Report of the Scientific Committee

The Committee met at 9.00 am on 30 June 1980 and following days at New Hall, Cambridge, under the Chairmanship of J. L. Bannister.

A list of participants is given in Annex A.

1. INTRODUCTION

The Chairman welcomed the participants and expressed pleasure that scientists from Spain and Chile were attending the meeting for the first time.

2. APPOINTMENT OF RAPPORTEURS

The Committee appointed Donovan rapporteur with the assistance of various members as appropriate. Chairmen of sub-committees appointed rapporteurs for their meetings.

3. ADOPTION OF AGENDA

The Agenda adopted is shown in Annex B.

4. ARRANGEMENTS FOR MEETING

4.1 Meeting procedure, establishment of sub-committees, and time schedule

The Committee agreed to a work schedule presented by the Chairman. In accordance with Rule D2 in the Rules of Precedure, a number of *ad hoc* sub-committees were established. Reports arising are dealt with under the relevant Agenda items and as annexes:

Annex D Report of the sub-committee on sperm whales
Annex E Report of the sub-committee on minke whales
Annex F Report of the sub-committee on other baleen whales
Annex G Report of the sub-committee on protected species and aboriginal subsistence whaling
Annex H Report of the sub-committee on small cetaceans

4.2 Computer arrangements

The Chairman welcomed Mr C. A. Free who had been appointed to set up the computer system agreed to by the Commission at its 1979 Annual Meeting. Computing facilities for the meeting were available on the University of Cambridge computer and access to the University of York computer had also been arranged.

4.3 Admission to meetings

4.3.1. Admission of local scientists

The Committee endorsed its decision of last year to allow 'a small number of interested local scientists to observe at its meetings, at the discretion of the Chairman', and agreed that 'local' applied to scientists connected with the University or other scientific institutions in the venue. Best felt that the presence of observers at workshop meetings might inhibit the free and frank exchange of views needed under such circumstances, and that more effective participation by observers might be obtained by holding one or more open sessions at which participants could be publicly questioned.

4.3.2. Admission of observers

The Committee recognised that there were two separate issues to be covered under this Agenda item:

(1) whether observers already able to attend meetings of the Committee under existing rule A4 should attend workshops or sub-committee meetings;
(2) whether scientists from non-member governments should be admitted to meetings.

After considerable discussion it was agreed to recommend to the Commission that the present Rules of Procedure are amended as follows:

(a) insert a new rule A4:
    4. Non-member governments may be represented by observers at meetings of the Scientific Committee, subject to the arrangements given in Rule B2(a) of the Commission's Rules of Procedure.
(b) re-number old rules A4 and A5 as A5 and A6;
(c) insert a new rule, A7:
    7. Meetings of the Scientific Committee as used in the paragraphs above include all meetings of sub-groups of the Committee, e.g. sub-committees, workshops etc.

5. REVIEW OF AVAILABLE DOCUMENTS AND REPORTS

5.1 and 5.2 Documents submitted and progress reports on research

Lists of documents, progress and other reports available are appended as Annex C.

5.3 Reports of Special Meetings and Workshops

5.3.1. Cetacean Behaviour and Intelligence and the Ethics of Killing Cetaceans

The report of this meeting (IWC/32/15) was discussed under Agenda item 14.

5.3.2. Sperm Whale Workshop

The Committee received the report. The Chairman's summary is given below.

The workshop was held in Cambridge from 23–27 June and the report is given in SC/32/Rep. 1 (published in this volume pp. 687–705). Prior to the Workshop, Mr C. A. Free, who had been appointed to set up the computer system agreed to by the Commission at its 1979 Meeting, spent time with Kirkwood and Breiwick at their laboratories. As a result of these visits, he was able to ensure the availability at the meeting of the assessment

programs currently used by the Committee and of all the catch, effort and length frequency data contained in the NP forms, as well as a computer tape of the detailed BIWS catch and length frequency data for the Southern Hemisphere. As it turned out, the availability of these data proved crucial to the success of the Workshop. Not only were these data required for a major reanalysis of age and length data using the new age data provided by Japanese scientists and existing age and length data, but the detailed length data were required also for a new population estimation technique developed by Beddington and Cooke (SC/Jn80/SpW6).

The estimation technique described by Beddington and Cooke obtains estimates of population sizes and mortality rates by minimising the sum of squares differences of observed and expected catches at length. The two techniques presented depended on the different assumptions that selectivity in the catch was a function of age or of length.

One of the major tasks of the Workshop was the re-examination of the currently used population model, and attempted validation of the estimation techniques described by Kirkwood and by Beddington and Cooke. To this end, a review of new and existing data on biological parameters was undertaken, with particular emphasis on pregnancy rates and on the age and length at social maturity of males. The Workshop considered new information on the reproductive capacity of medium sized males, and discussed the effects of depletion of numbers of large males. In addition, new sightings data presented by Japanese scientists were extensively discussed.

In order to examine the reliability of the available population models and estimation techniques, the Workshop agreed that population estimates for Southern Hemisphere Divisions 5 and 3 stocks should be calculated. The resulting predicted pregnancy rates for these stocks then were to be compared with observed rates. Due to the length of time required to prepare and extract the necessary data, the results of the desired computer runs were not available by the end of the Workshop, but it was expected that they would be available for early consideration by the Sperm Whale Sub-Committee.

The volume of new information and the limited time available resulted in not all the analyses being completed by the end of the Workshop. However, it was hoped that after receiving the results of further work carried out between the end of the Workshop and the convening of the sperm whale sub-committee, it would be possible for that Committee to be able to assess those stocks on which the Commission would require advice this year.

5.4 Report of standing committee on small cetaceans

The small cetaceans sub-committee presented its report (Annex H); the report was received by the Committee. Major items considered were the status of stocks of seven species (discussed below in item 11.1), effects of pollution and industrial development (item 15 below), and problems of interactions between marine mammals and fisheries, including direct conflicts, incidental mortality and ecological competition.

The Committee notes the creation of an international observer programme by the Inter-American Tropical Tuna Commission to collect data on mortality of dolphins in the tuna purse-seine fishery in the eastern tropical Pacific. This year for the first time, an estimate of total mortality based on data from several nations is available. An estimated 23,201 small cetaceans, of several species, were killed in the fishery. The Committee strongly recommends that member nations which seine for tuna in the Eastern Tropical Pacific or plan to do so, participate in the international observer programme. These presently include the United States, Spain, Republic of Korea and Peru.

Concerning the question of ecological competition, as is alleged to exist in Japanese and Norwegian waters, the Committee considers that while cases of perceived competition for common resources between fisheries interests and cetacean populations are reported from many areas, there is as yet no case in which quantitative verification is available. The Committee therefore again recommends that member nations be urged to foster and support expanded research on perceived competitive interactions between marine mammals and fishermen. The Committee strongly urges that such competition be assessed in direct and quantitative terms.

The sub-committee submitted an additional 15 recommendations for consideration by the Committee; they are treated under the relevant Agenda items.

5.5 Scientific Permits

5.5.1 1979–80: reports

There were no Scientific Permits during 1979–80.

5.5.2. 1980–81: advance review

In accordance with paragraph 30 of the Schedule, Peru submitted a proposal to take 2–3 blue whales in square H34 off Peru during the summer of 1981 (SC/32/O 23). The object of the proposal was:

(a) to determine whether the blue whales in Peruvian waters are 'normal' or pygmy blue whales;
(b) to provide skeletons for the Museums of Natural History in Peru and Ecuador.

Valdivia reported that the decline in anchovy stocks in Peruvian waters since 1973 has coincided with increased availability of blue whales (in terms of sightings per day) off Peru. It was hoped that the special permit catch would establish which sub-species had profited from the surplus of biological production due to the decline in the dominant fish species of the region.

Ohsumi commented that whalers with experience in taking 'normal' and pygmy blue whales would be able to determine between individuals in the sea, and Horwood suggested that it would be sensible to send such an expert to Peru to resolve point (a).

Ivashin noted that in a research cruise in 1975, A. A. Berzin had seen both 'normal' and pygmy blue whales off the South American coast and that he therefore thought the proposal could improve knowledge of the distribution of the blue whale. Clarke noted that both forms were found off the coast of Chile. Several members believed that if both sub-species were to be found in these waters, then a take of two-three whales would not yield any conclusive evidence.

With respect to point (b) Mitchell and Holt offered skeletons of stranded blue whales from Canada and the University of Santa Cruz, California, respectively.

Most members of the Committee believed that there was no great urgency or need for the take of the whales as outlined in this proposal although some members felt that it should be supported.

5.6 Previous season's catches and other statistical material
Statistical data prepared at the Bureau of International Whaling Statistics under the direction of E. Vangstein were presented to the meeting.

The Committee recommends that the Bureau of International Whaling Statistics be requested in compiling IWS to follow the list of common and scientific names accepted by IWC as a convention (*Rep. int. Whal. Commn* 27: 25 and Appendix 1). The list has not been followed in past issues of IWS. For example in Vol. LXXXIII of IWS the following corrections are needed:

(a) Common porpoise reported caught in the USA in Table Z^2 are actually common dolphins, *Delphinus delphis.*
(b) Northern bottlenose whales, *Hyperoodon ampullatus,* reported caught by the USSR in Table Z^4 are southern bottlenose whales, *H. planifrons.*
(c) Long-finned pilot whales, *Globicephala melaena,* reported caught by Japan and the British West indies in Table Z^5 are short-finned pilot whales, *G. macrorhynchus.*
(d) Common porpoises reported caught by the USA in Table Z^{10} are common dolphins, *Delphinus delphis.*

5.7 Whale marking

5.7.1. Progress of International Scheme including Commission's contribution to costs.
Brown presented a report (Annex I) which summarised whale marking during 1979 and 1980 and reviewed the current position regarding stocks of marks and funding for the International Marking Scheme.

Clarke noted that in the recent marking of sperm whales in Peruvian waters (SC/32/Sp2), a large number of small sperm whales had been marked using standard Discovery marks. The Committee agreed that there was some danger of injuring or killing small whales with such marks and strongly recommends that .410 and 12 bore marks are used as follows:

whales not less than 11 m (36 ft): 12 bore mark with increased charge for sperm whales;
whales not less than 9 m (30 ft): 12 bore mark, standard charge;
whales and calves not less than 6 m (20 ft): .410 mark.

It was noted that 7 of the 710 minke whales marked during last year's IDCR cruise may have been badly injured from evidence of blood in the blow (SC/32/Mi13). Experiments to determine the safest place to mark the animals were conducted on board the factory ship *Nissin Maru No. 3* in January and reported in SC/32/Mi29 (formerly SC/32/O 17).

Brown undertook to examine the relationship between mark recoveries and estimated length at marking to obtain information on the possible extent of this problem.

5.7.2 Reports of special cruises—minke whales
An extensive report on the Southern Hemisphere minke whale cruise 1979/80 undertaken as part of IDCR is given in SC/32/Mi12.

5.8 Sighting programme. Data reports from the 1979–80 season and analysis
Data reports for commercial operations were available in the Secretariat.

5.9 Marine Mammal Catches 1966–75
The Committee reiterated its request that the *'World Catch Statistics and Status of Marine Mammals; Cetacea, Carnivora and Sirenia'* published last year, and covering the years 1966–75, be updated.

5.10 Indexed List of Scientific Committee Documents
Donovan reported that the 'List of Scientific Committee Documents' was being updated. The Committee discussed the need for the provision of an index by author and possibly by subject. It recommended that the Secretariat investigates the possibility of participating in the world-wide network, ASFIS (Aquatic Sciences and Fisheries Information System). This would ensure that references to IWC publications would be available in the data bank and would enable special reference lists to be compiled more easily.

6. CO-OPERATION WITH OTHER ORGANISATIONS

6.1 FAO
Boerema reported that the remaining volumes arising from the Bergen meeting in 1976 should be published by the end of the year. FAO have collected statistics on the commercial krill fishery in the Antarctic and these are now available. FAO has tried in the past to collect statistics on catches of small cetaceans, but received very few replies to its request for information. Consequently, it is considering the possibility of sending out a questionnaire to its member governments. The Committee recommends that any questionnaire sent out should include the items listed on p. 124 of *Rep. int. Whal. Commn* 30.

The Committee recommends that the Commission formally requests FAO to provide any biological data it may have from the 1960s (e.g. age data) so that it may be incorporated into the Commission's data base.

6.2 UNEP
It is understood that the revised 'UNEP Action Proposals for Marine Mammals' is to be sent to the IWC for comment before April 1981. This raised the general problem as to how the Scientific Committee could respond to requests for its comment on matters between Annual Meetings. After some discussion it was agreed that the Secretariat would circulate and receive comments on the revised draft from individual members. The Chairman and Vice-Chairman of the Committee would confer with the Secretary on his collation of the results and forward an agreed response.

6.3 SCAR
The Committee agreed that K. R. Allen should again represent the Committee at the meeting of the BIOMASS Technical Group on Data, Statistics and Resources Evaluation, to be held in Cambridge in August. It also requested that Free should be available for consultation if required. SC/32/Mg9 urged that in the context of multi-species management, consideration should be given to the possibility that there is a non-linear increase in both individual and aggregate energy utilisation as stock abundance increases. The Committee agreed that this major potential effect should be examined further and that it should be borne in mind by Allen at the BIOMASS meeting, and drawn to the attention of the Technical Committee Working Group on multispecies management by Committee members attending that Working Group.

6.4 IUCN

Beddington reported that IUCN has now set up a permanent committee on marine mammals. This committee was planning one workshop on the interactions between fisheries and marine mammals to which a participating representative of the IWC would be invited. It was agreed that the Secretary should attend on the Committee's behalf.

In April IUCN had sponsored a workshop on the Southern Ocean to consider the convention for the conservation of Antarctic living marine resources. The report from this workshop was available for interested members of the Scientific Committee.

6.5 CITES

CITES had requested that the Scientific Committee comment on the 'World Review of Cetacea'. The Committee agreed that although it was unable to do this in the time available at this meeting, individual members nominated by convenors of sub-committees would review relevant sections of the volume and report directly to CITES.

The question arose as to how the Scientific Committee should respond to requests from CITES for comments on proposals to amend the Appendices in accordance with the CITES Article XV which states that the CITES Secretariat should 'consult inter-governmental bodies . . . with a view to obtaining scientific data these bodies may be able to provide'. The Committee agreed that the best advice it could give in this regard would be contained in its latest Report and consequently recommends that the Commission responds to special requests for information of this kind by referring to the views of the Scientific Committee as expressed in its report.

6.6 The Conservation of Antarctic Marine Living Resources

The Committee endorsed the recommendations of the IWC observer at the conference on the Conservation of Antarctic Marine Living Resources (IWC/32/25) regarding co-operation between this Committee and a Scientific Committee to be established under the new Convention. It was noted that the latter Committee would not be established until the Convention had been ratified. The Committee also recommends that it should be represented at any interim scientific conferences which may occur, either by the Secretary or the Chairman or his representative.

6.7 IATTC

In response to the comments of R. Allen, the small cetaceans sub-committee recommended that an IWC observer be sent to the annual meeting of the Inter-American Tropical Tuna Commission (IATTC), to report back on matters concerning the dolphin/tuna problem. The Committee accepted the recommendation and nominated Perrin to serve as the IWC observer.

7. INTERNATIONAL DECADE OF CETACEAN RESEARCH (IDCR)

7.1 Review of results 1979–80

The Committee reviewed the research proposals listed on page 45 of last year's report (*Rep. int. Whal. Commn 30*). It noted that the practice had grown in recent years of a wide spectrum of projects being included within this item even though not all meet the criterion of projects that require for their success co-operation between national groups, and/or funding from more than one national group source. Inspection of the items listed in last year's report indicates that only four items, (3), (5), (7) and (8) meet that criterion.

It was noted that progress had been achieved in item (3) the Southern Hemisphere Minke Whale Marking and Sightings Programme (SC/32/Mi13), and (5) South East Indian Ocean Sperm and Other Whales Marking and Sightings Programme (SC/32/ProgRep Peru), that item (7) has been undertaken off Iceland before the 1980 whaling season; and that there had been no progress with Item (8) North Atlantic Bottlenose Whales, collection of biological data, marking and sightings programme.

7.2 Proposals 1980–81

The Committee had received four proposals in writing, of which three requested funding (IWC/32/27; SC/32/Sp1; SC/32/O 25; SC/32/O 22). In addition, Soviet scientists informed the Committee that the Soviet Government planned a sightings and marking cruise in Antarctic Areas I and III in 1980/81 while Japanese scientists referred to the possibility of a further Antarctic minke whale sightings and marking cruise using two vessels in the forthcoming season. Roux and Pascal drew the Committee's attention to the necessity for greater collaboration between national groups, including participation in shipboard sampling, treatment of materials and interpretation of results. They offered to make available age-determination (including tooth-cutting) facilities; the Committee welcomed this offer. Interested national groups were asked to approach them individually.

The Committee's views, apart from funding, on the four proposals received, were as follows:

Icelandic Whale Research Facility (IWC/32/27)

The Committee endorsed the Icelandic Government's proposal whereby room and board for up to six scientists at a time will be provided at or near the whaling station during a four month period in each year for ten years from 1981. It noted that facilities would be provided for research workers to sample the catch and accompany the catchers during normal commercial activities, as well as access to computer services and log books. No funds are sought from the IDCR programme for the facility's establishment. The Committee requests that the Icelandic Government gives priority to research workers involved in projects to which priority has been given by the Scientific Committee, in allocating space at the station.

Sea Mammal Research unit, Azores Sperm Whales Proposal, 1981 (SC/32/Sp1)

It is planned that two scientists should visit the Azores in July and August 1981 to examine and collect biological material and measurements from sperm whales worked up at one or more land stations. The proposal was welcomed in principle particularly because the project should yield useful information on the stock identity of North Atlantic Sperm Whales and in view of the fact that Portugal is not a member of IWC. Funds are sought.

'Sperm Whales of the Southeast Pacific'—Completion of Report (SC/32/O 25)

For this project R. Clarke proposed that he and two colleagues should complete the remaining seven parts of

the 10 part Report. There was general agreement that the work was important because of its relevance to stock assessments of Southern Hemisphere, Division 9. The Committee noted that neither the Governments of Peru or Chile, both members of IWC, were in a position to support the work, and recommends that the Commission draws those Governments' attention to their responsibilities in the matter. Funds are sought.

'The South-west Pacific Humpback Whale Project'—(SC/32/O 22)

The Maui Chapter of the American Cetacean Society had sought financial support for a programme of collection of photographic and acoustic data on humpback whales in near shore waters of American and Western Samoa, Fiji, Tonga, New Zealand and Australia from August to November 1980. The Committee was unable to support the proposal in view of the project already being carried out by New Zealand on the same species in the same area. It recommends that future proposals of this kind should ensure that prior consultation and coordination with similar projects in the same area have taken place.

Concerning the Soviet and Japanese Antarctic minke whale proposals, the Committee agreed that a working group be set up, with Tillman as Convenor, to meet in the course of the Brighton meetings, in particular to plan the coordination of objectives and procedures.

In view of the success of the IDCR Antarctic minke whale joint venture, the Committee agreed to a proposal that a similar project should be investigated for the North Atlantic. Mitchell was appointed to convene a working group to meet during the Brighton meeting to prepare a research cruise plan and to address problems arising out of the North Atlantic assessments. The report of that working group is given in Annex N.

7.3 Funds Available

The Committee recognised the need for the establishment of a procedure for assessing projects, and allocating funds to them, between Annual Meetings. Funds available are of two kinds; those earmarked by member governments for particular projects, and those not so designated. In addition, two kinds of project were recognised; those involving support for travel to meetings and workshops, and those for specific research proposals.

The Committee agreed to recommend to the Commission that the Secretary should be empowered, following consultation with the Committee Chairman, to expend up to £10,000 per year in support of Committee members' and other relevant experts' travel to meetings and workshops already co-sponsored, or otherwise supported, by the Commission.

It was agreed that review of funding proposals should be undertaken by a working group appointed under the Chairmanship of Chapman, to include the Chairman of the Scientific Committee, the relevant sub-committee convenor and the Secretary, who would have responsibility for assessing, attaching priorities to, and recommending funding for all projects received. The Secretary would act upon that group's recommendations. In particular, that group would assess for funding the proposals already endorsed by the Committee under Item 7.2. They would also consider any proposals arising from the North Atlantic group convened by Mitchell, and a proposal for sponsorship of a proposed SCAR cephalopod workshop to be held in July 1981.

It became clear during the discussion, that the IDCR framework, established originally in 1975, needs to be reconsidered, particularly so that a clear distinction can be made between those projects generally regarded as the responsibility of individual national groups, and those requiring special international coordination and funding. The matter of the IDCR framework should be reviewed at the next meeting.

8. SPECIAL STUDIES

8.1 Sperm whales—reproductive capacity of medium-sized males

The Committee reviewed the two papers (SC/Jn80/SpW2 and SpW10) it had received as a result of a request by the Secretary for information on the reproductive capacity of medium-sized male sperm whales. In both papers it was concluded that there was no need to revise the existing protection of large males in the breeding season. However, there was some conflict in the conclusions on the fertility of the smaller males. The Committee noted that this apparent contradiction may be due to differences in methods of determining sperm counts in the seminal fluid.

The Committee considered the implications for interpretation of these studies on the assessments it had carried out for the Southern Hemisphere Division 9 and Western North Pacific stocks. It agreed that the likely effects on pregnancy rates of an increased proportion of medium-sized males over larger males in the catch were not clearcut. The Committee recommended further research on this matter.

The Committee agreed that the evidence to hand did not warrant a change for the present in the provisions of the Schedule for protection of large male sperm whales in the breeding season.

8.2 Sperm whales, North Pacific—by-catch of females, including alternatives such as size limits

The Committee noted that at its Special Meeting in Tokyo in 1978, the Commission had directed the Scientific Committee to study the effect of a by-catch of females on the stocks of sperm whales in the North Pacific and on their dynamics. It had also been directed to consider alternatives such as size limits. The Committee noted that continuing concern over the by-catch problem had been expressed by the Commission at its 1979 meeting.

The Committee draws the attention of the Commission to its recommendation for a Protection Stock status and zero catch limit for males in the Western Division of the North Pacific and its recommendation that a zero catch limit be also imposed for females. The Committee reiterated its concern that, given the estimates of stock size obtained for this Area, any catch of females will decrease the time taken for the female stock to reach Protection status and will extend the period it remains in that classification.

As a zero catch limit is proposed for males, the question of a by-catch of females should not arise, and the Committee did not attempt to analyse the biological consequences of a change in size limits.

However, the Committee agreed that in circumstances in which a by-catch of females may be considered, one of the more biologically reasonable measures for avoiding

the take of females would be to establish appropriate size limits.

9. MANAGEMENT PROCEDURES

9.1 Report of Special Scientific Working Group, Honolulu, 1980

K. R. Allen presented a summary of the Report of the third meeting of the Special Scientific Working Group on Management Procedures (IWC/32/13; published in this volume, pp. 42–50). He identified two areas in particular on which the Commission would probably expect advice from the Scientific Committee:

1. The choosing of target levels.
The group had proposed that management should be aimed at bringing stocks to a defined target level rather than to MSY level. The target should be however in the vicinity of the MSY level, and since it believed this was probably in the range 65–80% of initial level, it had provisionally proposed a target level for baleen whales of 70% of the initial population. In view of the flat topped nature of the curve it did not consider this value to be critical.

In the case of sperm whales, the group provisionally identified values of 95% of initial for females and 50% for males, while noting that this latter value is particularly sensitive to the model form and parameter values. It expected information on this would arise out of the Sperm Whale Workshop and sub-committee report.

2. Recommendation that management of sperm whales should aim at the maximisation of yield by weight.

In the course of discussion of the report, members raised a number of points. These are summarised below:

(i) Aboriginal and subsistence whaling: Borodin believed that in view of the difficulties in collecting data from aboriginal fisheries, it would be better to implement the new procedures discussed in IWC/32/13 gradually.

(ii) Proposed basic catch limits and allowances for error: Some members believed that in both cases the new procedures were too severe, and thought that it was important to encourage research and receive the additional information which comes from catches, rather than to phase out whaling on stocks where only RY is known but not the target level, or where estimates are only available by extrapolation or analogy.

Holt expressed his concern that the report in general still did not adequately take into account the limits of present knowledge and believed that in particular the proposals regarding distinction among five cases in a classification of stocks, and regarding allowances for error, could lead to protracted discussions and difficulties in reaching a consensus.

(iii) Stocks with increased carrying capacity: SC/32/Mg1 examined the effect on time to Target Level for stocks with increased carrying capacity of taking different proportions of RY.

Ohsumi believed that the procedure for allowing only a proportion of the RY for expanding stocks was too severe. The Committee noted that paper SC/32/Mg9 addresses the problem of the carrying capacity of the environment.

(iv) Time taken to reach target level: Doubleday (SC/32/Mg5) suggested that the rapid achievement of target levels was less important than progress in the appropriate direction.

(v) Protection stocks: Tillman expressed concern that no protocol had been suggested as to how to initiate whaling on a formerly protected stock after recovery.

(vi) Responsibility to undertake research: Tillman expressed concern that a principle had not been explicitly stated which indicated that whaling by a member nation implied a direct responsibility by that nation to undertake research upon the affected stocks.

Ikeda expressed his view that the importance of adequate monitoring of the stocks had not been taken into consideration in the report. In particular he felt that the recommendations concerning allowances for errors and the proposed regime for expanding stocks would be rendered unnecessary if adequate monitoring took place. He felt that catch limits had been in the past changed due to changes in scientists' calculations rather than changes in the populations in the sea as reflected by monitoring programmes.

Boerema felt that some of the proposals outlined in the report were too rigid. In particular he thought it would be advisable to allow the possibility of bringing stocks to the target level at different speeds, in different situations, for example to take into account competition between two species which have been differentially affected by exploitation. He also thought that it would be better to set quotas for more than one year. This would have the advantage of freeing the Scientific Committee from the reponsibility of assessing every stock, every year, allowing it to more thoroughly examine those stocks it did review.

The Commitee draws the attention of the Commission to its views on the following subjects:

(1) *General principles*
There was general agreement that the principles and objectives stated in the report represented an advance towards considerable improvement in management procedures and go far in addressing many of the concerns previously expressed by individual members.

(2) *Ecosystem management*
Last year the Committee commented (*Rep. int. Whal. Commn* 30: 50) that in some cases the management of an ecosystem may require that cetaceans be harvested in a manner that is not consistent with the Commission's management policy. It notes that this problem has not been addressed in the Report of the Working Group and reiterates its request that the Commission's Working Group on Management Procedures investigates such situations and suggests alternative management strategies for cases where the interest of another marine resource has an impact on the management of cetacean stocks.

(3) *The principle of fixed levels*
Some members expressed concern about the inflexibility of rules such as setting target levels at some percentage of initial size. Another concern was that it was possible to think of situations where initial stock size could not be estimated adequately even though current research might establish good estimates of current population size and replacement yield. Although case 2 (IWC/32/13 p. 5) addresses this case it sets a quota which will decline to zero over a period of years even though it may not be possible to estimate an initial stock size and hence a target level. In such cases it was suggested by some members that some more flexible management scheme should be introduced, such as allowing some fraction of the replacement yield to

continue to be taken. Other members of the group believed that no such situations could be identified.

(4) *Size of target levels*
The Committee also addressed the question of whether 70% of initial population size was a suitable target level for baleen whales. Although no alternative point values were suggested two different schemes were proposed. The first would allow the Commission to set different target levels for different stocks within an area, in an attempt to experimentally determine effects of harvesting. The second would be for the Scientific Committee to identify the range of stock sizes falling within a percentage range defined by the Commission as the target range. Within this range the Commission would choose an absolute stock size as the target level. No reclassification would be necessary following reassessment, as long as the defined target level remained within the specified percentage range of estimated initial stock size.

(5) *Management of sperm whales by weight*
The Committee received a tabulation of calculated MSY levels for combined weight of catch of both sexes derived from the standard model using a range of combinations of the principal parameters. It noted that the values used in the La Jolla model gave MSY levels of 80% for females and 59% for males. However, it felt that a more detailed study of the relation between parameter values and MSY levels and of the shape of the yield curve under different conditions was needed. Until this had been carried out it was not able to give any definite advice to the Commission on appropriate target levels for sperm whales. Some felt that the level proposed by the Management Working Group for females (95%) was not inappropriate, and that a value of 60% for males would be more appropriate than the 50% proposed by the Management Working Group. Others felt that it was inappropriate to make any statement about target levels at this stage.

9.2 Moratorium Proposals

9.2.1 Moratorium on all commercial whaling
This item was placed on the Committee's agenda as it had been placed on the Commission's revised agenda. Most members felt that the extensive report of last year's discussion (*Rep. int. Whal. Commn* 30: 46–8) still represents the best summary of its views. However some members wished to add the following statement. 'Upon reviewing the breadth and depth of uncertainties which exist in current stock assessments undertaken by the Scientific Committee, SC/32/Mg8 noted that not one whale stock assessment exists which is free from some of the uncertainties described. SC/32/Mg8 further stated that the greatest failure of the current management procedure is that it does not take into account these uncertainties in some numerical, practical manner. We view this as untenable and suggest that it is reasonable to consider developing and adopting management regimes, including a cessation of whaling if necessary, which decrease the risks of whaling in the face of such uncertainties.'

Best felt that the proposed revised management procedure (if adopted) would go a long way towards addressing and allowing for many of the uncertainties in current stock assessments.

Other members stated that the case for a blanket moratorium was groundless because it is impossible that the take of even one animal from any of the stocks of the world is not permissible. They believed that the problem of uncertainty should be considered on a stock by stock basis and that it could be overcome, in almost all cases, using trial-and-error methods based on the best available evidence.

The Committee noted an additional point raised by Holt arising out of SC/32/O 19 which stated that technology either exists or is likely to be developed which would allow monitoring of whale stocks by remote sensing by the end of the century.

9.2.2. Moratorium on the taking of sperm whales
The Committee agreed that the views expressed last year in its report (*Rep. int. Whal. Commn* 30: 46–8) still represent the most comprehensive statement available on its views.

Some members felt that despite the improvements in the estimation techniques used in this meeting, there had been no such improvement in the biological model. They noted that there are insufficient data to use improved estimation techniques in certain areas e.g. North Atlantic and that serious problems also remain regarding stock identity. Little or no progress has been made in determining the effects, either in numbers or population structure, of the considerable removals which took place before the period by which it is assumed the stocks have recovered to their 'initial level' in the assessments. Despite the work which had been carried out since the last meeting, they believe that most of the essential tasks outlined in last year's report (*Rep. int. Whal. Commn* 30: 132–33) remain to be completed. They also felt that in the past, the emphasis has been to act as if there has been no decline in stocks until it has been adequately proved that a serious decline has occurred. They believed that this has led to belated protection of stocks as the techniques available are not sufficiently sensitive to detect lesser trends in population size.

In view of the above, these members support the proposal outlined in IWC/32/17 for a moratorium on the taking of sperm whales for a minimum of three seasons. They also believe that this would encourage research projects which may increase our understanding of the social structure of sperm whales which is essential to the formulation of an adequate management procedure for this species.

Other members believed that the degree of uncertainty varied from stock to stock and that it was therefore sensible to deal with stocks individually rather than to introduce a blanket moratorium. They also felt that it was important to continue to obtain the valuable information obtained from whaling operations and associated sightings cruises to improve knowledge of the relevant biological parameters and indices of abundance, if the uncertainties referred to above are to be resolved. They therefore did not support the moratorium proposal.

Although the Committee could not agree on a recommendation regarding the proposal, it did believe that a qualitative advance had been made at this meeting in the development and testing of estimation techniques, although it recognised that considerable uncertainties still exist both in some estimations and in modelling population dynamics.

With regard to the uncertainties over sperm whales assessments, Best and R. Clarke noted that in two of the four sperm whale stocks examined at the meeting, the

models had predicted either a much greater decline in pregnancy rate than that observed or a decline where an apparent increase had been observed. They therefore felt that in these cases either the estimation procedure was at fault, or that the effect of male depletion on female fecundity was incorrectly modelled. If the latter was the case, then errors in the assessment of stock condition might be on the conservative side.

Some other members expressed the view that this conclusion tends to obscure the fact that there are likely to be other, and so far unmeasured, density and sex-ratio dependencies than in pregnancy rates.

Holt wished that his view be recorded that the second sentence of item 9.3 (moratorium on the taking of sperm whales) of Annex D did not reflect the proceedings of the Meeting under that item, which in fact had not been discussed; the rapporteur and the two members who had expressed the feelings quoted had confirmed that their observations were in fact made during discussions of item 5 (North Pacific sperm whales) by the sub-committee.

9.3 Whale sanctuaries

9.3.1 Indian Ocean

(a) Removal of southern boundary limit at 55°S

Holt presented IWC/32/18 which outlined the proposal by the government of the Seychelles for the removal of the southern boundary limit at 55°S. The major effect of this would be the cessation of minke whaling in the Indian Ocean sector of the Antarctic (i.e. Area IV and Area III east of 20°E). He believed that this was a prudent approach in view of the uncertainty in the assessment of minke whales as it would give them protection throughout their breeding and feeding grounds.

Ohsumi expounded the views expressed in SC/32/O 18 in which he concluded that an extension to the sanctuary would not aid the attempts to develop a rational management programme for this living resource.

Best pointed out that the situation had changed considerably since this subject had been discussed last year. At that time, the uncertainty in the estimates of sperm and Bryde's whale populations suggested that it might be prudent to close one area as a safety precaution. However, the ban on pelagic whaling introduced last year had had the effect of making the proposition now refer solely to minke whales. Apart from the fact that the available evidence on stock identity did not support the idea that the Indian Ocean was a coherent minke whale area, the main problem with respect to the minke whale was by how much it was increasing. In addition the extended area proposed for sanctuary comprised the two Areas for which most information was available, in terms of series of CPUE data and sightings and marking data from two IDCR cruises.

Holt commented that although much had been said in the past about the need to reduce the expanding minke whale population in order to aid the depleted blue whales which compete with minke whales for food, he believed that the present level of knowledge of this ecosystem did not allow any judgement on selective 'culling'. He also provided an analysis (Annex J) which in his view showed that according to the Commission's current assessments the increase in minke whales could not constitute any threat to the more depleted species in the next few decades and perhaps ever.

He felt that the fact that there was more information available for the Indian Ocean than elsewhere enhanced rather than detracted from the argument in favour of the proposal, since there would be a better basis for future comparisons. However he believed that the strongest argument was that the extended sanctuary proposal would lead to the greatest feasible rate of potential sustainable yield of baleen whale meat. Future use of this resource could be more rational than present use, with better biological understanding and improved monitoring techniques. He felt that ensuring such chance of rapid increase was desirable in view of emerging threats to baleen whale productivity by krill fishing and other human activities.

Saito felt that Holt's proposal for the expansion of the sanctuary for the purpose of conducting comparative studies on management by means of the application of differential rates of exploitation was groundless because long-ranging research is necessary for the implementation of such studies. However the history of exploitation in the area south of 55°S of the Indian Ocean is quite short and most progress in the knowledge of stock status has been obtained in this area as a result of IWC/IDCR research. The closure of the area will lead such comparative studies nowhere. Moreover, the cessation of whaling operations as a result of the closure of any area makes it impossible to obtain research data. This has been evidenced by the fact that no substantial researches are going on in the open sea of the Indian Ocean, north of 55°S after the IWC decided on the closure of the area last year. If one looks at whales as a future food resource, research should be encouraged on more easily accessible baleen whale stocks in the northern part of the Indian Ocean while rational exploitation is countinued in the Antarctic with due regard to conservation.

Beddington made two points. The first was to note that some baleen whales in Area IV had been severely depleted and that anything that might be expected to slow their recovery rate such as unrestricted growth of minke whales or expansion of a krill fishery should be avoided. The second was concerned with the uncertainty involved in estimating minke whale population size and potential yields. He observed that population estimates in Areas III and IV were more soundly based than those in other Areas and if there was to be a case for ceasing harvesting of minke whales, due to such uncertainty, more appropriate Areas for cessation could be chosen.

(b) Inclusion of all cetaceans in the sanctuary

Holt outlined the proposal of the Seychelles to include all cetaceans in the sanctuary, noting that, as for large whales, 'take' was to include all cases of directed capture. There is no take of small cetaceans in the Indian Ocean by member nations at present.

Ohsumi and Saito opposed the inclusion of small cetaceans in the sanctuary for the following reasons:

(i) opportunities for the rational utilisation of small cetaceans which constitute valuable living resources should not be denied;
(ii) small cetaceans are not under the regulations of the Commission according to the Convention.

Some other members could see no biological reasons why the Sanctuary should apply to some cetaceans and not to others, as there is a continuum in size from 'large' (the great whales) through 'medium' (pilot, minke, killer whales etc.) to 'small' (dolphins and porpoises) cetaceans,

all presumably of importance in the ecology of the Indian Ocean.

(c) Scientific research proposals

Holt drew the Committee's attention to the recommendation of the Meeting of the Indian Ocean Coastal States (IWC/32/16 p. 5) that an international meeting of scientists be arranged by UNEP, in cooperation with the IWC and IUCN to plan a programme of monitoring and research for marine mammals in the Indian Ocean.

The Committee endorsed the proposal in principle. It recommends that the Commission should co-sponsor the meeting, that the Chairman of the Scientific Committee should be officially represented and that member countries be urged to send relevant scientists to it.

A sub-committee under Brownell was set up to prepare research proposals to be presented on behalf of the Scientific Committee at the meeting. The sub-committee would meet at Brighton to finalise the proposals which would then be circulated for comment by members prior to them being presented at the meeting by the Chairman or his representative.

9.3.2 Other areas—including scientific aspects of their establishment

The Committee agreed that in the absence of a discussion document it was unable to discuss this matter fully. However it recognised that many of the principles, at least relating to research needs, would be embodied in the proposals being prepared for the Indian Ocean Sanctuary Meeting outlined above (9.3.1 (c)). The Committee agreed that the matter should be more fully discussed next year.

In the discussion the distinction was made between sanctuaries encompassing all or most of the animals' range and those much smaller areas especially set aside to protect, for example, breeding stocks (e.g. San Ignacio Lagoon, Baja California for gray whales). It was agreed that the Committee's discussion should be directed to aspects of the larger areas in considering this item in the future.

9.4 Effects on assessments of changing area boundaries

The Committee noted that last year it recommended that research into stock identification should be undertaken, in particular:

(1) theoretical exploration into the consequences of boundary changes;
(2) the provision and analysis of all available data on stock identification.

Holt reported that he had not had the opportunity to undertake (1) due to other commitments and it was noted that (2) is reviewed each year by the relevant sub-committees.

The Committee believed that workshops such as that proposed for minke whales could provide an opportunity to allow for analysis of alternative stock boundaries. It requests that Free ensures that the data for the minke whale workshop are available in a form which would facilitate such analyses.

9.5 Previously unexploited or little known stocks

The Committee discussed Annex K of last year's report (*Rep. int. Whal. Commn* 30: 130) which suggested a protocol for dealing with previously exploited little known stocks. A draft revision of the principles proposed was prepared but the Committee was unable to reach firm conclusions in the time available. It agreed to discuss this matter early in the Agenda of its next meeting.

9.6 Management principles and guidelines for subsistence catches by indigenous peoples

The Secretary had drawn attention to this item which had been introduced to the Commission's Agenda (14.1) by Australia. The Committee agreed that this item is more properly a matter for consideration by the Technical Committee and it draws that Committee's attention to SC/32/PS22 which addresses this question.

9.7 Clarification of coastal whaling seasons

The Committee agreed to specify the period for which its recommendations were made. In the case of coastal whaling seasons which begin in one calendar year and end in the next, the Committee agreed to name the season by the starting date, e.g. a season starting in November of 1980 and running to April of 1981 would be designated the 1980 season.

9.8 Management by weight

Discussion of this topic in relation to the Report of the Special Scientific Working Group on Management Procedures is reported under Agenda item 9.1.

Some members believed that it was not necessary to wait for the implementation of a revised management procedure before recommending that sperm whales be managed on the basis of maximising weight (biomass) rather than numbers. This possibility exists under the terms of the current management procedure. Although the sperm whale sub-committee (Annex D) noted that a number of other options existed for management of sperm whale populations, implementing these may not be possible without revising the current procedure. Further, although some members of the sub-committee stated that a qualitative advance had been made this year in the development and testing of estimation techniques, they nonetheless noted that considerable uncertainties still exist. Other uncertainties were reviewed by SC/32/Mg8, and SC/32/Mg4 provided arguments for why MSY stock sizes of marine mammals occurred at levels very near their maximum levels. In the Scientific Committee's last review of the consequences of management by weight (*Rep. int. Whal. Commn* 29: 43) it concluded that MSY levels in terms of weight occurred at stock sizes greater than those defined in terms of number. Given the continuing occurrence of uncertainties in sperm whale models and data, management by weight thus would seem to provide a safer basis for management. Consequently some members of the Committee believed that it is prudent to adopt such management criteria which decrease the risk of over-exploitation through incorrect assessment.

9.9 Role of the Scientific Committee

Chairmen of sub-committees were reminded of the Commission's charge that major changes from previous

recommendations should be adequately documented and explained in the Committee's Report.

10. WHALE STOCKS, STATUS AND REGULATORY MEASURES

10.1 Minke Whales (also see Annex E)

10.1.1 Southern Hemisphere stocks

The problem of stock identity was discussed in detail but not fully resolved. Analysis of biochemical data suggested a difference between Areas IV and V giving some support for retaining the existing six Areas. However, catch distributions suggested that three new Areas could be defined. Moreover, a synthesis of marking data, morphometrical analysis, and biochemical results suggested that either four or five new Areas might be described. Unfortunately, time did not permit a full analysis of the implications of changing stock boundaries, and assessments were made only for the six traditional Areas. As noted in Appendix 2 of Annex E, the Committee recommends that further analysis of available data on biochemical characteristics be undertaken to test the validity of suggested differences between Areas IV and V.

The Committee attempted to use the assessment models DOIPOP, BALEEN, and the new model described in SC/32/Mi3. Also available were estimates based upon IWC/IDCR sightings for Areas III and IV, an estimate based upon mark-recapture data for Area IV, and an estimate based upon Japanese research sightings for Area VI.

Upon reviewing biological parameters for the Southern Hemisphere, the Committee agreed on a new estimate of natural mortality rate M = 0.09. This was based upon the mean M value obtained from several alternative regressions of natural mortality rates versus the average maximum lengths of a variety of cetacean species. It was thought likely that the juvenile natural mortality rate was greater than the adult rate but no evidence was available to suggest by how much. Alternative values of the juvenile rate were suggested but time did not permit examination of alternatives. The Committee agreed to assume that the adult and juvenile rates were equal, for its assessments.

With regard to pregnancy rate, the Committee agreed to adopt the procedure of last year wherein pregnancy rate was assumed not to have varied over time and utilised the balance equation to calculate the pregnancy rates resulting from various values of adult and juvenile natural mortality rates. Ages at maturity were allowed to decrease through time. Last year the observed declines in age at maturity were applied in the year of birth of the year class in which a decline was seen. This caused the increase in recruitment to occur too early giving higher estimates of replacement yield. This error has been corrected at this meeting.

Japanese pelagic effort in catcher hours searched were analysed by means of analysis of variance to obtain modifiers to correct for the effects of differences between years, months, zones, sex, visibility states, weather states, and interactions between sex and month.

Estimates of abundance giving reasonable fits were obtained only for Area IV using BALEEN and the model in SC/32/Mi3. Since DOIPOP did not incorporate a minimisation routine which seeks a best fit, the Committee did not use its results for any Areas.

Three independent estimates of 1978/79 recruited populations were available for Area IV based upon (i) the model in SC/32/Mi3 (chosen for its biologically realistic use of age-specific maturity), (ii) mark-recapture data and (iii) sightings data, as follows:

(i) Model	29,300
(ii) Mark-recapture	95,000
(iii) Sightings	101,200

The sightings estimate assumes a 15% bias and a recruited stock which is 80.9% of total. The Committee agreed that these three estimates should be averaged using the reciprocal of the range of the 95% confidence limits of each as approximate weights. The 1978/79 value obtained was 75,725. The skewed nature of the distributions of the individual estimates did not permit calculation of confidence limits for the average, but it was recognized that they would be very wide.

Given that inconsistencies existed between relative indices of abundance derived from CPUE and sightings data and that estimates derived for Areas III and VI by extrapolation from the Area IV estimate using these indices were inconsistent with sightings estimates, the Committee felt that the relative indices were unreliable and did not use them for extrapolating to other Areas. It agreed that the most acceptable estimates for Areas III and VI were therefore those from sightings. The estimates of recruited population size were calculated assuming that 80.9% of the total population is recruited but deducting 15% for an assumed bias (SC/32/Mi12) as follows:

Area III	74,266
Area VI	25,787

Since these stocks apparently have been increasing in response to the reduction of other whale stocks in the Southern Hemisphere, they do not fit into the Commission's present classification scheme. Therefore, the Committee recommends that catch limits be based upon replacement yield.

Given the accepted estimates for Areas III, IV, and VI, replacement yields were obtained for the period 1980–85 by running the model in SC/32/Mi3 using the catches and ages at maturity for each Area. It was agreed that the replacement yield would be calculated as the average yield which would stabilise the population over 1980–85. The catch limits based upon replacement yields for each sex are shown in Table 1. Also shown are the catch limits which account for the continued occurrence of unbalanced catches by sex by ensuring that the replacement yields of females are not exceeded. These were calculated as last year (IWC 30: 99), by dividing the female replacement yields by 0.658 which is the highest proportion of females in the total catch during the past six years.

To help rectify the continuing problem of high proportions of females in catches, the Committee recommends that catch limits be established according to either strategy given in Table 1: (i) catch limits by sex with minke whaling to cease in any Area when either sex catch limit is reached, or (ii) total catch limits which ensure that female replacement yield is not exceeded.

Although Table 1 was accepted as the appropriate basis for setting catch limits for Area III, IV and VI, the Committee could not agree as to the procedure to be used for Areas I, II, and V. All members considered that the Southern Hemisphere stocks were in a robust state. Some members considered that in the absence of proper assessment for Areas I, II, and V, it is not possible to provide scientific advice as to the catch limits for these Areas. Others, believing the stocks to be in a healthy state, considered that, pending further analysis, it is

appropriate to recommend the same catch limits as last year for these Areas (see IWC 30: 98–99) as an interim measure.

Holt considered that it was inappropriate both not to provide advice for Areas I, II and V or to recommend last year's quotas. He considered that the indices used to allocate catch limits last year, relative to Area IV, were erroneous and that in his view this had been confirmed by the assessments made this year for Areas III, IV and VI. Annex K presents a derivation of catch limits based on new indices. There was some support in the Committee for this approach. The replacement yields thus obtained are:

Area	I	270	both sexes combined
	II	858	,, ,, ,,
	V	745	,, ,, ,,

Ohsumi expressed his view that the ratios used for extrapolation were inadequate because no whale sightings have been carried out in Zone C, in which the pack ice edge is found in Areas I, II and V, and because Japanese whaling operations in these Areas have been on a small scale. He also pointed out that, after examining the marking results from Area III in 1979/80, the population size in the Area should be larger than the figure adopted by the Committee. He further expressed his view that the model from which RY was calculated has large problems. Therefore, the results of RY for Areas I, II and V calculated by Holt are extremely underestimated.

W. Clark noted that it had been agreed that the stocks were in a healthy state and that the magnitude of the catches next season are likely to affect the value of the IWC/IDCR mark-recapture exercise. Based on information from Area III he presented (Annex L) tables to show that if the population in Area III was between 50 and 100,000, the coefficient of variation of the population estimate will be about 21–27% with a catch of 1,500 and that this variation can be reduced with an increased catch. He considered it would not be irrational to take a large catch in one season to obtain a usefully precise marking estimate. To assist in the evaluation of the range of distribution of the whales he suggested that a catch of not less than 1,000 be taken in Areas II and V. There was some support for this rationale and more support specifically for a higher catch than recommended in Area III. Others felt that such forms of experimental management should be carried out within a more systematic regime and that this scheme offered small advantages which it was not essential to pursue this year. There would be an opportunity to develop these ideas further if the proposed special meeting was to be held. However, others noted that the number of marked whales available for capture was being reduced with time and that the validity of the mark-recapture model was becoming strained with increasing time.

Table 1

Recommended catch limits for 1980–81

Area	(i) Catch limits by sex		(ii) Total catch limits ensuring female RY not exceeded
	Male	Female	
III	759	775	1,178
IV	1,374	1,495	2,272
VI	297	293	445

Given the concerns expressed in Appendix 8 of Annex E about the validity of the estimates for Areas III, IV and VI and noting the inability to formulate an appropriate basis for extrapolation of these estimates to the other three areas, the Japanese and Soviet scientists recommended that the same catch limits as last year be used as the interim measure for all six Areas (see *Rep. int. Whal. Commn* 30: 98–99).

Noting that the 10 per cent allowance system had been used each season to exceed systematically the replacement yields calculated for Areas III and IV and given the uncertainties in defining stock boundaries, some scientists recommended that no allowances be granted under an interim regime. Given the apparent health of the stocks, other scientists stated that it is unreasonable to eliminate allowances.

In view of the many assessment problems encountered at this meeting, the Committee recommends that a special meeting be held to reassess Southern Hemisphere minke whales prior to the next annual meeting.

10.1.2 North Pacific stocks

(i) *Okhotsk Sea – West Pacific stock*

No trend is observed in available CPUE data under a regime of constant catches during 1965–79, and the Committee recommends that this stock remains classified as a Sustained Management Stock.

Noting the collection by Japanese scientists of detailed effort and biological data since 1977, the Committee urges that analyses of these be submitted to the next Annual Meeting.

Given no apparent change in the stock, the Committee recommends that the regime established last year be continued for 1981: a five-year block quota of 1,678 with a maximum catch limit in any one year of 421.

(ii) *Sea of Japan – Yellow Sea – East China Sea*

Based upon the stability of the limited CPUE data available, the Committee recommends that this stock be provisionally classified as a Sustained Management Stock, and that the regime established last year be continued for 1981—a five-year block quota of 3,634 with a maximum catch limit in any one year of 940.

Noting the existence of logbook data for Republic of Korean catches and effort, the Committee urges that these be analysed by the two regions east and west of Korea.

(iii) *Remainder of North Pacific*

Given the lack of assessment data, the Committee recommends that this stock remain classified as an Initial Management Stock with zero catch limits.

10.1.3 North Atlantic stocks

Upon reviewing stock identities, the Committee received no new evidence which would lead it to change the four putative stock areas currently utilised. The Committee recommends, however, that for convenience, the names of two stock areas be changed:

Svalbard – Norway – British Isles stock becomes Northeast Atlantic stock.

East Greenland – Iceland – Jan Mayen stock becomes Central North Atlantic stock.

(i) *Northeast Atlantic stock*

Given the total population estimate of 120,000 and the lack of trend observed in the CPUE series, the Committee

recommends that this stock remains classified as a Sustained Management Stock with a catch limit of 1,790 whales.

The Committee noted the slight reduction of the proportion of females in the catch achieved in 1979 by delaying the start of the season and urges that action be continued to reduce the percentage of females in the catch.

(ii) *Central North Atlantic stock*

Given difficulty in estimating the abundance of this stock, the Committee recommends that the marking programme be substantially increased and that the possibility of a systematic sightings programme be investigated.

The Committee also recommends that a time series of effort data be provided to the next meeting.

Given the lack of trend in CPUE under a regime of constant catches, the Committee recommends that, pending the results of marking/sighting programmes, the stock be classified provisionally as a Sustained Management Stock with a catch limit of 320.

(iii) *West Greenland stock*

No estimate of abundance exists for this stock and the Committee urges that a marking and sightings programme be undertaken to provide a basis for estimating stock size.

On the basis of the relatively stable CPUE under a regime of fairly constant catches over the period 1970–79, the Committee recommends that this stock remains classified as a Sustained Management Stock. Taking account of the coastal nature of the Greenland fishery, the Committee recommends a five-year block quota of 1,778 starting in 1981 with a maximum catch limit in any one year of 444.

This is a change from the recommended catch limits for 1980 of 370 or 394, which were based on the average catch during 1969–78 or 1968–77, respectively. These did not account for the environmentally induced variability within Greenland's coastal fishery.

Given the continuing problem of a high proportion of females taken in catches, the Committee urges that the possible seasonal and geographical segregation of sexes in Norwegian catches be investigated along with the possible connection between the Central North Atlantic and West Greenland stocks.

(iv) *Canadian East Coast stock*

Given the lack of information for this stock since 1972, when whaling ceased, the Committee is unable to recommend a suitable classification but does recommend that, pending submission of information leading to an adequate assessment, a zero catch limit be established. This is a change from last year (Sustained Management Stock with catch limit of 48) which is motivated by the lack of information received during the past several years.

An alternative view of the status and classification of North Atlantic stocks is given by Mitchell in Annex M. This was supported by Holt and Tillman.

10.2 Sperm Whales (see also Annex D)

The sub-committee had reviewed the report of the Sperm Whale Workshop (SC/32/Rep. 1), and agreed that sufficient progress had been made in the research tasks that the Committee had agreed must be completed (*Rep. int. Whal. Commn* 30: 132–3) for it to attempt assessments. Initial priority in attempting assessments had been given to the North Pacific, North Atlantic and Southern Hemisphere Division 9 stocks.

The sub-committee had had before it estimation techniques developed by Kirkwood and by Doi, which had been available at previous meetings, as well as new techniques developed by Beddington and Cooke. It had agreed that before these techniques could be used in assessments for the North Pacific, they should be applied to data for Division 5, and the resulting predicted trends in pregnancy rate should match satisfactorily the observed trend in apparent pregnancy rate for that stock. Reviewing the results obtained, the sub-committee had agreed that the Kirkwood and Beddington and Cooke techniques could be used for assessments, as they were not contradicted by the pregnancy rate data. The Beddington and Cooke length specific technique in fact predicted pregnancy rates which were closely correlated with the observed values. The sub-committee had found it was unable to test the DOIPOP technique in the way that it had agreed, as it was not possible to obtain a series of predicted pregnancy rates. Consequently it had agreed DOIPOP could not be used for assessments at this meeting. The Japanese scientists dissented from this view, and believed that estimates based on DOIPOP should be considered. Their views are outlined in Appendix F of Annex D.

The sub-committee had also reviewed the results of applying the Beddington and Cooke and Kirkwood techniques to data for Division 3. Application of the Beddington and Cooke technique led to predicted pregnancy rate trends that did not satisfactorily match observed trends. However it was pointed out that it had not been possible to fully test these techniques using a complete data set for Division 3. In particular it had been necessary to pool the data from the pelagic fishery and ignore potentially important variation in the length distribution of catches by series. Application of the Kirkwood technique led to predicted trends in pregnancy rate that were much closer to the observed trends, but it was felt that the estimate of initial mature female numbers was rather high. The sub-committee agreed that the results of these comparisons were inconclusive.

10.2.1 Southern Hemisphere, Divisions 1–8

The Committee noted that owing to time constraints and priority being given to the other sperm whale stocks, no assessments of Southern Hemisphere Divisions 1–8 stocks had been attempted.

10.2.2 Southern Hemisphere, Division 9

Estimates of current and initial population sizes were obtained using both the Beddington and Cooke and the Kirkwood technique. Use of both techniques indicated that both male and female stocks have been severely reduced from their initial levels. However concern was expressed that both techniques predicted a much greater decrease in pregnancy rate than that observed in apparent pregnancy rates. It was agreed that this discrepancy casts doubt on some of the sperm whale model parameter values for this stock, but that this did not alter the conclusion that both males and females had been severely depleted.

The Committee recommends that both male and female sperm whales in Division 9 be classified as Protection Stocks with a zero catch limit.

10.2.3 North Pacific

The sub-committee had examined the problem of stock identity in the North Pacific and agreed that there were separate breeding stocks in the Eastern and Western Divisions of the North Pacific, and accepted that the boundary between these stocks should be the line shown in *Rep. int. Whal. Commn* (special issue 2), p. 67, Fig. 1. The Committee agreed that for the purposes of assessments, analysis would be carried out treating the Western Division as a single stock. Assessments were only attempted for this Division.

In view of a number of still unresolved difficulties in interpretation and pooling of CPUE data, the sub-committee had agreed that the Kirkwood technique could not be used at this meeting to estimate population sizes for this stock as it employed CPUE data. However Japanese scientists expressed the view that CPUE data should be used in the assessments, in order to obtain more reliable results.

Estimates of initial and current population sizes were obtained using the Beddington and Cooke estimation techniques, with parameter values as shown in Table 2, *Rep. int. Whal. Commn* (special issue 2), p. 112. Estimates of MSY levels and catches were also calculated using these parameter values. These estimates and the resulting classification according to the New Management Procedure are shown in Table 10.1

Table 10.1

Estimated stock sizes and MSY and recommended catch limits, North Pacific: Western Division

	Males (11+)	Females (10+)
1910 stock $\times 10^3$	157.9	175.0
1981 stock $\times 10^3$	66.5	124.6
1981/1910	42.1%	71.2%
MSY level $\times 10^3$	88.3	131.1
1981% MSY level	75.3	95.0
Classification	P	SMS
Catch limits	0	405

The degree of concordance between predicted and observed pregnancy rate trends in the Western Division was discussed in detail. Most members agreed that the observed data indicated that the true pregnancy rate had declined between 1966 and 1979, but that there may have been an increase in the most recent years. They concluded that the estimates obtained therefore were not invalidated, in that they did not fail to adequately match observed trends.

Best and W. Clark felt that the failure of the models used to consistently predict the observed trend in pregnancy rates with male depletion (e.g. Divisions 3 and 9) indicated that it was difficult at present to identify male MSY levels, as these depend to a great extent on the effective sex-ratio needed in the population.

The Committee noted that while male sperm whales should be classified as a Protection Stock, under strict application of the New Management Procedure females would be classified as a Sustained Management Stock with a catch limit of 405. However, projections of current estimated population sizes indicated that even if no catch of females was taken, their level would continue to decline, and they would enter the Protection category in 1983 and remain there for a considerable period. The Committee also noted that this projection of reduced recruitment is reinforced by the observed decline in pregnancy rate in earlier years.

Accordingly the Committee recommends that males be classified as a Protection Stock with a zero catch limit, and that a zero catch limit be set for females.

The Japanese scientists did not agree with this recommendation. (See Appendix 6 of Annex D).

10.2.4 North Atlantic

The Committee noted that there were few data available on sperm whale stock identity in the North Atlantic. However the data available were not inconsistent with the treatment of North Atlantic sperm whales as one stock, and for the purposes of assessments this approach was adopted.

The Committee also noted that no specific estimates of biological parameters, apart from pregnancy rates, were available for the North Atlantic and it agreed to adopt the parameter values in Table 2, *Rep. int. Whal. Commn* (special issue 2), p. 112 for Divisions 1–8 of the Southern Hemisphere. New data on recorded catches and length distributions of parts of the catch in the North Atlantic were available, but no CPUE data that could be used for stock size estimation were available.

A method of estimating total mortality rates was discussed, but most members felt that insufficient confidence could be placed in it for the results to be used to estimate stock sizes.

Use of the Beddington and Cooke length-specific technique fitting to Icelandic sperm whale catch length frequencies suggested that the current stock size of males over 34 ft was 68% of initial size, and that mature females were currently at 86% of initial level. However it was felt that some of the assumptions underlying use of this technique may be violated, and that the stock size estimates were too high. It was also noted that analysis of the Icelandic catch data using different population parameters had provided a better fit to the data and suggested a greater level of depletion, as did the analysis of total mortality. However, although the fit to the data was improved there was still a strong suggestion that the method was overestimating current stock size.

In view of these uncertainties about the current status of the stock, the Committee recommends that the stock should remain unclassified. It recommends that the catch limit set for 1981 should not exceed that recommended for 1980, and that separate catch limits by sex should be set for 1981. Accordingly it recommends that the catch limits set for 1981 should not exceed 230 for males and 42 for females, these representing the average of the Icelandic and Spanish catches by sex for the period 1969–78.

10.3 Other Baleen Whales (see also Annex F)

10.3.1 Fin whales, Southern Hemisphere Areas I–V

Estimates of these stock sizes were updated and are presented in Annex F, Appendix A, Table 1. It is recommended that these stocks remain protected with zero catch limits and that reassessments of these stocks should be undertaken.

10.3.2 Fin whales, Southern Hemisphere Area VI

A new assessment using the BALEEN programme was carried out using new parameter estimates and new sightings data were available. The results are available in Annex F, Table 1.

It is recommended that this stock remains in the protected category with a zero catch limit, and that reassessment be undertaken as for the other Southern Hemisphere stocks.

10.3.3 Fin whales, North Pacific

New sightings data suggest a new assessment may be necessary next year. The Committee recommends that this stock continues in protection status with a zero catch limit.

10.3.4 Fin whales, North Atlantic

The Committee recognised the same stock boundaries as last year.

(a) Nova Scotia stock: It is recommended that this remains a Protected Stock with zero catch limit.

(b) West Greenland stock: It is recommended that there be no change in the provisional classification as a Sustained Management Stock with a catch limit of 6.

(c) North Norway stock: It is recommended that the current classification as a Sustained Management Stock should continue with a catch limit of 61.

(d) West Norway – Faroe Islands stock: It is recommended that this stock remain a Protected Stock with zero catch limit. The Commission's attention is drawn to the 11 animals caught from this stock by the Faroes in 1979.

(e) East Greenland – Iceland stock: The procedure in previous assessments had been to act primarily on limited evaluations of the CPUE although additional information was available from age samples and from marking. More complete age data and age of maturity estimates were available this year. Measures of effort had been refined so that even though pregnancy estimates are lacking it was possible to use the programme BALEEN to obtain population estimates of the stock at the present time and past trajectories. However different adjustments of effort data led to different assessments. In addition there are problems over the lack of data on the response of the population to early exploitation. It was not possible to resolve the differences and as a result there are two alternate recommendations:

(1) that the stock should be classified as a Sustained Management Stock with a catch limit of 304 in any one year (and a total catch limit not to exceed 1,524 between 1977 and 1982) or (2) that it should be classified as a Protected Stock with zero catch limit. It is recommended that further assessments be carried out prior to the next meeting of the Committee and that data be obtained on current pregnancy rates for this stock and that additional effort data be obtained and analysed.

(f) Spain – Portugal – British Isles stock: An additional set of crude effort data associated with catches in the 1920s was available as well as some further catch data. Thus two assessments similar to those carried out in 1979 were made, but also taking into account the pre-1920 catches. These refinements led to an improvement in the estimate though there is still a complete lack of the data necessary for analysis of recent catches. On the basis of the limited analyses carried out it is recommended that the stock should be provisionally classified as a Sustained Management Stock with a catch limit of 220 compared with 143 which is the average of the 1970–77 catches. The catch limit should apply for 1980 and 1981.

Some members dissented from the recommendation both with respect to stock classification and to catch limits. The assessments are based solely on a few years of very crude CPUE (annual catch per boat) more than fifty years ago and extrapolated from a long and incomplete catch series. The stock had apparently been very greatly depleted very quickly in the 1920s and it is possible that the model used exaggerates the rate of recovery of a stock from such a condition when whaling temporarily stops. The prediction of current stock status cannot even be checked by inspection of its size or age composition. There is little scientific basis for classification or for calculation either of RY or MSY. The limited evidence certainly does not justify any increase in the catch limit established by the Commission in 1979; no such increase should be agreed until recent data have been received and scrutinised and an appropriate classification can be made of this stock. Appropriate advice would be for the stock to be unclassified and a provisional catch limit of 143 set by the Commission for 1980 and 1981.

The Committee again requests additional biological and effort data on these catches.

Further research should be carried out to clarify the possible connections of this stock with other North Atlantic stocks, in particular through comparison of external features by photographic procedure or otherwise.

(g) Newfoundland – Labrador stock: It is recommended that the present classification as an Initial Management Stock with a catch limit of 90 be retained. Completion of studies on this stock are necessary to provide better estimates of stock size and the appropriate catch limit.

10.3.5 Sei whales, Southern Hemisphere

These stocks were assessed at the 1979 special meeting. No new data or analyses were available. At the request of Chile previous assessments of the Area I stock were particularly reviewed. The Committee recommends continued protection classification with a zero catch limit for all these stocks.

10.3.6 Sei whales, North Pacific

New sightings data suggest a new assessment may be necessary next year. The Committee recommends that the stock continue in protection classification with a zero catch limit.

10.3.7 Sei whales, North Atlantic

There is no new information on these stocks although a sei whale marking cruise was carried out in 1979 in the Iceland-Denmark Strait area.

The Committee recommends the Nova Scotia stock continue as a Protected Stock with a zero catch limit.

The Committee repeats its recommendation of last year for the Iceland-Denmark Strait stock that it be classified as a Sustained Management Stock. It notes that there was established last year a block quota with a total catch in the period 1980–85 not to exceed 504 whales with no more than 100 to be taken in any one year.

No information is available concerning a sei whale stock in the eastern North Atlantic except that some catches of sei whales have in past years been taken by Spain and off the Faroes. In these circumstances the Committee recommends that this stock be unclassified with a zero catch limit.

10.3.8 Bryde's whales, Southern Hemisphere

The South Atlantic stocks were not reconsidered and should remain classified as an Initial Management Stock with a zero catch limit.

The Committee recommends that remaining Southern Ocean stocks be sub-divided as follows:

Indian Ocean—20°E to coast of Australia and north to north of the equator.
Solomon Island Stock—0 to 20°S, 150–170°E.
Western South Pacific stock—Coast of Australia to 150°W excluding Solomon Islands area.
Peruvian stock—South American coast to 110°W, 10°N to 10°S.
Eastern South Pacific stock—Southern American coast to 150°W excluding the Peruvian stock area.

Tentatively all of these stock areas (except the Indian, Peruvian and Solomon areas) are bounded on the north by the equator and on the south by 40°S latitude. It is more than likely that there is more than one stock in the Indian Ocean but these cannot be treated separately at present.

For the Peruvian stock, catch and effort data were available as well as the results of the sightings expedition carried out by Peru in 1980. Other biological information is mostly lacking. Analyses of CPUE series were attempted as in 1979 but were generally unsatisfactory. While several alternate catch limits were proposed it was finally agreed to consider only two approaches—a catch limit based on the average of the last five years catches (359), and a catch limit derived by applying the North Pacific Bryde's Whale Model to the southeast Pacific including the Peruvian stock using sightings data by Peru and Japan, determining an estimate by subtraction of the oceanic portion (164). However, the Committee was unable to agree on a single recommendation for the Peruvian stock. It is recommended that this stock be classified as a Sustained Management Stock (provisional) with catch limits: Option 1: 359; Option 2: 164.

The Committee believes that stock estimates for the Indian Ocean, Western South Pacific and Eastern South Pacific stocks are satisfactory and these can be classified as Initial Management. If these stocks are exploited, recommended catch limits would be 197 (Indian Ocean), 237 (Western South Pacific), 188 (Eastern South Pacific), 0 (Solomon Islands stock). The Committee notes that change in the Commission's regulations would be required to permit any catches in the Indian Ocean or pelagic catches in the other areas. If pelagic operations are permitted, the Committee recommends a further marking programme at the outset to provide better information on stock identities and stock sizes.

10.3.9 Bryde's whales, North Pacific

The Eastern North Pacific stock has never been exploited and hence should remain classified as an Initial Management Stock with zero catch limit.

No additional information was available on the East China Sea stock which has been provisionally classified as a Sustained Management Stock with a catch limit of 19.

For the Western North Pacific stock there were new sightings data and a reanalysis. Based on this reanalysis which gave results similar to last year this stock is recommended to remain classified as Sustained Management. The recommended catch limit is 510. The Commission's attention is drawn to the large catches by Taiwan, estimated between 500 and 1,000, taken to be from this stock (Annex F, p. 132).

At its Annual Meeting in 1979 the Scientific Committee recommended that the species identity of Korean catches be investigated as a matter of urgency but this was not accomplished during the last year. It is recommended that the Commission send an expert, if possible in 1980, to assist in the identification of large whales landed in Korea and that photographs and whole baleen series of every whale landed should be collected and stored for examination by the expert.

10.3.10 Bryde's Whales, North Atlantic

The Committee had no new information on this stock and recommends that it remains an Initial Management Stock with zero catch limit.

10.4 Other protected species and aboriginal subsistence whaling (see also Annex G).

10.4.1 Bowhead whales

The Committee noted that the Alaskan eskimo harvest for 1979 was 12 landed and 27 struck (IWC quota 18 landed or 27 struck). The 1980 quota of 18 landed or 26 struck had already been exceeded in the spring harvest, when 15 animals had been landed and 31 struck, and the harvest for the year had been closed on 29 May. The spring migration in 1980 was greatly affected by ice conditions, and the estimated total of 1,643 animals seen may have been lower than the 1978 count for this reason. The proportion of calves seen (1.7%) was lower than in the two previous years (2.5% and 3.5%). A preliminary estimate of the mature component is 60% of all animals seen.

The present population is estimated to be 6–23% of its initial size. A simulation model indicated that (with 'moderate' or 'pessimistic' parameters) the bowhead population would decline from 1980, even in the absence of catches, and with 'optimistic' parameters would only increase slowly. Consequently, the Committee confirms its recommendations at the last three annual meetings that from a biological point of view the only safe course is for the kill of bowhead whales from the Bering Sea stock to be zero.

The Committee noted that the Commission has consistently rejected this recommendation on grounds other than scientific ones. If it chooses to do so this year, the Committee strongly recommends that removals of any kind should be (a) of sexually immature animals (less than 12 m long) in order to maximise reproduction in the short term, and (b) taken in a manner that will reduce the struck-and-lost rate to zero in order to minimise total removals. The Committee further recommends that all parties concerned with bowhead studies attempt to coordinate efforts in order to maximise the collection of data. The Committee recommends that other populations of the species should also be protected from all hunting.

10.4.2 Right whales

The results of 11 annual aerial counts of right whales off South Africa indicated a 7% rate of increase. The Committee recommends that the Secretary should write to the US Marine Mammal Commission requesting the provision of an analysis of population trends for the Argentine stock.

The Committee recommends that all stocks of right whales should remain as Protected Stocks. It also recommends that a study of historical records should be made to reconstruct as far as possible the pattern of exploitation in the eighteenth and nineteenth centuries. The Secretary should also write to the People's Republic of China for information concerning possible catches of right whales, and to the US Marine Mammal Commission for provision of an analysis of population trends in the right whale stock off Argentina.

10.4.3 and 10.4.4. Blue whales

The Committee recommends that the blue whale continue to be a protected species.

The Committee also requests Tillman and Ohsumi to undertake a reassessment of Antarctic (non-pygmy) blue whale stocks.

10.4.5 Humpback whales

The Committee noted with interest the development of fluke pattern matching as a technique for individual recognition of humpback whales, and that seven fluke pattern matches had linked whales from Hawaii, Alaska or Mexico.

In the northwest Atlantic during 1979 a reported total of 53 humpbacks became entangled in fishing gear, 18 of which are known to have died. In the Greenlanders' fishery, 14 humpback and 7 fin whales were landed during 1979, compared to the IWC decision that the combined catch limit for fin and humpback whales from this stock should not exceed 15 whales. There were no data for the take of humpback whales in the Caribbean. Total removals from this stock during 1979 were therefore at least 32, or 2.5% of the lowest reasonable estimate of population size; this may be close to the net recruitment rate. The Committee recommends the continuation of the study of the incidence of net entanglements and subsequent deaths, and that the efficiency of warning devices be evaluated as a matter of urgency. A formal paper on this subject from the Canadian government at the next meeting is requested. Until such time as more reliable estimates of population size and recruitment are available, the Committee recommends that the exemption for a Greenland catch of 10 humpbacks be removed (as previously recommended), and that other non-member nations involved in catches from this stock be requested to follow suit.

The Committee recommends that the humpback whale continue to be a protected species.

10.4.6 Gray whales

Shore counts of gray whales off California indicate a best estimate for the 1979/80 stock size of 15,647 and a rate of increase from 1967/68 of about 2.5%. The Committee recommends that a counting programme should continue. The Soviet catch of gray whales in 1979 for their eskimos was 178, of which 123 were females. The Committee noted that the USSR was attempting to correct for this imbalance in the sex ratio of the catch and urges them to continue these efforts. The take of gray whales by Alaskan eskimos in 1979 was 4 animals, and a further two stranded animals had apparently been lost from the Soviet catch. Total removals in 1979 were therefore 184 animals, six more than the IWC quota.

The Committee recommends that the Eastern Stock of gray whales remain classified as a Sustained Management Stock. A reanalysis of the stock and its productivity should be undertaken before the next meeting. In the interim a catch limit of 179 animals (as last year) is recommended, as catches of this size have apparently allowed the stock to increase. The Committee also recommends that the Western Stock should remain as a Protected stock.

Ohsumi believed that evidence from this stock, and from the southern right whales off South Africa (see below) suggested that the net recruitment rate of baleen whale stocks may be higher than previously thought.

Substitution of gray whales for bowhead whales in the Alaskan eskimo fishery:

Leaving aside the problems of traditional, nutritional or cultural acceptability, but considering the differential availability of gray whales as discussed in Annex G (2.2.3), some members believed that there was no biological reason why the present bowhead harvest could not be replaced (in whole or in part) by gray whaling, for those villages south of the Bering Strait, perhaps for the whaling villages from the Bering Strait to Cape Lisburne, but probably not north and east of Cape Lisburne. Others felt it was inappropriate for the Committee to make this comment.

Mitchell believed that judging the 'feasibility' of gray whaling was a technical matter, but that intermittent 'availability' of gray whales to Alaskan villages northeast of Cape Lisburne (e.g. Wainwright, Barrow, Cross I, Barter I), could be shown by minimum reported catches (from SC/32/PS12: Table 1):

Cross Island, one or more in 1933;
Wainwright, over six years in the period 1934–57, 8 gray whales:
Barrow, over seven years in the period 1954–79, 13 gray whales.

10.4.7 Any other Arctic stocks

The Committee noted that the Commission's Agenda (item 14.5) included 'any other aboriginal/subsistence whaling in the Arctic determined to be under the management of the IWC'. This was considered under Agenda item 11.

11. SMALL CETACEANS
(including bottlenose and killer whales)
(see also Annex H)

11.1 Status of stocks

11.1.1 Northern bottlenose whale

No significant new information was available on the status of this stock. The research programme recommended by the Commission in 1978 has not been implemented.

11.1.2 Striped dolphin

The striped dolphin is still being exploited in Japan. The take in 1979 was about 2,200. The last stock assessment was made in 1974. Population size was estimated at about 200,000, less than 50% of original. MSY was estimated at 4,140–6,530 and SY in 1974 just a little lower. The take in 1974, however, was about 13,000. This assessment was based on a simple logistic model of density-dependent response and on other assumptions and estimations that should be re-examined. It was agreed that more infor-

mation on stock identity and trends in life history parameters is needed.

A planned research programme announced last year by Japan has not yet been fully implemented but may be in the coming year.

11.1.3 Dall's porpoise

Dall's porpoise is taken both directly and in salmon gillnets. The take in gillnets in the Northeast Pacific in 1979 was 829. The range of two estimates of abundance there is from about 800,000 to 5 million, so it would seem that the incidental kill alone may not be a problem, if it be assumed that there is some degree of density-dependent response and that only one, large, population is involved. These assumptions are being examined as part of a 3-year cooperative research effort by Japan and the US. 1980 is the last year of the field programme, and there will be a report on the results at next year's meeting.

The directed take around the Japanese home islands in 1979 was 6,878. There has been no estimate of abundance, but it has been estimated that a sustainable take of 6,000 would require a population of 125,000 to 400,000, based on alternative assumptions of natural mortality and recruitment. The available data are not adequate for a stock assessment.

11.1.4 Harbour porpoise

There was no new information available on this species other than the estimate of 900 taken by Greenland.

There are no estimates of abundance, but some members of the sub-committee on small cetaceans felt that the history of similar takes over the last 40 years indicates that the stock, or stocks, have not been adversely affected. The information necessary for a stock assessment, however, does not exist.

11.1.5 Killer whale

Two killer whale populations were considered, that around Antarctica and that off the coast of Norway.

11.1.5.1 Antarctica

The Committee had available to it an abundance estimate for portions of Baleen Areas III and IV, based on line-transect analysis of data collected on the two IDCR minke whale cruises in 1978/79 and 1979/80. The estimate was 27,400. An alternative analysis was performed on the same data correcting a numerical error, fitting a different model to the frequency distribution of sighting distances and not stratifying by area; this yielded an estimate of 61,200, with a 95% confidence interval of 30,600 to 81,800. The Committee considered this to be the best estimate available. The available information on vital rates was reviewed and it was decided that likely maximum net reproductive rate could not be estimated. What did emerge in the review of all new available information is a picture of the probable existence of several stocks. There are several lines of evidence:

(a) There are indications, from a detailed review by Soviet scientists of migrations, that there may be several populations that move north and south between Antarctica and the coasts of the other Continents but not east and west.
(b) Morphometric and other data indicate that a dwarf form of the killer whale may inhabit the Amundsen Gulf.
(c) Length-frequency data from the 1979/80 Soviet catch show considerable differences, in both males and females, between whales from Baleen Areas III and IV.
(d) Joint study of the Soviet and US scientists of available colour pattern data has found sharp geographical differences between samples from several parts of the world, including between the whales off southern Argentina and those in the Ross Sea.

11.1.5.2 Norway

Killer whales are taken in the coastal waters of Norway because they are thought to be competing with fishermen for herring. The take in 1979 was 221. In response to a Committee recommendation last year, which was not taken up by the Commission, Norway set a national catch limit of 52 in 1980. These were all taken in January.

No data on abundance or stock structure were available to the meeting and stock assessment was not possible. There has been a long history of catches in the northeastern Atlantic. Whether the completion between killer whales and fishermen is real or only perceived, the Norwegian situation demonstrates, and the Committee wishes to point out, that the New Management Procedure criteria are of little assistance in cases where management strategies for whales and for other marine resources are in conflict. The Commission therefore is requested to instruct the Scientific Committee on what criteria to employ in such situations.

11.1.6 White whale

The meeting had available to it relatively little new data of a substantive nature on this species. Some of the more important items were:

(a) The population in the Sea of Okhotsk may have declined in recent years, but the data are very sketchy.
(b) A morphometric study indicates that white whales in the White and Kara Seas probably belong to the same stock.
(c) A population off Quebec in southeastern Hudson Bay may have declined in historical times: its present size is about 400, and the current take is thought to exceed MSY.

Although considerable new catch data and several new estimates of various reproductive rates were available and reviewed, the Committee concludes that more and better data are needed to estimate recruitment rates, current exploitation rates (especially struck-and-lost rates), and abundance, before assessments can be carried out for most of the populations.

Two developments are of interest:

(a) This year, for the first time, relatively complete catch statistics are available for Alaska, as requested by the Committee last year.
(b) Canada has placed a national catch limit of 40 on the white whale fishery in Cumberland Sound. This is the stock that the Committee last year recommended be protected. An analysis by a Canadian government biologist estimates that the landed take of 40 will be about equal gross production and prevent further decline of the population.

11.2 Recommendations for management and conservation

11.2.1 Bottlenose whale

The Committee recommends that the research programme recommended for the northern bottlenose whale in

1977–78 be carried out and that the stock continue to be classified a Protection Stock with a zero catch.

11.2.2 Killer whale

The small-cetaceans sub-committee in its report stated that it recognised the mandate of the Commission to manage killer whale populations, as the species is listed in the Schedule.

Some members of the Committee do not endorse the introductory statement of section 8.2 of Annex H on the grounds that the issue of the Commission's mandate in relation to small cetaceans has not been decided by the Commission.

(1) Noting that until 1979/80 the catches of killer whales have been a small fraction of the estimated stock size for a part of the waters near Antarctica, the Committee recommends that the stock(s) be classified as an Initial Management Stock.

Nevertheless because of the uncertainty over stock identities and consequently the abundance of any Antarctic stocks, because of the lack of knowledge of population parameters and of the effects of exploitation on social structure, the Committee recommends that the catch limit for Antarctic killer whale stocks be zero. This would be consistent with the New Management Procedure as now applied to whale stocks classified and managed by the Commission.

(2) Noting a lack of information about reproductive rates, natural mortality rates, stock structure, and the effects of various harvesting regimes on social structure, the Committee recommends that the USSR be asked to continue its research with the aim of providing adequate data for stock assessments. The Committee also recommends that the USSR be made aware of the requirement for collecting full catch and biological statistics for each killer whale taken by catcher vessels (Schedule VI.24), should any catch occur.

(3) Noting that the Norwegian exploitation of killer whales in the North Atlantic has a long history of catches, the Committee recommends that this stock be provisionally classified as a Sustained Management Stock, with a catch limit of 52 pending an assessment of the population. The provisional classification would require review at next year's meeting.

(4) Noting that no estimates of population size are available for the killer whales in Norwegian coastal waters, the Committee recommends that Norway be asked to conduct research to provide this and other information necessary for an adequate stock assessment.

11.2.3 White whales and narwhals

Last year, the Committee's recommendations concerning white whales were set aside by the Commission pending a legal review of the Commission's mandate for small cetacean species not listed in the Schedule. The Committee restates those recommendations this year, taking into account new information.

(1) The Committee believes that management of the aboriginal/subsistence fisheries for white whales and narwhals should be considered by the Commission in the same manner as is the bowhead fishery in the Bering Sea and Arctic Ocean. White whales of some stocks and narwhals on the one hand and bowhead whales on the other both undergo long migrations, crossing national territorial boundaries. Both are taken by indigenous peoples using light craft and harpoons with various modifications derived from modern technology. The Committee recommends that the white whale (*Delphinapterus leucas*) and the narwhal (*Monodon monoceros*) be defined as 'whales' and listed in Paragraph 1 of the Schedule thus:

> 'white whale' (*Delphinapterus leucas*) means any whale known as white whale, beluga, belukha.
> 'narwhal' (*Monodon monoceros*) means any whale known as narwhal, sea unicorn.

so that the appropriate management procedures may be discussed and implemented.

(2) The Committee recognises that for the first time a catch limit (40) has been set by the Canadian government for the Cumberland Sound stock of white whales, but because the population has declined to approximately 10–15% of its initial size, the Committee still must recommend on biological grounds that the stock be classified as Protection Stock and a catch limit of zero placed on it. The Committee further recommends that the current research on the Cumberland Sound stock of white whales be continued and expanded as recommended by the small-cetaceans sub-committee.

(3) The Committee notes that the white whales that winter along the southern coast of West Greenland and at the edge of the pack ice migrate to summering areas in the Thule areas of Greenland. The Committee believes it possible that current levels of removals are too high for the overall population. The Committee recommends that these groups be provisionally managed as one stock and that Canada and Denmark (Greenland) be urged to initiate a joint research programme on this stock(s). Of particular importance is an accurate census of the numbers of white whales summering in Melville Bay – Thule District and Canadian and Greenland waters of Smith Sound and Kane Basin. The programme should also include more accurate determination of the killed-but-lost rates associated with the various types of hunts in Greenland and Canada.

(4) The Committee believes the catch levels for white whales that inhabit the Barents, White, Kara and Laptev Seas are either substantially above even annual gross production or that the present population estimates are incomplete. The new information made available at this meeting did not include abundance estimates. The Committee therefore recommends that the USSR be urged to commission a study of the components of the Barents Sea wintering group and an assessment of the stock or stocks involved.

(5) The main wintering grounds and composition of the Bering Sea group of white whales are largely unknown including those summering in Soviet waters. Although present removals from these groups may be sustainable, it is probable that harvests will increase as indigenous populations increase or alternative subsistence needs arise. The Committee therefore recommends that national research programmes be expanded and that a co-operative research programme be instituted by the USA, USSR and Canada. The research should include documentation of catches, loss rates, and characteristics of the hunts, collection of biological samples for estimation of vital rates, and identification and censuses of the summering components of the stock(s).

The Committee considers recommendation (1) to be especially important.

11.3 Statistics

As discussed in the Report of the sub-committee on small cetaceans (Annex H), statistics supplied by member nations for directed and incidental takes of small cetaceans are in very many cases incomplete or inadequately detailed. The Committee again recommends that member nations again be requested to collect and submit full statistics, as detailed in last year's recommendation (*Rep. int. Whal. Commn* 30: 124).

11.4 Terminology

The Committee recommends that the common name *beiji* be substituted for *white flag dolphin* (an erroneous translation of the Chinese name) for *Lipotes vexillifer* in the IWC List of Small Cetaceans recognised (*Rep. int. Whal. Commn* 27: 483).

12. DATA COLLECTION, STORAGE AND MANIPULATION

12.1 Central computer facilities

The Committee expressed its thanks to the University of Cambridge Computing Service for the additional facilities which had been generously made available for the Scientific Committee meeting. The use of the Cambridge machine for the principal computing work of the Committee affords an excellent service and will continue to be the basis of the IWC system. However, it was found this year that access to the University of York DEC–10 computer provided a useful extra facility at weekends, when the Cambridge computer was closed down. The Committee asked Free to convey their appreciation to the University of York and expressed the hope that similar arrangements could be made in the future.

Free reported that he intended shortly to visit the Bureau of International Whaling Statistics in Norway to resolve difficulties concerning the interpretation of the major body of Southern Hemisphere catch data. The Committee endorsed this and recommended that the proposal be pursued as a matter of urgency.

12.2 Exchange and centralisation of existing data

Free reported that the process of centralisation of data had begun, with, in particular, the receipt of master tapes from Japan and from the National Marine Mammal Laboratory in the USA. He emphasised that it was especially helpful to the organisation of the computer system to have new data or assessment programmes available well in advance of meetings, and hoped to provide the continuity of computing support needed to achieve this.

12.3 Review of biological material awaiting treatment

Information provided in Progress Reports was available to sub-committees. It was agreed that national groups should be urged to include details in future annual Progress Reports as a matter of course.

12.4 Schedule provisions for data collection

It was agreed to reiterate the proposal made last year (*Rep. int. Whal. Commn* 30: 58 Item 16.4) which had been noted by the Technical Committee for consideration at its meeting this year.

12.5 Schedule provisions for biological material collection

No proposals for inclusion in the schedule were put forward by the Committee. It welcomed an offer from Albert to process fresh biological material, and reiterated its appreciation of Roux's offer to process material for age determination (see Item 7.2).

13. EFFECTS OF POLLUTION AND INDUSTRIAL DEVELOPMENT ON WHALE POPULATIONS, INCLUDING SMALL CETACEANS

The Committee continues to be concerned about the lack of knowledge of the short- and long-term effects of pollution and industrial development on cetaceans and is also concerned about the paucity of new information presented at this meeting, although a number of recommendations were made last year (*Rep. int. Whal. Commn* 30: 58).

The Committee therefore recommends that member nations be asked to ensure appropriate sampling and analysis, to list relevant studies and references in their Progress Reports and to encourage the presentation of fuller reports of studies of particular interest, so that a balanced and more comprehensive assessment may be made next year.

Kapel reported that ICES had some information on these matters and the Committee recommends that the IWC observer at the next ICES meeting requests that this information is sent to the IWC Secretariat.

13.1 Large whales

Mercury levels in samples of meat from several species of large whales were reported in SC/32/O 11. A series of letters in *Science*, mentioning and criticising an earlier version of this work were noted (Beary, 1979 *Science* 206(4424): 1260; Junghans, 1980 *Science* 208(4439): 6; Brownell and Omura, 1980 *Science* 208: 976). Further comments are found in Annex H (item 6.1.1).

Several studies are known to be in progress (e.g. a laboratory study on oil fouling of baleen) and these results should be presented to the Scientific Committee in due course. An outline of work in progress on bowhead and gray whales was presented (SC/32/PS26). The major emphasis is on tissue examinations, particularly those most likely to evidence adverse effects, either direct or indirect, as a result of offshore oil and gas activity.

13.2 Small cetaceans

The Committee notes the concern of the small cetaceans sub-committee (Annex H) and recommends that member nations be especially urged to investigate the physiological effects of pollution and industrial development on growth, reproduction and mortality.

14. BEHAVIOURAL STUDIES AND HUMANE KILLING

14.1 Behavioural studies

The Committee had before it the Report of the Meeting on Cetacean Behaviour and Intelligence and the Ethics of Killing Cetaceans (IWC/32/15). Holt reported on the first part of the meeting 'Cetacean behaviour and intelligence as relevant to the assessment of whale stocks and the management of whaling' which was relevant to this Committee.

Hayashi stated that the reports of the Session Chairmen for Sessions 1 and 2 did not take full account of all the

views expressed during the sessions and particularly those of the Japanese participants which had been submitted in writing to the two Session Chairmen.

The Committee welcomed the recommendation of the Steering Committee of the above meeting that there should be a workshop on behaviour for 'the detailed examination of those matters identified as being of greatest significance to the assessment and management of cetaceans'. It noted that this is in accordance with its recommendations to the Commission in 1979 (*Rep. int. Whal. Commn* 29: 52) and therefore recommends that the Commission arranges for such a meeting to be held. It notes, however, that great care should be taken to ensure that discussions concentrate on those matters which the Scientific Committee sees as being of potential importance to cetacean assessment and management and therefore endorses the recommendation of the Steering Committee that the workshop be established by the Scientific Committee. It agreed that the meeting should take place as soon as is consistent with adequate preparations and circulation of documents. Tillman offered to make preliminary arrangements and report to the next Annual Meeting.

14.2 Humane killing

The Committee had before it two documents regarding the humane killing of minke whales, SC/32/O 24 and IWC/32/30.

Hayashi presented his report (SC/32/O 24) on the method of catching minke whales used by the Japanese fleet in the Southern Hemisphere. He examined 52 whales killed from 21–30 December 1979 using ECG equipment to determine time to death, as it was impossible in practice to use EEG equipment to determine time to unconsciousness in field conditions. Although he concluded that his results showed that the method of taking minke whales was 'satisfactory in terms of humane killing' he suggested the following areas where improvements might be made: 'shape of electrode used in electric lancing; improvement in the electric lance by experimenting with batteries built into the harpoon rather than wires and a power source on the catcher; experimenting with position of electrodes'. Best, Horwood and Tillman suggested that research into modifying an explosive harpoon which did not damage the meat should be undertaken.

Yamamura reported on the work of the Japan Whaling Association in this respect. They have organised a research team comprising experts from several fields (e.g. ballistics, electrical engineering) and had conducted experiments on Bryde's whales and hoped to conduct experiments in the Antarctic next season. A fuller report would be available in Brighton.

Øritsland presented a preliminary report (IWC/32/30) on Norwegian investigations into this problem. Among other regulations introduced in 1979 was a requirement that whales not killed with the first harpoon should be killed as soon as possible by rifle shot. Whalers now have to complete forms detailing death times; and during the 1980 season 10 national observers will be surveilling whaling activities in the field. It is planned to establish an expert group shortly.

The Committee welcomed these reports and the proposals for further work and noted that the matter was now one for consideration by the Technical Committee. It recommended that a person familiar with the practical problems of whaling should be included in the experts invited to the Technical Committee Workshop on Humane Killing Techniques which is to meet in the Autumn.

15. ANNUAL SUMMARY OF NATIONAL RESEARCH PROPOSALS

It was agreed that the kind of material envisaged under the Australian proposal (Commission Agenda Item 17) was already contained in annual Progress Reports, but that an attempt should be made in future to include, as far as possible, all government-sponsored research in those reports. The matter would be discussed further next year, when a documented proposal would be provided.

16. PUBLICATION ARRANGEMENTS

16.1/16.2 Review of Meeting Documents and Publication Policy

Sub-committee chairmen were asked to confer with relevant authors and provide the editor with a list of papers for publication.

The Committee noted the recommendations of two years ago (*Rep. int. Whal. Commn* 29: 52, Item 21) especially concerning the need for papers to be reviewed by two referees before final submission, and agreed that publication policy should be reviewed early in the next annual meeting, particularly in view of the larger number of documents now being submitted, some of which may be peripheral to the Committee's deliberations.

The Committee wished to record its appreciation of the work of the editor, Donovan, during the year and in the course of the meeting.

17. FUTURE MEETINGS AND THE NEED FOR SPECIAL STUDIES

The Committee reviewed the recommendations for special meetings already in hand and arising from the sub-committee reports. It agreed on the following:

(i) *Workshop on Sightings Techniques and Assessments*—to be held in Seattle, USA, 11–16 September 1980 and to be convened by Tillman. It was agreed to recommend that travel support be provided for participants in accordance with the recommendation in item 7.3. Tillman urged intending participants to contact him as soon as possible.

(ii) *Workshop on Minke Whales*—to be held as proposed by the Minke Whale sub-committee for one week immediately preceding the next annual meeting in Cambridge, and to be convened by Horwood, assisted by Harwood and Holt.

(iii) *Workshop on Killer Whales*—to be held as proposed by the small cetaceans sub-committee (Annex H, p. 150), during the week preceding the next annual meeting in Cambridge, and to be convened by Perrin. It was noted that there was unlikely to be any conflict with (ii) above, and that accommodation problems, if any, might be solved by approaching the British Antarctic Survey for use of their Conference Room. Recommendations for travel support would be handled as in item (i).

(iv) *Meeting on Cetacean Female Reproduction*—proposed for 1–9 December 1981. The Committee recognised the continuing need for a meeting (with a laboratory-based workshop component) on cetacean reproduction as it relates to stock assessment and

management, emphasizing reproduction in female odontocetes. An invitation for this to be held at La Jolla, California, had already been received by the Secretary from the Southwest Fisheries Center Director. Brownell and Perrin would be joint convenors. Proposals for travel support would be raised at the next annual meeting for consideration as in (i).

(v) *Workshop on Behaviour*—(see item 14.1). As already noted, the Committee agreed to accept the proposal to be responsible for such a meeting subject to certain conditions. In view of members' existing commitments and other priorities for workshops in 1980/81, the Committee believes it might be possible to hold this workshop during 1981–82. Tillman offered to make preliminary arrangements and report to the next annual meeting.

18. ELECTION OF OFFICERS AND COMMITTEES

In response to a proposal that the small cetacean sub-committee need no longer maintain its status as a standing sub-committee it was agreed that the *status quo* be retained for a further year, the position to be reviewed at the next annual meeting.

Bannister and Tillman were relected as Chairman and Vice-Chairman respectively. The following were appointed to convene sub-committees at next year's meeting:

Kirkwood; sperm whales
Horwood; minke whales
Chapman; other baleen whales
Best; protected species and aboriginal subsistence whaling
Perrin; small cetaceans.

19. INITIAL AGENDA FOR 1981 MEETING

A number of items were noted for inclusion, or priority in discussion. Members were asked to advise the Chairman of any new items for inclusion in the next meeting's Agenda. It was agreed that the meeting should begin on the Saturday directly following the minke and killer whale workshops.

20. OTHER BUSINESS

The Committee wished to record its appreciation of the long hours, hard work and prompt service of the Secretariat during the meeting.

Annex A
List of Participants

AUSTRALIA
K. R. Allen
G. R. Anderson
J. L. Bannister
G. P. Kirkwood
W. De la Mare

BRAZIL
J. da Rocha

CANADA
E. D. Mitchell
P. Brodie

CHILE
P. Arriagada
R. Maturana

DENMARK
F. Kapel

FRANCE
M. Pascal
C. Roux

ICELAND
J. Jónsson

KOREA
J. W. Choi
Y. Gong

JAPAN
T. Doi
I. Ikeda
Y. Katanami
M. Kakibaya
H. Kato
S. Misaki
S. Ohsumi
T. Saito
S. Tanaka
J. Tedori
S. Wada
K. Yamamura
R. Yoshimura
Y. Yoshinari

NETHERLANDS
J. G. van Beek

NORWAY
T. Øritsland
C. J. Rørvik

PERU
J. Valdivia

SEYCHELLES
J. Carr
L. Fraser
S. J. Holt

SOUTH AFRICA
P. B. Best

SPAIN
A. Aguilar
S. L. Lens
R. Ros

UK
S. G. Brown
D. Garrod
J. Harwood
A. R. Hiby
J. Horwood
M. Klinowska
C. Lockyer
A. R. Martin
A. J. B. Rudge

USSR
R. G. Borodin
M. V. Ivashin
L. G. Nazarova
A. V. Sharov
G. Terekhin

USA
T. Albert
H. Braham
J. Breiwick
R. L. Brownell
D. G. Chapman
W. G. Clarke
S. Mizroch
W. F. Perrin
M. F. Tillman

IWC
G. Donovan
C. A. Free
R. Gambell

INVITED PARTICIPANTS
R. Allen (IATTC)
R. Clarke (PTES)
J. Cooke
B. S. Goh
B. Grenfell
Chen Pei-Xun
J. Beddington (IUCN)
J. Berney (CITES)
L. Boerema (FAO)

OBSERVERS
W. J. Jordan (PTES)
T. Clarke (FOE)
C. Mearns (MAC)
P. Spong (Greenpeace)
P. Vodden (RSPCA)

Annex B
Agenda

1. Chairman's welcome and opening remarks.

2. Appointment of rapporteurs.

3. Adoption of agenda.

4. Arrangements for meeting:
   - 4.1 Meeting procedure, establishment of sub-committees, and time schedule.
   - 4.2 Computer arrangements.
   - 4.3 Admission to meetings.
     - 4.3.1 Admission of local scientists.
     - 4.3.2. Admission of observers.

5. Review of available documents and reports.
   - 5.1 Documents submitted.
   - 5.2 Progress Reports on Research.
   - 5.3 Reports of Special Meetings and Workshops:
     - 5.3.1 Cetacean Behaviour and Intelligence and the Ethics of Killing Cetaceans.
     - 5.3.2 Sperm Whale Workshop.
   - 5.4 Reports of Standing Sub-Committee on small cetaceans.
   - 5.5 Scientific permits:
     - 5.5.1 1979–80: reports.
     - 5.5.2 1980–81: advance review.
   - 5.6 Previous season's catches and other statistical material.
   - 5.7 Whale Marking:
     - 5.7.1. Progress of International Scheme, including Commission's contribution to costs.
     - 5.7.2. Reports of special cruises—Minke whales.