing the status of Southern Hemisphere blue whales. In Anchorage, the Committee reviewed information on distribution, stock structure and movements from a number of areas. With respect to abundance and trends, the Committee agreed that: (1) on average, the Antarctic blue whale population increased at a rate of 8.2% per annum (95% CI 3.8–12.5%) between 1978/79 and 2003/2004; and (2) had an estimated circumpolar population size of at least 2,300 (95% CI 1,150–4,500) in 1997/98. However, despite this encouraging news, Antarctic blue whales remain at a very small fraction of their unexploited level.

The Committee reviewed progress towards undertaking an in-depth assessment and has developed a workplan for next year.

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. In 2006, considerable progress was 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. At the 2006 Annual Meeting (IWC, 2007c), the Committee reviewed the results of assessment modelling. It 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 Anchorage, priority was given to trying to complete the Comprehensive Assessment for Southern Hemisphere humpback whale Breeding Stocks B and C off the western and eastern African coasts, respectively. With respect to stock structure it was noted that interchange of whales from different breeding populations on the feeding ground and the migratory process between breeding stocks and feeding stocks are not yet well understood. For Breeding Stock B there is an indication of sub-population structure but this is poorly understood. Any assessments performed at this time should combine information from both putative sub-stocks. For Breeding Stock C there is also an indication of multiple stocks. A more in-depth comparison between sub-areas is required. A number of research recommendations were made that should enable progress towards agreed assessments for these Breeding Stocks in 2008. In addition, the Committee welcomed a novel genetic model approach to estimate minimum abundance in a historic population trajectory for a species undergoing a bottleneck and recommended further research on this.

North Pacific common minke whales

After the completion of the *Implementation* of North Pacific common minke whales in 2003, it was agreed that preparations should begin for an in-depth assessment of common minke whales in the North Pacific, with special emphasis on the J-stock.

This year, the Committee was pleased with the substantial intersessional progress made including receiving results from three cruises and a successful collaboration between Japanese and Korean scientists for genetic analysis. With respect to stock structure, there is now sufficient information available to begin specifying some plausible hypotheses for stock structure but the Committee recommends biopsy sampling for some areas where data are sparse. This will require co-operation amongst range states.

Similarly in terms of distribution and abundance, the Committee was pleased to receive some new information from Japanese and Korean surveys. It was especially pleased to hear that permission had been granted by the Russian Federation for surveys within its EEZ. It requested co-operative work by all range states to fill in information gaps and the Committee was pleased to receive a summary of a workshop of range state scientists held in Korea in late 2006. Work on combining the information obtained from a large number of partial surveys in the region is continuing.

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

This is one of the most endangered populations of great whales in the world. There are a number of proposed oil and gas-related projects in and near its only known feeding ground. The population is very small (about 120), and suffers from a low number of reproductive females (about 23), low calf survival, male-biased sex ratio, dependence upon a restricted feeding area and apparent nutritional stress in some years. Other major potential concerns include behavioural reactions to noise (notably in light of increasing industrial activity in the area) and the threat of an oil spill off Sakhalin which could cover all or part of the Piltun area and thus potentially exclude animals from this feeding ground. Again this year, the Committee stressed the urgency of reducing anthropogenic mortality to zero – particularly in the light of four fatal entanglements in fishing gear since 2005. The Committee made a number of mitigation suggestions in this regard and welcomed the intentions of the Japanese authorities to address this issue urgently. Related to this concern is the issue of obtaining better information on the migratory route(s) and breeding grounds of western gray whales. An important aid to this is the use of telemetry but any work in this regard must be undertaken with great care given the precarious state of the population. Given this, the Committee has established a co-ordination group to work with the IUCN facilitated Western Gray Whale Advisory Panel (WGWAP; see http://www.iucn.org/themes/marine/sakhalin/) to ensure that if telemetry work is

carried out, it is done to the highest specifications. The Commission has established a voluntary fund for such purposes.

With respect to the WGWAP, the Committee strongly supports its efforts to develop a framework for collaborative research, monitoring and mitigation efforts between oil companies, independent experts, national programmes and authorities and the IWC and other intergovernmental organisations. It particularly urged that all companies in the area co-operate with this process.

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. Phase I of POLLUTION 2000+ was completed and reviewed last year (Reijnders *et al*., 2007) and work to develop Phase II is continuing. The other, SOWER 2000, was developed to examine the influence of temporal and spatial variability in the physical and biological Antarctic environment on the distribution, abundance and migration of whales; an important part of that work involves cooperation with other organisations working in the region such as CCAMLR and Southern Ocean GLOBEC. The main body of analytical work will be presented at the 2008 Annual Meeting.

Infectious and non-infectious diseases and impact on cetaceans

The Committee received the results of a 2-day Workshop held just before the Anchorage meeting. Three major topics were discussed: harmful algal blooms (HABs) and associated biotoxins; infectious diseases; and modelling and risk assessment. The Committee recognised that there are increases in the frequency, type and duration of HABs and increases in biotoxin and pathogen related diseases in cetaceans throughout the world. Furthermore, it recognised the need for increased research and standardised reporting in a wide number of disciplines dealing with cetacean health. There is a need for a better understanding of the epidemiology and clinical aspects of infectious and non-infectious diseases that may affect cetacean population status. Finally, the Committee noted that, for most cetacean species, there are currently insufficient disease-specific data to allow modelling exercises to be informative. Data and analytical gaps were identified and *inter alia* the Committee established a Working Group on Cetacean Emerging and Resurging Diseases that will report to the 2008 Annual Meeting.

Handling and release of entangled cetaceans

Five items were discussed at the Commission's request: (1) use of data from release programmes to improve knowledge of the magnitude of entanglements; (2) impact of entanglements at the population level; (3) practical guidelines for dealing with entanglements; (4) types of data that can be collected from entangled/trapped whales; and (5) use of other data that can enhance understanding of entanglement issues (e.g. stranding and scarring data). The Committee emphasised the potential danger in attempting to release large whales from entanglements, and recommended that those who wish to establish disentanglement teams in their countries should work with the appropriate local governmental authorities and seek training from professionals with a track record of safety and success. Data on the fate of released whales are useful to evaluate the success of release operations. However, in conclusion, the Committee emphasised that the most valuable use of disentanglement data is for developing new fishing gear and practices that prevent lethal entanglements of large whales. This is especially important in situations where entanglement is inhibiting the recovery of extremely endangered species or populations.

Other habitat related issues

The Committee agreed that there is a need to hold a workshop on the potential effects of climate change on cetaceans and a scoping meeting for such a workshop will be held before the 2008 Annual Meeting. It also reviewed progress on matters related to acoustic disturbance of cetaceans, particularly related to military exercises and seismic surveys. The Committee repeated a number of its recommendations from last year with respect to collecting baseline information and taking precautionary mitigation measures. The Committee also discussed matters related to sea ice.

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. Last year the Committee agreed to work collaboratively with both CCAMLR and FAO initiatives (IWC, 2007c). It also agreed on the following with respect to the applicability of ecosystem models for the use of the Committee in providing advice to the Commission:

spatial modelling is a valuable tool to explore possible effects of anthropogenic stressors;

there is a great need for the proper incorporation of uncertainty in ecosystem models;

there is a critical lack of data, in particular at the lower trophic levels, to evaluate the reliability of models;

some models can be useful to generate hypotheses regarding trophic dynamics; and finally

that there is a need for an increased collaboration between scientists designing field studies and those developing analytical models.

In Anchorage, the Committee reviewed progress on a number of issues, particularly collaboration with CCAMLR and FAO. With respect to the former, a joint Workshop will be held in summer 2008 on the modelling of krill predators in the Antarctic. The terms of reference for the Workshop include: reviewing types, relative importance and uncertainties in data required for modelling approaches;

reviewing available input data; summarising the nature of the available data; and identifying and prioritising knowledge gaps. With respect to FAO, the results of an expert consultation on 'modelling ecosystem interactions for informing an ecosystem approach to fisheries' will be reported to the 2008 Annual Meeting. The Committee also reviewed progress in the development of ecosystem models.

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 Scientific 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 primary topic was a review of population structure, systematics and status of killer whales. In general, our knowledge of killer whales varies considerably from region to region. In some parts of the world, for example the northwest coast of the USA and Canada, local killer whale populations have been studied for many years; in other areas such as Europe studies are on the increase but, particularly for high seas habitats, knowledge remains sparse. The Committee encourages the continuation of long-term programmes and the establishment of new programmes to increase our understanding of killer whales worldwide. With respect to status, the Committee expressed concern over: (1) the southern resident killer whale population from the coasts of Washington State and British Columbia; (2) killer whales in Greenland; (3) killer whales found near the Strait of Gibraltar; and (4) killer whales of the Oyashio Current ecosystem.

The Committee also reviewed progress on previous recommendations. In recent years, the Committee has repeatedly expressed concern over the critical conservation status of the Chinese river dolphin the baiji; and made recommendations accordingly. This year, it was saddened to receive information that leads us to agree with the conclusions of the scientists who conducted a comprehensive international survey, that the baiji is probably extinct. The Committee expressed its great concern that, despite extensive scientific discourse for more than two decades, little effort was made to implement any real conservation measures. Such highly endangered species require swift and decisive human intervention before they are extinct.

With the probable extinction of the baiji, the vaquita of the upper Gulf of California is probably the most endangered cetacean species. Available information suggests that the current population decline is possibly close to 10% annually, with a critical threshold in approximately 8 years. The Committee reiterated its extreme concern for this species and strongly recommended that resources be found to design and implement a comprehensive programme to eliminate entangling nets from the range of the vaquita through a buy-out programme or other system of compensation to affected fishing communities. Such a programme should include appropriate enforcement and control measures.

The Committee also expressed concerns over a number of issues, including the catches of small cetaceans off West Greenland, the capture of *boto* for bait in the central Brazilian Amazonas and the hand-harpoon hunt for Dall's porpoise populations in the western North Pacific.

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

The major topic this year concerned quantitative methods for assessing the impacts of whalewatching on cetaceans. In assessing biological impacts of whalewatching on cetaceans the Committee first reviewed some terminological and theoretical aspects before entering into a detailed discussion on methodology for impact studies. Two case studies reporting on population-level effects were considered. The Committee agreed that such long-term studies in areas where whalewatching activities are taking place, especially those studies that measure vital rates over time, are extremely valuable. The Committee requested the Commission to encourage Contracting Governments to provide long-term funding for longitudinal studies. The Committee also received information on short-term impacts, noting that vessel interaction studies should begin before whalewatching traffic reaches saturation point. There is some evidence that in some areas habitat degradation is influencing whale behaviour but determining the mechanism requires further work. It was also noted that a meta-analysis of recent studies would be valuable and an intersessional working group will address this issue.

Last year, the Committee had agreed that it was necessary to concentrate research effort on understanding the interactions between whalewatching impacts on cetaceans and other anthropogenic disturbances and ecological factors (IWC, 2007c). To do so, the Committee had proposed a dedicated Workshop to develop a global scale research design and recommended that such a Workshop be held. The Committee this year agreed that this Workshop should be held prior to the 2008 Annual Meeting.

Given the location of the meeting, whalewatching in Alaska was discussed as a separate item. These operations are highly seasonal, and the main target species are humpback whales and killer whales. For application in other situations, the Committee expressed interest in the design of a study aimed at using ferries to gather survey data and to help assess collision risk, and the Committee recommended the collection of such basic information about the whalewatching industry worldwide. The Committee also reviewed: data sources from platforms of opportunity of potential value to the Committee; reports from a number of intersessional working groups; potential impacts of 'swim with' programmes; progress on developing a compendium of whalewatching guidelines and regulations from around the world; and risk to cetaceans from colliding with whalewatching vessels.

REVIEW AND COMMENT ON SCIENTIFIC PERMITS ISSUED FOR SCIENTIFIC RESEARCH

All proposed scientific permits have to be submitted for review by the Scientific Committee following guidelines issued by the Commission. However, in accordance with the Convention, the ultimate responsibility for issuing them lies with the member nation.

An intersessional meeting to review the results from the JARPA research program was convened in Tokyo in December 2006. The report of the JARPA Review Workshop will be published in the 2008 supplement to the Journal; a very short summary of the Workshop is given below.

In summary, considerable data have been collected by the JARPA programme by both lethal and non-lethal methods, but there was disagreement at the Workshop regarding the analyses presented and the interpretation of some of these data. A number of recommendations for further analyses were made. Much progress has been made in addressing Antarctic minke whale abundance and trends and, provided that the recommendations from the workshop are followed, the Committee may be able to agree estimates, although the confidence intervals are wide and probably will preclude information on trends becoming available. For humpback whales the abundance estimates provided useful steps towards acceptable estimates of abundance.

A considerable amount of work has been undertaken on population structure since the mid-term JARPA Review held in 1997 (IWC, 1998). It was agreed that there are at least two stocks of Antarctic minke whales present in the JARPA research area, and an area of transition in the region around 150°-165°E was suggested. The data do not support the current IWC Management Areas for Antarctic minke whales. Samples from the breeding areas would greatly facilitate these analyses, and are likely to be required to resolve issues relevant to stock structure and mixing within the JARPA research area.

The estimation of natural mortality was the main initial objective of JARPA. However, the confidence limits around the current estimate spanned such a wide range that the parameter is still effectively unknown. More precise estimates of natural mortality rates depend on the use of commercial catch-at-age data, but there are some yet unresolved problems with those data.

The Committee welcomed the oceanographic and krill-related work undertaken since the 1997 Workshop. The Committee also agreed that considerable relevant data had been collected by the JARPA programme on matters related to body condition and feeding. However, it is clear that the nature of the analyses presented at the 2006 Workshop meant that relatively little progress had been made in addressing the role of Antarctic minke whales in the ecosystem. However, a number of more refined analyses were presented and discussed at the Anchorage meeting.

Levels of toxic metals and organochlorines were low compared with whales in the Northern Hemisphere.

In conclusion, the Committee concurred with the view of the 1997 Workshop that 'The results of the JARPA programme, while not required for management under the RMP, have the potential to improve management of minke whales in the Southern Hemisphere' in a number of ways. As has been the case in past Committee discussions on the respective merits of lethal and non-lethal methodology, it was not possible to reach consensus amongst the participants.

Three continuing permits were discussed this year.

JARPA II was a new proposal two years ago. Its stated objectives of the new long-term research programme proposal are: (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 the Antarctic minke whale stocks.

The proposed catches for the full programme were: 850 (with 10% allowance) Antarctic minke whales, 50 humpback whales (not to begin for two years) and 50 fin whales (10 in the first two years). There was considerable disagreement over the value of this research both within the Scientific Committee and the Commission. As in previous years, there was severe disagreement within the Committee regarding advice that should be provided on a number of issues, including: the relevance of the proposed research to management, appropriate sample sizes and applicability of alternate (non-lethal) research methods.

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 in the western North Pacific. Again there is considerable disagreement within the Committee over the value of this research.

The Icelandic research programme on common minke whales in Icelandic waters continued in 2006. The main objective of the project concerns feeding ecology, energetics and multispecies modelling, but several additional subprojects are included in the programme. In 2006, 60 common minke whales were caught under special permit in accordance with the original research proposal. A total of 161 common minke whales have been caught since the start of the research programme in 2003 and it is expected to be completed in 2007. Again, as in the past, different views on the value of this research were expressed in the Scientific Committee.

An important part of the discussions in Anchorage centred around improving the review process for scientific permit proposals. The Committee agreed that the process suggested last year (DeMaster *et al*., 2007) represented a great improvement on the existing process. A few items left over from last year were completed. The key feature of the process is the holding of a specialist Workshop to review proposals for, and results from scientific permits. The Committee agreed that a Standing Steering Group (SSG) established by the Chair of the Scientific Committee would develop an initial list of potential candidates to serve as independent experts at the Workshop. The final list would be agreed by the Chair, Vice-Chair, and Head of Science. Further, the Committee agreed that the Terms of Reference for the specialist Workshop should be developed by the SSG and submitted to the Scientific Committee at the annual meeting prior to the Workshop. The Committee also agreed that scientists selected to be proponents of a proposal for a special permit can participate in the specialist Workshop but that participation will be limited to (1) providing information to the invited experts in addition to that contained in the proposal or research results and (2) answering questions posed by the invited experts. The findings and recommendations in the Workshop report will only reflect the opinions of the independent experts.

Finally, the Committee agreed that there is a desire to ensure that the process of reviewing new proposals and that for the review of existing proposals should be effectively the same and should encompass the process of scientific transparency and independence outlined in DeMaster *et al*. (2007). The Committee recommended the adoption of the revised process for new proposals and in principle to periodic and final reviews. It was recognised that additional work was needed to implement this new process for the review of results. The Committee anticipated that a final protocol will be adopted at the 2008 Annual Meeting. This protocol will then allow for orderly review of results from JARPNII and the Icelandic programme. The Committee was informed that no new Special Permit proposals are anticipated in the foreseeable future.

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 can be justified scientifically. This year no proposals were received for review.

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Editor

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