

Report of the Scientific Committee

The Committee met at 9.00 am on 26 June 1982 and following days at New Hall, Cambridge under the Chairmanship of J. L. Bannister.

A list of participants is given in Annex A.

1. CHAIRMAN'S WELCOME AND OPENING REMARKS

The Chairman welcomed the Committee members and invited participants and noted that observers from several organisations were present. He expressed pleasure that participants from the Philippines and St. Lucia were attending the Annual Meeting for the first time.

2. APPOINTMENT OF RAPORTEURS

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

3. ADOPTION OF THE AGENDA

The Agenda adopted is shown in Annex B.

4. ARRANGEMENTS FOR THE MEETING

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

The Committee agreed to a work schedule proposed by the Chairman. In accordance with Rule C1 in the Rules of Procedure, four sub-committees (minke, sperm, other baleen whales and protected species and aboriginal/subsistence whaling) had been appointed at last year's meeting; a fifth (small cetaceans) remained as a standing sub-committee. 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

Additional sub-committees were established to discuss Antarctic logbooks (Item 7.2 and Annex I), computing (Items 11.1-3 and Annex J), management (Item 8.3.2 and Annex K) and management principles for aboriginal whaling (Item 8.3.3 and Annex L).

Sub-committees were reminded to consider last year's deliberations on meeting procedures (Annex I, *Rep. int. Whal. Commn* 32: 127) in formulating their meeting schedules.

4.2 Computer arrangements

As in previous years the University of Cambridge Computer Laboratory installed a network node at New Hall, permitting several terminals to share one communications line.

The University again generously gave the IWC a high priority on its IBM 370/165 computer.

In addition Free reported that the University was in the process of replacing the computer with a new system based on an IBM 3081D machine, which would offer a substantial increase in computing power. Despite the large amount of work involved in the installation of the new system, the schedule had been arranged to minimise interruptions to the service during the IWC meeting. The Committee expressed its appreciation of the consideration shown by the staff of the Computing Service and requests that the Secretary forwards its thanks.

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 given in Annex C.

In addition the Committee agreed that any data submitted in written form during the meeting should be deposited with the Secretariat and receive a reference code for the IWC Data Catalogue. A list of such data is also given in Annex C.

5.3 Reports of Special Meetings and Workshops

5.3.1 Conference on Cetacean Reproduction, La Jolla Nov/Dec 1981

The draft report of the workshop is given in SC/34/Rep 1. In addition the abstracts of the papers presented to the Symposium were circulated. The Committee wishes to express its appreciation to Perrin and Brownell for their work in convening the meeting and preparing the draft report.

5.3.2 Special Meeting on Western North Pacific Sperm Whale Assessments, Cambridge, February/March 1982

The report of this meeting is given in SC/34/Rep 3.

5.3.3 Workshop on the Behaviour of Whales, Seattle, April 1982

The draft report of this workshop is given in SC/34/Rep 2. The Committee wishes to express its appreciation to Tillman for his work in convening the meeting and preparing the draft report (see also Item 13).

5.4 Scientific permits

5.4.1 1982-83 Advance Review

No requests for scientific permits for 1982-83 were received.

5.5 Previous season's catches and other statistical material

Owing to a misunderstanding between the Bureau of International Whaling Statistics (BIWS) and the Secretariat, the statistical material normally provided by BIWS was not available to the Committee at the start of the meeting. The Committee thanks Mr E. Vangstein for his prompt response when this was pointed out.

As last year the Committee noted that several countries had not provided the Bureau with information in time for it to be included in these statistics, although some of these data were available in national Progress Reports. The Committee again recommends that member nations be reminded of the need for prompt provision of catch information to the Bureau, if the Committee is to carry out its stock assessment work satisfactorily.

5.6 Whale marking

5.6.1 Progress of the International Scheme, including the Commission's contribution to costs and computerisation

Brown presented a report (Annex N) which summarised whale marking during 1981 and 1982 and reviewed the current position regarding stocks of marks and funding for the International Marking Scheme. The Committee endorsed the report.

The Committee noted that £5,000 will be required for the Area I IWC/IDCR cruise. This is within the £11,000 available in the budget.

The Committee noted that the possibility of errors occurring in the reading of serial numbers on .410 marks recovered from minke whales marked in the IWC/IDCR cruises in the Southern Hemisphere has recently arisen. It therefore recommends that all .410 marks (from any species) should be returned with the recovery data to the Sea Mammal Research Unit, UK, in order that the serial numbers may be checked against the original marking records (including, where possible, any marks already recovered). Marks will be returned to the finders, or other organisations concerned, after checking, if required.

Should the IDCR cruise (see Item 7.3) in Chilean and Peruvian waters take place and include a marking component, sufficient 12-bore marks (although no .410 marks) are available in Peru.

The Committee noted with interest the recovery of two marks from the same male minke whale taken off Brazil. The animal was marked on 1 February 1980 at 69°02'S, 19°49'E (Western Area III) and recovered on 11 July 1982 at 06°32'S, 34°02'W. This is the first recovery showing migration of a minke whale from the Antarctic to tropical waters.

5.6.2 Reports of special cruises

5.6.2.1 Southern Hemisphere minke whales

The report of the cruise undertaken in Area II is given in SC/34/Mi12 and the report of the cruise in Brazilian waters is given in SC/34/Mi27.

5.6.2.2 North Atlantic

The report of the cruise undertaken in the waters off Spain and Portugal is given in SC/34/O 3. The report of the cruise off the west coast of Iceland is given in SC/34/O 6 and SC/34/O 7.

5.6.2.3 Japanese cruises in the Southern Hemisphere

Information on these cruises is given in SC/34/ProgRep Japan.

6. CO-OPERATION WITH OTHER ORGANISATIONS

6.1 FAO

Gulland reported that volume III (General papers and large cetaceans) of *Mammals in the Seas*, arising from the 1976 FAO/ACMRR Meeting would soon be available and indicated that the final volume would be available by the end of the year. There had been continuing co-operation during the year between FAO and the IWC concerning large and particularly small cetacean catch statistics. The FAO/UNEP Global Plan of Action is discussed under Item 6.2.

6.2 UNEP

Olembo reported that the FAO/UNEP Plan of Action was now available from FAO and UNEP. He indicated that UNEP would be pleased to receive comments from members of the Scientific Committee, either directly or via the IWC or FAO. He stated that there was to be an inter-Secretariat meeting for the five major interested parties to discuss implementation of the plan, probably before the end of the year; the Committee recommends that Gambell attends on its behalf. Holt believed that the implementation of the plan should be speeded up but Gulland reported that there were financial as well as administrative problems involved. Olembo referred to UNEP's interest in IDCR research proposals, the concept of sanctuaries, and the Committee's views on moratorium proposals; each of these items is discussed later in this report.

6.3 IUCN

Beddington reported that interested members of the Committee could still obtain copies of the Report of the Workshop on the Interactions between Fisheries and Marine Mammals from him at the International Institute for Environment and Development. Proceedings of the Workshop will be published in 1983. In addition IUCN is organising a 'World Conference on Parks' which will include a special meeting on marine parks in the early (northern) spring of 1983 (see also Item 8.2).

6.4 IATTC

Hammond reported to the sub-committee on small cetaceans on the activities of IATTC with respect to cetaceans (Annex H). The IWC observer's report of the 39th meeting of the IATTC held in Paris in October 1981 is given in IWC/34/11C. The Committee agreed that Perrin should attend the next meeting on its behalf in October 1982.

6.5 CITES

Berney reported that the Committee examining all species not under the jurisdiction of any state (i.e. cetaceans) had not recommended any changes to the Appendices. The next meeting of the parties is to be held in Botswana in April 1983. At present there are no proposals concerning cetaceans but amendments to the Agenda can be made until November 1982.

There was considerable discussion within the Committee as to how it could best fulfil its role as adviser to CITES on cetacean matters for the Botswana meeting. The

Committee agreed to modify slightly the procedure it had adopted two years ago (*Rep. int. Whal. Commn* 31: 54). It recommends that the Commission responds to requests for advice from CITES for this meeting in the following manner: the Secretary, in conjunction with the Chairman of the Committee and the relevant sub-committee Chairman, will forward relevant information from the Reports of the Scientific Committee Meetings which have taken place since the last CITES meeting. The Committee will discuss in detail at its next meeting how it might best give advice to CITES meetings in the future.

Best, Braham, Cawthorn, Horwood and Klinowska did not agree with the proposed procedure as they felt the questions being asked and the criteria being used by CITES for the listing of organisms on their Appendices I and II were quite different from those being used by the IWC in classifying whale stocks. Consequently if meaningful advice was to be given to CITES they felt that the Scientific Committee, if possible, should provide specific advice vis à vis the appropriateness of listing certain species on CITES Appendices relative to CITES' own biological criteria.

6.6 BIOMASS

Free reported on two meetings relating to the analysis of BIOMASS data and the establishment of a BIOMASS Data Centre. The first was the Post-FIBEX Data Interpretation Workshop, held in Hamburg in September/October 1981. In his view the meeting was unfortunately only a partial success. In many respects it was a unique exercise in international co-operation, in both the collation and analysis of a wide range of ecological data from many sources. However, problems caused by the timing of the workshop, a lack of prior input from participants and insufficiently analytical computing facilities at the meeting led to fewer scientific results being produced than had been anticipated. The principal achievement was the combination of acoustic survey measurements with data from biological samples to provide preliminary estimates of krill population densities over several large areas in the Antarctic. However, the major difficulty in continuing the analyses begun at this meeting was that the workshop had been conceived as a single exercise and no follow-up facilities had been arranged.

Free further reported that, after a brief *ad hoc* meeting in Cambridge, he had attended the BIOMASS meetings in Japan in May 1982, while visiting Japan for the IWC. The meetings of the Technical Group on Data and the BIOMASS Group of Specialists had acknowledged that the establishment of a Data Centre was crucial to the success of the BIOMASS programme. The problems of the provision of a suitable system for both data handling and analysis were therefore thoroughly reviewed. A list of requirements was drawn up and a range of options specified. The input to this process from the IWC had been considered valuable.

Free concluded that he had found the experience of working with a different type of data-handling system to be instructive and that he hoped to maintain the contact with BIOMASS. However, as the specification phase for a BIOMASS facility had now almost been completed, the contact would be continued at a reduced level of involvement.

At the Nikko meeting of the Group of Specialists on Southern Ocean Ecosystems and their Living Resources,

BIOMASS made four recommendations of interest to the IWC Scientific Committee. Two of these are discussed under Item 11. The other two recommendations are:

- (i) that the IWC be requested to co-ordinate the planned 1983/84 whale sighting and marking cruise, and any cruise to be held in 1984/85, with operations to be conducted in SIBEX;
- (ii) that only IWC trained observers be used in any whale sighting observations which may be conducted in SIBEX.

With respect to the first request the Committee welcomed the idea and agreed to examine the matter in detail when planning a 1983/84 IDCRCR cruise.

The Committee noted several problems with the second proposal. On SIBEX cruises it was unlikely to be possible to divert the vessels to confirm either identification or school size, and thus the sightings information obtained would be of little value in stock assessment work. However, some useful information on distribution, particularly with respect to krill density may be obtained, if member nations with suitable personnel responded to the BIOMASS request (as Japan had done for FIBEX and was planning to do for SIBEX). The Committee agreed that it should make available to BIOMASS any information it may have that would prove useful to future BIOMASS cruises.

6.7 CCAMLR

Observer's reports of the preliminary meeting in September 1981 and the first Commission meeting in May-June 1982 are given in IWC/34/11D and F. The Committee noted that the CCAMLR Executive Secretary has been authorised to discuss possible co-operative arrangements with the IWC, and recommends that the IWC Secretary be authorised to explore the form and content of an agreement between the two Commissions. It understands that a summary of informal discussions of the CCAMLR Scientific Committee may be attached as an Annex to its report; it urges the Secretary to ensure that a copy of that Annex is made available to the IWC.

6.8 AEWC

Gambell reported on the AEWC 'First Conference on the Biology of the Bowhead Whale, *Balaena mysticetus*: Population Assessment' held in Anchorage in January 1982 (IWC/34/11E). The Committee agreed that the question of who should represent it at the Second Conference to be held in January 1983 and who should observe the spring census in response to an invitation from the AEWC should be left to the Chairman, Secretary and Chairman of the sub-committee on protected species and aboriginal/subsistence whaling to decide, when the subject matter of the conference was known. Funds will be required.

6.9 ICES

The report of the IWC observer at the 69th Statutory Meeting of ICES held in Woods Hole in October 1981 is given in IWC/34/11A. The Committee agreed that Harwood should represent it at the next meeting of the ICES Marine Mammal Committee. The subject matter of this meeting, the assessment of critical habitat with special reference to the problems of pollution, is of particular interest to this Committee (see Item 12.1).

6.10 ICCAT

The report of the IWC observer at the 7th Regular Meeting of ICCAT is given in IWC/34/11B. The Committee would be particularly interested in receiving information from ICCAT on the occurrence of any interactions between small cetaceans and purse-seining operations in the North Atlantic, and recommends that Dr Sakagawa should maintain a watching brief on its behalf.

7. INTERNATIONAL DECADE OF CETACEAN RESEARCH (IDCR)

7.1 Review for UNEP

The Review of the IDCR programme and its achievements to date will be finalised in Brighton by the group formed to prepare the document last year (*Rep. int. Whal. Commn* 32: 46).

7.2 Review of results 1981–82

7.2.1 Southern Hemisphere minke whale assessment cruise, Area II.

A report of the Antarctic Area II cruise is given in SC/34/Mi12. Financial support for the project was provided principally by the Japanese and Soviet Governments who provided scouting vessels (in the case of two Japanese scouting vessels this represented an expenditure of £1,607,000). Further support was provided by South Africa (R. 21,237), Australia (Aus. \$6,000) and USA (\$3,350). The Committee noted the problems that were caused by nations nominating scientists but not indicating to the organisers that they were unable to provide sufficient financial support to cover expenses (including travel and subsistence) and salary. It recommends that the Commission explores ways of ensuring that such problems do not arise again, including an examination of the possibility of the Commission itself paying the salary and expenses of participating scientists.

A report of the cruise in Brazilian waters is given in SC/34/Mi27. The Committee wishes to express its appreciation of the support given to these cruises and it again stresses the importance and value of such co-operative ventures.

7.2.2 North Atlantic cruise

The Committee noted that the cruise was currently in progress, although the form was considerably different from that outlined last year (*Rep. int. Whal. Commn* 32: 130–1). A working group had met during the Special Meeting in Cambridge in March 1982 to finalise details. The final plan comprises two parts: a marking cruise, and a study on the feasibility of using aerial surveys for that part of the ocean. Information will be obtained on the East Greenland–Iceland stock of fin whales and the central stock of minke whales. Financial support was provided by the IWC (£30,000), Norway (£23,600) and Iceland (£23,600). As for Item 7.2.1 above, the Committee expresses its appreciation for this support.

7.2.3 Age determination and interspecies comparison of baleen whales using the aspartic acid racemisation method

Preliminary analysis of ageing baleen whales using aspartic acid racemisation of eye lens nuclei was conducted on fin whales of known age taken in the Icelandic fishery

(SC/34/Ba5). This study served as a basis for evaluating the method, especially for those species (e.g. bowhead) for which no alternative method now exists. The method appears reliable for perhaps the Balaenopteridae although samples from other species in this group are needed, but early analysis and comparison with bowhead eye lens material did not look promising. In view of this the request for funding for 1982 from the IWC was not pursued and no further request will be made until the technical problems of the analysis are resolved. The present conclusion is that the method appears to be viable and useful, and although some analytical problems remain, they may not pose a significant problem.

7.2.4 Examination of logbooks from Antarctic whaling

The Report of a Working Group on Antarctic logbooks is given in Annex I. The Committee endorsed the report and recommends that a sum of £4,000 should be provided for employment of a Norwegian graduate student for up to six months to make a start on the extraction of Norwegian and British data at Sandefjord. Christensen advised that his institution would be able to cover incidental costs.

It was also noted that some additional funds (approximately £500) may be required to cover miscellaneous expenses in extracting or entering the Japanese data into computer records.

The total requirement for an initial year's work is therefore £4,500.

The Committee also noted that the Sea Mammal Research Unit (UK) was arranging to collect any logbooks or other whaling records which may remain on South Georgia.

7.2.5 Humane killing study in Iceland

The Committee noted that this study did not take place (see Item 14).

7.2.6 Killer whales in the northeast Atlantic

The Committee received a proposal (SC/34/RP5) in response to its request for research proposals concerning killer whales in this area last year (*Rep. int. Whal. Commn* 32: 46). The Committee strongly supports this proposal in principle (Annex H, p. 164) but recommends that it should be returned to the authors for revision as it is not at present formulated in sufficient detail. The Committee notes that the proposal is for a one-month pilot study and that, should this prove successful, funding would be required for continuation of the research.

7.2.7 Biochemical analysis of Southern Hemisphere minke whale samples

The results of this study are presented in SC/34/Mi13 and discussed in Annex E. The Committee thanked Wada for his valuable work and recommends that further analyses be carried out. Wada reported that further work would be undertaken and that no funding was required.

7.2.8 Azores sperm whale project

A report of this study is given in SC/34/Sp8.

7.3 Review of proposals 1982–83

(a) Research projects for which funding is available

The Committee reviewed the proposals for research for 1982–83, as outlined by the sub-committee appointed to review new proposals. It agreed that the first priority was work related to Southern Hemisphere minke whales, and

that the 'unallocated' monies in the Research Fund should be used to support the three relevant proposals:

- (i) the 5th IWC/IDCR minke whale assessment cruise (£27,885 including salaries).
- (ii) Minke whale cruise data validation (£2,000)—see Annex E item 6.3.2, p. 95 and Appendix 6.
- (iii) Minke whale ageing workshop (£5,000)—see Item 16.1.

The second priority was considered the Right Whale Workshop (see Item 16.2). The required funding for participants of £8,500 can be covered from the remaining unallocated money from the Research Fund (£2,000) and £6,500 from the discretionary travel fund.

The Committee also noted that, subject to receipt of an acceptable revised proposal, the money (DF10,000) designated for small cetaceans research by the Netherlands would be used for a pilot study of northeast Atlantic killer whales (see Item 7.2.6).

Ohsumi reported that the two Japanese scouting vessels being used for the Area I IWC/IDCR minke whale assessment cruise will be passing through Chilean and Peruvian waters, on their way to the Antarctic, and that it was planned to carry out marking and sightings work in this area, concentrating particularly on the Peruvian stock of Bryde's whales.

The Committee believed that any such cruise should be carefully planned in the light of the available distribution and abundance data, particularly if systematic sightings work is to be carried out. It agreed that a steering group comprising Horwood, Ohsumi, Chapman, Valdivia, Tillman and Donovan should meet in Brighton. A local co-ordinator should be appointed who should also attend the planning meeting for the Area I IDCR minke whale cruise which will be held in Tokyo in late September-early October.

(b) Research projects for which funding is required

The Committee supports four research projects and requests that these be funded by the Commission in the coming year. These are given below and are considered of equal priority.

- (a) West Greenland Cetacea: investigation of archival records (SC/34/RP4), first stage only, indexing of microfilms and extraction of sample station data—total cost of translator, purchase of microfilms, transfer to computer £1,000
- (b) Western North Atlantic right whales: catch history (SC/34/RP13), review of published and unpublished data—salary, travel and per diem costs for two months £4,500
- (c) North Atlantic humpback stocks—investigation of possible stock identity (SC/34/RP15), contribution to *Regina Maris* cruise costs £3,000
- (d) Logbook extractions, Antarctic blue and fin whales, employment of graduate student (subject to successful preliminary logbook examination, Annex I)—excluding £1,000 already available. £3,500

£12,000

In accordance with *Rep. int. Whal. Commn* 32:

a 10% contingency £1,200

Thus the Committee recommends that the Commission allocates a total of £13,200 to the Research Fund for 1982-83.

8. MANAGEMENT

8.1 Moratorium proposals

The Committee received comments from a number of members although in the time available it was not able to discuss the content of any of the papers. SC/34/O 17 presented scientific views on the proposed moratoria. These views were further developed in the light of discussions during the meeting by Nagasaki (Annex M1) who concluded that whales should be managed on a stock by stock basis.

A similar conclusion was reached by several members (Allen, Best, Butterworth, Cawthorn, Fraker, Kapel, Murphy, Øritsland and Rørvik) who also discussed the type of advice the Scientific Committee should be presenting to the Commission (Annex M2).

Chapman, de la Mare, Holt and Pascal (Annex M3) stated that their views had been affected by the scientific proceedings at the present meeting. They believed that a negotiated interim cessation of commercial whaling was a reasonable alternative to other methods that have been tried to ensure the future productivity of whale resources.

8.2 Whale sanctuaries

8.2.1 Indian Ocean—Seychelles/Netherlands Planning Meeting

The Report of the Workshop to plan a Programme of Scientific Research on Cetaceans in the Indian Ocean Sanctuary was given in IWC/34/13. Individual research proposals were examined by the relevant sub-committees. Holt reported that some of these proposals were already being implemented and that funds for others were now being actively sought. He expressed concern that experienced whale biologists from a number of IWC member nations not coastal to the Indian Ocean had not been present at the meeting. He noted that many of the Indian Ocean states did not possess the required expertise and expressed disappointment that little help was being given by IWC member nations with such expertise towards work being carried out within the sanctuary.

SC/34/O 20 expressed concern that little work had been carried out in the sanctuary since its inception, noting that neither the funds nor the expertise were available to carry on the necessary research. The author noted that the present area covered a wide range of habitats including both the feeding and breeding grounds of certain cetacean species. He believed that most research effort should be directed towards determining the breeding grounds of the large cetaceans and then protecting the animals in those areas: this contraction of the sanctuary would help to focus research on the most important biological problems concerning the formerly exploited species.

Holt noted that at the 1980 Commission meeting, the Seychelles and other countries had supported a proposal to extend the sanctuary south to the ice edge, in order to include the full range of at least one minke whale population within its boundaries. They believed that this was desirable in view of the uncertainty prevailing in the estimates and replacement yields of Southern Hemisphere minke whales, and the possibility that, at least in Area IV, they had been reduced by whaling. Holt considered that this proposed extension of the Sanctuary could have

provided a desirable form of experimental management for minke whales. He considered that given the recent increasing uncertainty over replacement yields of Southern Hemisphere minke whales, arguments for extending rather than contracting the Sanctuary were now strengthened.

8.2.2 General concept and characteristics of sanctuaries

At last year's meeting the Committee agreed that individual members would pass on their comments on the Australian document 'Examination of the General Concept and Characteristics of Sanctuaries' (IWC/33/24) to Anderson (*Rep. int. Whal. Commn* 32: 48); however, it noted that an unrevised version of this paper is being presented to the Technical Committee Working Group addressing this question. Comments on the document were presented in SC/34/O 16 and SC/34/O 20.

SC/34/O 16 drew attention to several areas in which it felt IWC/33/24 to be deficient. In particular, as also noted in SC/34/O 20, it believed that a sanctuary should regulate not only whaling but also other factors which may affect whale populations, e.g. vessel traffic, military activity, industrial development. Both papers point out that such wide-ranging protection may pose considerable legal difficulties. The author of SC/34/O 16 also noted that there were problems attached to the concept of sanctuaries as reference areas for comparison with areas where whaling occurs: the data base which can be obtained from a sanctuary area may be insufficient for comparison with that from stocks on which whaling occurs; unless factors other than whaling are regulated then comparison between areas may be made much more difficult.

Best and Kapel drew attention to the fact that three of the four functions of sanctuaries listed in IWC/33/24 required a strong scientific input and in particular required the monitoring of populations. They felt it was essential for any sanctuary to be situated in an area (i) where an adequate data base exists and (ii) where sufficient expertise is available to monitor the populations, and (iii) where it is logistically feasible to carry out monitoring exercises.

Holt believed that since the current sanctuary provisions did not preclude research catches and there were no legal or special logistic problems concerning access to the present sanctuary, Best and Kapel's fears might be unfounded.

In view of the considerable importance of the scientific aspects of sanctuaries, the Committee strongly recommends that it should be represented on the forthcoming Technical Committee Working Group and agrees that Bannister should seek to attend the meeting on its behalf.

8.3 Management procedures

8.3.1 Review of alternative definition of Sustained Management Stock

Chapman drew the Committee's attention to Schedule Section 10(a) paragraph 2 which states that 'When a stock has remained at a stable level for a considerable period under a regime of approximately constant catches, it shall be classified as a Sustained Management Stock in the absence of any positive evidence that it should be otherwise classified.' He noted that the terms 'stable level', 'considerable period' and 'approximately constant catches' are undefined and that this was unacceptable if these criteria were to be used by the Scientific Committee when classifying stocks.

In the subsequent discussion it was also noted that while in Section 10 of the Schedule it was stated that 'All stocks of whales shall be classified' this was not in fact the current practice of the Committee which in certain cases has recommended stocks to be 'unclassified', and the Commission has in some cases followed this course of action.

The Committee agreed to adopt the following definitions during its deliberations:

- (i) 'Stable level': the trend in the index of stock abundance does not differ significantly from zero at the 5% level.
- (ii) 'Considerable period': the most recent 20 years or more.
- (iii) 'Approximately constant catches': the trend in the catch does not differ significantly from zero at the 5% level.

Any index of stock abundance should be one that is acceptable to the Scientific Committee.

If Conditions (i) and (iii) are met for a period of ten or more but less than 20 years, the Committee will recommend that the stock be classified as a 'Provisional Sustained Management Stock'.

The Committee noted that the above does not solve the problem of being unable to allocate certain stocks to any of the three categories defined in the Schedule (e.g. stocks for which information on the index of abundance is not available for the 'considerable period' defined above or where the trend in index of abundance shows a significant increase). It therefore draws the Commission's attention to the fact that it is unable to offer advice on classification of all stocks under the current management procedure as it is obliged to do according to Schedule Section 10.

The above procedure was agreed to early in the meeting and was implemented as far as possible by the sub-committees. However, substantial problems were raised subsequently concerning the probability of these criteria successfully detecting declines in a stock within a ten or twenty-year period. The Committee recommends that further work should be carried out on this matter prior to a thorough discussion at the next Annual Meeting.

8.3.2 New Management Procedure—Japanese Proposals

At its last meeting, the Commission adopted a resolution calling upon

'interested governments to pursue consultations prior to the 34th Annual Meeting with the object of achieving broadly agreed proposals on revised (management) procedures for consideration at the 34th Annual Meeting that will enable the Scientific Committee subsequently to provide better advice to the Commission relative to management' (*Rep. int. Whal. Commn* 32: 35).

The new Japanese proposal (IWC/34/24) was produced in response to this resolution. A sub-committee was appointed to examine the proposal and the Committee adopted its report which is given as Annex K. Chapman pointed out that the new Japanese proposal was additional to, and did not supersede, the four presented last year and discussed by the Committee (*Rep. int. Whal. Commn* 32: 47–50).

Øritsland drew attention to the fact that the proposal outlined in SC/33/Mg2 (discussed on p. 47 of *Rep. int. Whal. Commn* 32) was fundamentally different from the others presented in that it did not require determination of

a 'reference level'. The Committee had nothing to add to its comments on this new conceptual approach to those reported last year.

8.3.3 *Aboriginal/Subsistence Whaling*

The Committee appointed a working group to consider the implications for the Scientific Committee of the Report of the *ad hoc* Technical Committee Working Group on Development of Management Principles and Guidelines for Subsistence Catches of Whales by Indigenous (Aboriginal) Peoples (IWC/33/14). The report was adopted with certain amendments and is given in Annex L. The Committee recommends that this report be transmitted to the Technical Committee steering group meeting held in Brighton on 17 July. It notes that Nagasaki and Tillman will be attending this meeting as members of their national delegations should the steering group have any queries concerning the Report.

In particular the Committee draws the Commission's attention to Annex L, p. 181 where it strongly recommends that Scientific Committee advice should be transmitted directly and unaltered to the Commission.

8.4 Review of regulatory measures other than catch limits

Annex O discusses the types of regulations currently used by the IWC other than catch limits. One of these, size limits, was referred to the sub-committee on other baleen whales and is discussed in Annex F (p. 123). During Committee discussions the question arose of a lower size limit for animals taken by land stations provided the meat is used for local consumption. Some members felt that any recommendation on this issue should be deferred until next year and that the matter should be examined further in the interim.

Other members believed that the restriction concerning use of the meat should be removed provided that the proportion of such 'undersized' whales is restricted to the average taken over the last ten years. They emphasised that while there is no biological reason for the restriction, there are two reasons why the proportion of such whales taken is of concern:

- a substantial change in their number would change the impact of their exploitation;
- a substantial change would cause a shift in the size distribution of the catch which would make future assessments more difficult.

The Committee also draws the Commission's attention to other considerations of size limits within its report, concerning bowhead whales (Item 9.5.1 and Annex G) and sperm whales (Item 9.1.2 and Annex D).

9. WHALE STOCKS, STATUS AND REGULATORY MEASURES

9.1 Sperm whales (see also Annex D)

Following the request from the Commission that the review undertaken at the Special Meeting be completed as a matter of priority, and the guidelines of Annex I (*Rep. int. Whal. Commn* 32: 127), highest priority in attempting sperm whale assessments was accorded to the Western North Pacific stock.

9.1.1 *Southern Hemisphere*

In the time available the Committee was unable to carry out assessments of Southern Hemisphere stocks.

9.1.2 *North Pacific*

9.1.2.1 Western North Pacific

Three population estimation techniques were available to the Committee. These were the age-specific technique, which was unchanged from that presented at the Special Meeting; the length-specific technique discussed at the Special Meeting (SC/F82/SpS6), which had been modified slightly, but not in such a way that the population estimates were altered; and a different length-specific technique (SC/34/Sp10). The principal difference between the two length-specific techniques lay in assumptions regarding the growth curve. In the revised length-specific procedure (SC/34/Sp10), a growth curve derived from age-length keys was assumed. In the length-specific technique used at the Special Meeting, the growth curve parameters were estimated, along with the population size, as those giving the best fit to the observed catch length structure.

Japanese scientists believed that the growth curve assumptions in SC/34/Sp10 were preferable, due to their incorporation of as much biological realism as possible. Other members, believing it essential to take account of the distortion of observed age-length keys after exploitation, believed the alternative procedure was preferable.

Sensitivity tests and simulation trials, similar to those presented at the Special Meeting for the age- and length-specific procedures, were not available for the revised length-specific procedure (SC/34/Sp10). Some members suggested a partial test of the reliability of the estimates presented in SC/34/Sp10, in which the growth curve parameters of the length-specific techniques used at the Special Meeting were altered to match as closely as possible those used in SC/34/Sp10. A comparison of the results obtained is shown in Appendix 6 of Annex D. The Japanese scientists believed similar results had been obtained, but most members believed that the results showed significant differences.

The Committee noted that changing the growth parameters to those considered more appropriate by the Japanese scientists led to higher population estimates, but less consistency and worse fit in estimates calculated for data from different operations.

Several new analyses carried out since the Special Meeting were available to the Committee, and detailed discussion of these is given in Section 5.2 of Annex D. Most members believed that new evidence presented on the appropriate stock boundary, on comparisons of trends in CPUE and recruitment rates with those predicted, and on the maximum population size, were consistent with estimates presented at the Special Meeting for the length-specific procedure using the 160°W boundary.

As a consequence, most members believed that, of the estimates discussed at this meeting, the most reliable estimates of initial and current population size are those shown in Table 1.

Table 1

Estimated stock sizes (thousands) for the Western North Pacific

Year	Males (age 11+)	Females (age 10+)
1910	128.5	180.9
1982	61.0	137.1
%1982/1910	47.5	75.7

However, most members believed that, due to the likely misallocation of catches into length classes near the size limit, these estimates may be biased upwards, as discussed in Section 5.2.2 of Annex D.

The Japanese scientists did not agree with the interpretation placed by most members on the new analyses presented. They believed that the most appropriate boundary was the Cambridge boundary, and that no reliance could be placed on CPUE data for comparisons or upon predictions of a maximum possible stock size. They emphasised their view that the population estimates shown in Table 1 are considerable underestimates, due to adoption of growth parameters inconsistent with observed values. They also considered that the actual data show no evidence of any misallocation of catches, and that it was erroneous to conclude that the estimates are biased upwards.

The Japanese scientists also believed that the pregnancy rates predicted using the estimates in Table 1 were inconsistent with the observed data. This view was not shared by other members of the Committee. The Committee noted a report by Beddington that he had been unable to obtain access to detailed biological data on reproduction rates and on age-length data, and that this had prevented him from carrying out a thorough reanalysis of these data.

The Committee agreed that, due to uncertainties about some of the parameters and functional forms assumed in the La Jolla pregnancy model (see Section 5.2.4), it was not possible to reliably determine the MSY level for this stock, and therefore the relationship between the current stock level and the MSY level. Consequently, the Committee was unable to recommend a stock classification or catch limits for this stock on the basis of the New Management Procedure.

The Committee also agreed that not much reliance could be placed on the actual values predicted for the replacement yields for this stock, nor on the predicted extent of the decline in population size. However, most members, noting that declines in estimated recruitment rates did not contradict the decline predicted using the estimates in Table 1, believed that the current replacement yields were negative, and that the stock will decline in the absence of catches.

The Japanese scientists disagreed with this conclusion, believing that the comparisons of predicted and estimated recruitment rates were invalid, and that these predicted trends were incompatible with a lack of trend in observed pregnancy data.

Noting that it had been unable to determine reliably the MSY level, and therefore whether the current population size was above or below MSY, the Committee found that it had no basis for recommending catch limits based on estimated replacement yields.

At the 33rd Annual Meeting of the Commission, the Japanese Commissioner requested that the Scientific Committee consider the effect of the current catch, and continuation of the current catch, on the population trajectory.

The Committee agreed to discuss this question on the basis of differences between projections forwards from the 1982 population sizes shown in Table 1, using a zero catch and a catch of 890 males. While not much reliance could be placed on the actual predicted annual population sizes in each projected trajectory, it agreed that more reliance could be placed on differences between annual levels in the

two projections. The two projected trajectories are shown in Annex D, Table 2 and Fig. 1.

In discussing these trajectories, the Committee noted that differences between them would be exaggerated by the assumption, made in calculating them, that length-specific selectivities were constant over lengths, rather than similar to Japanese coastal length-specific selections. It also agreed that differences between projections of a catch of 890 with and without a by-catch of females were small, but that a slightly greater decline in female levels since 1982 would occur with a female by-catch than that seen in Fig. 1 of Annex D. The size of this effect can be seen in Appendix 9 of Annex D.

The Committee noted that the population projections in Table 2 of Annex D indicate a greater decline in population size than any other assessments considered for this stock at this meeting.

Commenting on the differences observed between the two projections, the Japanese scientists believed that continuation of the current catch levels caused relatively little change in the population trajectory.

Other members believed that interpretation of the differences between the projections involved a subjective judgement, and believed they had no scientific basis on which to comment.

Three questions raised by the Australian Commissioner were not fully answered at the Special Meeting, and these were reconsidered.

The first two questions involved the advisability of complete protection for females and a minimum size limit to ensure this, should a catch be allowed when the stock was below MSY level. The Committee agreed, in view of the projections given in Annex D, Appendix 9, that there was likely to be little effect on the population trajectory provided the level of by-catch of females is kept at its present level. With this proviso the Committee does not recommend complete protection for females and consequently does not recommend a change in the minimum size limit of 30 ft for both sexes. Holt and Fortom-Gouin pointed out that on previous occasions the Committee had recommended that a female catch was undesirable for a number of reasons which are specified in the Reports of the Commission. They believed that those reasons were still valid. The third question concerned the continuation of a maximum size limit for males. Although the Committee noted that catches in the Japanese coastal grounds were unlikely to include a significant number of socially mature males, it recommends that the current maximum size limit of 45 ft in the North Pacific Ocean from March to June inclusive be continued, to ensure minimum disturbance of breeding activities during the breeding season.

The Committee discussed the research needs for this stock outlined in Section 10 of Annex D. It agreed that, before another comprehensive review of the Western North Pacific stock, such as at a Special Meeting, the following three tasks should be completed (noting that the first two tasks had financial implications):

- (i) coding of the North Pacific BIWS data from 1949 to the present;
- (ii) validation of the computer programs implementing the estimation procedures discussed at this meeting;
- (iii) the working up and publication (and if possible, inclusion in the IWC data bank) of outstanding biological data necessary for assessments of this stock.

The Committee endorses the other recommendations listed in Section 10 of Annex D, amending Item (f), so that the Japanese and Soviet governments be requested to make their marking data available so that they may be coded and entered on the IWC computing facility and hence available for analysis. The Committee also agreed that behavioural research on sperm whales should be encouraged, particularly involving study of breeding schools and obtaining calf counts, as recommended in SC/34/Rep 2.

9.1.2.2 *Eastern North Pacific*

In the time available the Committee was unable to carry out an assessment of this stock.

9.1.3 *North Atlantic*

In the time available the Committee was unable to carry out an assessment of this stock.

9.1.4 *Northern Indian Ocean*

In the time available the Committee was unable to carry out an assessment of this stock.

9.2 **Minke whales** (also see Annex E)

9.2.1 *Southern Hemisphere*

(i) Stock boundaries

Upon reviewing new analyses of catch distributions by 1° longitudinal strip and of biochemical data, the Committee found no evidence for abandoning the current boundaries between the six Southern Hemisphere Areas previously adopted for minke whales. A new proposal for moving three of the boundaries based upon mark-recapture data was thought premature given the small number of recoveries upon which it was based.

(ii) Estimates of abundance

After undertaking a new non-linear analysis of Japanese CPUE data available at the IWC computing facility, the Committee had serious doubts that this series constituted a reasonable index of abundance. The Committee was also unable to resolve differences of opinion regarding trends in the age of maturity of females. Given these difficulties with required input values and taking account of the new finding that the underlying population model sometimes produced unreliable results, the Committee agreed that the assessment model BALEEN could not be used to obtain estimates of abundance at this meeting.

Estimates of abundance based upon systematic sightings cruises were available for all six Areas: Areas II, III, IV and V utilised results from IWC/IDCR cruises while Areas I and VI utilised those from Japanese scouting cruises. The Committee agreed not to add on estimates of abundance obtained for waters north of 60°S since these sightings data had not been collected in a systematic fashion. It is therefore noted that these estimates would be underestimates since abundance north of 60°S and inside the pack ice was not included.

Upon reviewing available mark-recapture estimates, most of the Committee believed that these may be unreliable given the low number of recoveries (38 spread over six Areas), the possibility of undetected biases (e.g. due to marking mortality or shedding of marks), and their lack of comparability with sightings estimates (mark-recapture estimates frequently being 1.5–6.5 times larger than those from other methods).

However, Best, Ohsumi, Murphy, and Shimadzu believed that estimates of abundance from mark-recapture analysis were not necessarily incomparable with the sightings estimates. On comparing estimates of population size obtained by mark-recapture analysis with those obtained by sighting, they found the ratios to be 2.0 for Area III and 1.9 for Area IV. They also noted that these estimates are based on 12 and 21 mark recoveries, respectively. Moreover they observed that, since estimates based on sightings did not take account of populations north of 60°S nor inside the pack ice-edge, they were biased downwards.

Despite the above difference of opinion regarding comparability of sightings estimates and mark-recapture estimates of abundance, the Committee believed the sightings estimates to be the most reliable ones available this year, even though it could not calculate their standard deviations and thus provide some indication of the statistical errors involved. The Committee agreed to adopt the sightings estimates for all six Areas as the sole basis for this year's assessments.

(iii) Net recruitment rate

Annex E provided two estimates of net recruitment rate: (1) 0.007, based upon reanalysis of r_{II} values calculated last year for the period 1974/75–1979/80; (2) 0.044, based upon a new analysis of available age data. Noting that the difficulties of reading ages with certainty might bias these estimates, the Committee was unable to determine a best estimate within the range defined by the two values.

Another estimate of net recruitment rate, 0.074, had been proposed by Shimadzu during deliberations of the minke whale sub-committee. However, this value had not been recorded in Annex E since the sub-committee Chairman did not appreciate that it had been presented as a proposal. The Japanese scientists believed this to be a properly estimated and reasonable value and provided the rationale for it in Annex P1.

Given the deficiencies noted in Annex P2 regarding the Japanese estimate of 0.074 and in view of the need to study the estimation method more fully than was possible at this year's meeting, some members of the Committee believed that this estimate was unacceptable at this time.

(iv) Unbalanced catches by sex

The Committee was greatly concerned by the continuing high proportions of females which have occurred in catches from Areas II, III, IV, and V. To mitigate the effects of unbalanced catches, the Committee agreed that it should recommend setting the total catch limit for each affected Area at the level ensuring that female replacement yield was not exceeded. The procedure used for this is given in Annex P3.

(v) Classification

The Committee recommends that the Southern Hemisphere stocks of minke whales should remain unclassified under the criteria given in the Schedule.

(vi) Catch limits

Although the Committee had been unable this year to determine a best estimate of net recruitment rate for use in calculating replacement yields, most of the Committee believed that the range of values obtained, 0.007–0.044, could be used to express the range of possibilities. Accounting for the likely accuracy of these estimates, most

members believed that recruitment rates lay in the range 1–4%. Most members recommend that the catch limit for each Area should fall within the range of replacement yields shown below (Table 2, proposal 1). They were unable to distinguish which value within a given range was most likely.

Table 2

Recommended catch limits ensuring female RY not exceeded

Area	Proposal 1 0.01–0.04	Proposal 2 0.007
I	283–1,132	198
II	218– 871	152
III	371–1,486	260
IV	654–2,615	458
V	630–2,520	441
VI	311–1,243	217
Total	2,467–9,867	1,726

Ikeda and Zemsky proposed that the catch limits be established as at least the upper limits of the range of replacement yields shown in Table 2 in view of Shimadzu's estimated net recruitment rate of 0.074 and the fact that the adopted stock estimates are underestimates.

Allowing for inappropriate methodology and for the possibility of bias as explained in Annex P4, Best and Allen felt that catch limits would be more appropriately based on an *r*-*M* value closer to the upper end of the range 1–4%.

Some other members of the Committee were unable to accept completely any of the values of net recruitment obtained this year given the many problems in their estimation. In this circumstance they believed that caution was necessary, and that a value no greater than 0.007 should be taken, which, although problematical, was perhaps more nearly representative of the present circumstances of Southern Hemisphere stocks than any higher value. They proposed that catch limits be established on this basis as shown in Table 2 under proposal 2.

(vii) Comparison with last year's recommendations

This year's recommendations are compared with last year's in Table 3. In Area II a sighting estimate was available this

Table 3

Comparison of stock estimates and replacement yields obtained in 1981 and 1982

Area	Exploitable population		Replacement yield		
			1982		
	1981	1982	1981 ¹	Proposal 1	Proposal 2
I	28,628 ³	28,298	1,179	283–1,132	198
II	56,358 ^{2,3}	32,063	1,964 ²	218– 871	152
III	88,218 ³	53,069	3,301	371–1,486	260
IV	44,376	73,947	1,556	654–2,615	458
V	51,804 ³	86,799	1,926	630–2,520	441
VI	54,142 ³	31,069	1,669	311–1,243	217
Total			11,595	2,467–9,867	1,726

¹ RY for sexes combined.

² Not agreed by some members of the Committee.

³ Some other members expressed reservations about these estimates (*Rep. int. Whal. Commn* 32: 136–8).

year for the first time. In Areas IV, V and VI most of the change resulted this year from not using the BALEEN procedure which tended to produce stock estimates having low values and small variances. Otherwise, changes this year resulted from the new values of parameters used in the sightings estimates.

(viii) Other recommendations:

The Committee recommends:

- that a workshop be convened before the next annual meeting to undertake a comprehensive review of the problem of reading errors in the ageing of minke whales, including examination of the bias with respect to animals' size and between readers, the form of the underlying error model, and the effect of bias on trends in life history parameters. (Also see Item 16.)
- that further analyses of the Japanese CPUE series be undertaken in light of new techniques available at this year's meeting and moreover that Free determine what Soviet CPUE data are available and encode these if possible.
- that documentation be obtained concerning the effect of different ice conditions on the catchability of minke whales.
- that the programme of research outlined by the sightings sub-group (Annex F, Appendix 6) be undertaken to improve the reliability and precision of sightings estimates.
- that an IWC/IDCR sighting and marking cruise be undertaken in Area I to improve the basis of assessments for that Area.

9.2.2 North Pacific

9.2.2.1 Stock boundaries

The Committee recommends that stocks in the North Pacific be defined as follows (Annex E, Fig. 1):

- Sea of Japan – Yellow Sea – East China Sea stock: west of a line through the Philippine Islands, Taiwan, Ryukyu Islands, Kyushu, Honshu, Hokkaido and Sakhalin Island, north of the Equator.
- Okhotsk Sea – West Pacific stock: east of the Sea of Japan – Yellow Sea – East China Sea stock and west of 180°, north of the Equator.
- Remainder stock: east of the Okhotsk Sea – West Pacific stock, north of the Equator.

The Committee also recommends that a biochemical comparison of samples from the Korean and Japanese coastal operations be undertaken as soon as possible.

9.2.2.2 Sea of Japan – Yellow Sea – East China Sea stock

On the basis of the stability of the catches and available CPUE data over the past ten years, most members recommend that the stock be classified provisionally as SMS and that the block quota of 3,634 whales for the period 1980–84 with a maximum of 940 in any one year be continued.

There is no problem of imbalance in the sex ratio of the catch for this stock.

Van Beek, Chapman, de la Mare and Holt noted that the catch limit for this stock was calculated as an average over a period 1969–78 in which many of the catches were extremely high. Consequently they did not believe it reasonable to say that the catches in the past decade were 'stable'. They also noted that knowledge of the abundance of the stock only came from a crude CPUE series. Therefore they preferred to follow a cautious approach in

recommending a catch limit, viz. a catch limit for 1983 of 90% of the average catch over the period 1969–78, which is 654 whales, using the safety factor that is currently applied to stocks which have been satisfactorily assessed from much more complete data and analyses to be in the SMS category.

The Committee further recommends that details of fleet composition and vessel tonnages over the past ten years be provided in order that a tonnage correction factor may be developed to account for temporal trends in efficiency.

9.2.2.3 *Okhotsk Sea – West Pacific stock*

On the basis of the stability of catches and available CPUE data over the past ten years, the Committee recommends that the stock be classified provisionally as SMS and that the block quota of 1,678 for the period 1980–84 with a maximum of 421 in any one year be continued.

There is no problem of imbalance in the sex ratio of the catch for this stock.

9.2.2.4 *Remainder of the North Pacific*

The Committee recommends that the stock remain classified as IMS with a zero quota pending receipt of an adequate stock estimate.

9.2.3 *North Atlantic*

9.2.3.1 *Northeastern stock*

Observing that no significant trends over the past ten years could be discerned either for catches or for a problematical CPUE series and taking account of progress in obtaining mark-recapture estimates, most members recommend that the stock be classified provisionally as SMS with a catch limit of 1,690, based upon the average catch over the most recent ten years (1972–81).

Chapman, Holt and de la Mare, for reasons detailed in Annex P5, proposed that this stock should be unclassified and that, because there was a real probability it had been declining under regulation based on unchanging averages of past catches, the catch limit for 1983 should be set substantially lower than the average of the past ten years' catches (1,690) and in any case not higher than 90% of that number (1,521).

Rørvik commented that Annex P5 failed to take account of real progress made in improving the scientific basis of management for this stock, including a marking programme in which 25 recoveries had been obtained, biological material collected and analysed, CPUE data improved, and a simulation model developed. Although noting that more work needed to be done, he concluded that the mark-recapture estimates, CPUE series, modelling effort, and past history of exploitation all indicated that the stock could sustain the present quota. This view is developed further by Rørvik, Christensen and Øritsland in Annex P6.

The Committee also recommends that available effort data be reanalysed to obtain efficiency correction factors accounting for changes in horsepower and for tonnage.

The Committee noted that the proportion of females in catches had stabilised at 57% over the past three years, the period over which restrictions on Norwegian operations by time and location had been in force.

9.2.3.2 *Central stock*

Given the lack of at least a ten year series of reliable CPUE data, the Committee recommends that the stock be unclassified. Given that the CPUE series which is available

did not show any significant changes under a regime of constant catches over the past ten years, most members recommend that the current catch limit of 320 (based on the average catch during 1961–75) be maintained.

Chapman, Holt and de la Mare, for reasons detailed in Annex P5, proposed that, because there was a real probability that this stock had been declining under regulations based on unchanging averages of past catches, the catch limit for 1983 should be set substantially lower than the average of past years' catches (320) and in any case not higher than 90% of that number (288).

Sigurjonsson commented that Annex P5 did not account for recent progress made in improving the scientific basis of management for this stock.

The Committee also recommends that the available CPUE data be re-evaluated by next year with the aim of developing reliable indices of abundance extending over at least a ten year period.

There is no problem of imbalance in the sex ratio of the catch for this stock.

9.2.3.3 *West Greenland stock*

Given the lack of at least a ten year series of reliable CPUE data, the Committee recommends that the stock be unclassified. Given the stability of long term Greenlandic catches and of total catches in the past ten years, most members of the Committee recommend that the block quota of 1,778 whales for the period 1981–85, with the catch not to exceed 444 in any one year, be continued. Other members being concerned about recent possible declines in abundance, recommend a catch limit for 1983 of 213 whales, based on the average Greenlandic catch over the past ten years.

Kapel, Ikeda and Øritsland pointed out that the latter recommendation, if it were adopted, would lead to a reduction of the level of the Greenlanders' subsistence catch. No scientific evidence had been presented during the deliberations of the sub-committee to justify such a reduction.

The Committee noted that the continuing high proportion of females in the catch could affect the status of this stock but no mitigating measures are recommended.

9.2.3.4 *Canadian East Coast stock*

The Committee recommends as last year that this stock should remain unclassified with zero catch limit pending satisfactory estimates of stock size.

9.2.3.5 *General*

The Committee recommends that the IWC/IDCR North Atlantic project be continued if it proves feasible (and see Item 7.2.2).

9.2.4 *Northern Indian Ocean*

The Committee agreed that there is no information as to whether minke whales occur in this region.

Pending a satisfactory estimate of stock size, the Committee recommends that minke whales in this region, if any, continue to be classified IMS with zero catch limit.

9.3 *Other baleen whales* (also see Annex F)

9.3.1 *Fin whales, Southern Hemisphere, Areas I–VI*

The Committee did not discuss these stocks. It therefore recommends that they remain classified as Protection Stocks.

9.3.2 *Fin whales, North Pacific*

The Committee did not discuss this stock. It therefore recommends that it remains classified as a Protection Stock.

9.3.3 *Fin whales, North Atlantic*

The Committee noted that last year it had agreed to pay special attention to classifying these stocks in a coherent and consistent way (*Rep. int. Whal. Commn* 32: 54).

9.3.3.1 *Nova Scotia stock*

The Committee had no new information on this stock. It recommends that it remains classified as a Protection Stock.

9.3.3.2 *Newfoundland – Labrador stock*

The Committee recommends that this stock should be Unclassified with a zero catch limit.

9.3.3.3 *West Greenland stock*

The Committee noted sightings from a Norwegian small-type whaling vessel in 1981 (SC/34/O 5) and welcomed the information from Kapel that a systematic sightings cruise off West Greenland is planned for 1982. SC/34/ProgRep Denmark reported a preliminary catch figure of six for 1981.

No assessment was undertaken and no CPUE data were available for this stock. The Committee therefore recommends that this stock should be Unclassified with the same catch limit, six, as recommended last year.

9.3.3.4 *East Greenland – Iceland stock*

Effort data provided by Sigurjónsson and Rørvik were examined and modified (Annex F, Appendix 2) and used in the BALEEN program with several alternative values of biological parameters, the most important being the values of M ($M = 0.04$; or 0.055 for males, 0.06 for females) and the pregnancy rate (either increasing from 0.33 – 0.48 between 1948–81 or constant). The results from all four runs were compatible with the available mark-recapture estimates. The estimates from the program were very sensitive to the years included, presumably the result of the wide variation in the availability of this stock to the exploitation by a single land station. The Committee was unable to reach consensus on a recommendation for this stock and three proposals were put forward, as follows:

1. Some members considered the time series of r_{11} recruitment rates in SC/34/Ba9 gave strong support to a value of $M = 0.04$ rather than 0.055 and 0.06. Furthermore, the Committee had been unable to determine whether or not the pregnancy rate had been changing. There is great year-to-year variation in availability. Thus as seen in Annex F, Appendix 3, Run 1, if only the data up to 1975 were available, the BALEEN program estimates the 1983 stock to be only 30.1% of the 1948 level and the replacement yield to be 66. In fact using data up to 1980 showed much lower ratios of $N(\text{current})$ to $N(1948)$ in all four runs and in those cases the stock would be in the protection category. However using all the data points up to 1981 the stock is estimated to be in the sustained management category. They were therefore doubtful whether it should be firmly classified as a Sustained Management Stock at this time. Thus they propose a Provisional Sustained Management Stock classification, with a catch limit based on replacement yield as appropriate. They further propose that the average of

the two runs shown in Annex F, Appendix 3 (1 and 3) which gave, respectively, five year average replacement yields of 163 and 73, should be averaged to calculate a recommended catch limit of 118.

2. Other members, agreeing that the stock should be classified as a Sustained Management Stock, reasoned as follows: although there is no significant trend in the CPUE the possibility of a small continuing downward trend cannot be precluded. If this trend is, as appears possible, about 2% annually, and the replacement yield is taken to be 4% of population level, a value the Scientific Committee has sometimes used in the past, then it follows that the average catch would be approximately 1.5 times the average replacement yield, i.e. replacement yield is approximately 0.67 times the average catch. Therefore, they propose a catch limit of 167 which is two-thirds of average catch of the 20 year period 1962–81.

3. Some other members felt that the output from the modified BALEEN model gave unreliable estimates of the state of the stock, the replacement yields changing abruptly with different options of biological parameters. Also yearly variations in CPUE result in greatly differing estimates of replacement yield. It was felt that the replacement yield values calculated by the model as well below 100 were difficult to accept due to the apparent stable CPUE series (no significant trend, Annex F, Appendix 2) and an average yearly catch of 250 animals during the past 20 years. Therefore they propose that the stock should be classified as a Sustained Management Stock with a catch limit as 90% of the average yearly catch during the past 20 years, or 225 animals. This quota would be set for one year at a time, recognizing that stock estimates from over 170 fin whales marked during 1977–82 would soon be available.

The Committee sees no reason to change its recommendation of last year that catch limits be set for one year at a time.

9.3.3.5 *North Norway stock*

There have been no catches from this stock since 1971. Some members of the Committee recommended that this stock should be Unclassified. Other members agreed that the stock should be Unclassified but felt that the catch limit should be zero until further investigations are presented. Ohsumi objected to the latter recommendation as a matter of principle. He believed that when a stock is classified as a Sustained Management Stock, if catches cease and there is no evidence of a worsening environment, then the stock would be expected to increase. It therefore seems untenable to prevent the re-opening of operations because there is no new information obtainable.

9.3.3.6 *West Norway – Faroe Islands stock*

The Committee noted that in 1981 m/s *Hvitiklettur* made 35 sightings of fin whales and took 3 animals (SC/34/ProgRep Denmark). The Committee recommends that this stock should remain as a Protection Stock with a zero catch limit.

9.3.3.7 *Spain – Portugal – British Isles stock*

The Committee examined the historical catch statistics (particularly for the 1920s) provided by Rørvik. The early catch and effort data have been used in recent years to assess this stock. The Committee agreed, however, that the catch and effort data off Spain (mostly off Gibraltar) in the period 1921–27 were unlikely to be representative of the current catching area and these and other early data could

not be used to provide a reliable estimate of initial population size off Western Spain.

After considerable discussion, the Committee agreed that data presented in SC/34/O 19 and modified by Holt (Annex F, Appendix 5), provided a CPUE series for the most recent period (1977–81). This was used in a modified DeLury procedure rather than in the BALEEN program due to the lack of information on biological parameters. Revised catch data for 1957–81 are shown in Annex F, Appendix 4. The results of the DeLury analysis are shown in Annex F, Appendix 5.

The Committee considered four proposals from the sub-committee concerning catch limits for this stock (Annex F). Most members of the Committee support the third proposal and recommend that on the basis of the available data the stock should be Unclassified and that if a quota is set, caution should be exercised. They agreed that the range of replacement yields (78–103) given in Annex F Appendix 5, would be an appropriate upper limit.

Quiroga believed that despite the efforts made, it was impossible to decide on a catch limit on purely scientific grounds. He believed that a catch limit of 146 whales (last season's catch), which represents a 35% reduction on last season's catch limits, should be set as a provisional measure until an independent estimate of population size (e.g. from sightings or marking) is available. The Committee noted that this was not based purely on scientific grounds.

Ohsumi, Aguilar and de Salas felt that the DeLury estimate was based on a very short time series and that it reflected changes in availability on the grounds rather than actual changes in stock size; on this basis they also felt that the estimates of replacement yield (Annex F, Appendix 5) were unreliable. They believed that the CPUE data for the post-war years (1960–81) were sufficiently reliable to warrant classification as a Provisional Sustained Management Stock with the same catch limit, 210, as adopted by the Commission last year.

Holt and de la Mare believed that on the basis of the scientific evidence available, which was a considerable improvement on that of previous years, the stock should be classified as a Protection Stock with zero catch limit.

9.3.4 *Sei whales, Southern Hemisphere, Areas I–VI*

The Committee did not discuss these stocks. It therefore recommends that they remain classified as Protection Stocks.

9.3.5 *Sei whales, North Pacific*

The Committee did not discuss this stock. It therefore recommends that it remains classified as a Protection Stock.

9.3.6 *Sei whales, North Atlantic*

9.3.6.1 *Nova Scotia stock*

This stock has not been exploited since 1972 and no new information was presented. The Committee recommends that it should remain as a Protection Stock with a zero catch limit.

9.3.6.2 *Iceland – Denmark Strait stock*

Extensive new biological material was available to the Committee (SC/34/Ba12 and SC/34/Ba13) although it was agreed that this could not be used for assessment purposes in the absence of a reliable CPUE series. The Committee noted that there is little chance of obtaining reliable indices

for this stock since it is taken incidentally by a single land station at the northern limit of its range. It noted however that marking is continuing and that this may eventually provide an estimate of current stock size.

The Committee recommends that this stock should be Unclassified with the present catch limit of 504 for the period 1980–85, with a maximum catch of 100 in any one year.

9.3.6.3 *Eastern stock (or stocks)*

In the absence of new information (except for three sightings off Spain—SC/34/O 3) the Committee recommends that this stock should be Unclassified with a zero catch limit.

9.3.7 *Bryde's whales, Southern Hemisphere*

9.3.7.1 *South Atlantic stock*

The Committee did not discuss this stock and therefore recommends that it remains Unclassified with a zero catch limit.

9.3.7.2 *South African inshore stock*

The Committee did not discuss this stock and therefore recommends that it remains Unclassified with a zero catch limit.

9.3.7.3 *Southern Indian Ocean stock*

9.3.7.4 *Solomon Islands stock*

9.3.7.5 *Western South Pacific stock*

9.3.7.6 *Eastern South Pacific stock*

Most members of the Committee recommend a revision of the status of these stocks to IMS with zero catch limit pending satisfactory estimates of stock sizes. They also recommend that:

- (i) stock boundaries, particularly for the Eastern South Pacific be re-examined;
- (ii) any outstanding biological material which may assist in stock assessments be worked up;
- (iii) the catch history off Chile (taking into account the possibility of confusion between sei and Bryde's whales in the statistics) be reconstructed;
- (iv) the sightings data used to estimate stock sizes previously (*Rep. int. Whal. Commn* 31: 65) be reanalysed;
- (v) the basis of calculating catch limits for Initial Management Stocks be re-examined.

Some other members believed that as the Commission had set classifications and catch limits on the recommendation of the Scientific Committee which assessed the stock on the basis of satisfactory data in 1980, and since no catches had been taken, there was no reason to change those limits which were:

Southern Indian Ocean	IMS	197
Western South Pacific	IMS	237
Solomon Islands	IMS	0
Eastern South Pacific	IMS	188

9.3.7.7 *Peruvian stock*

The Committee discussed the available catch statistics (*Rep. int. Whal. Commn* 32: 96) and agreed that it would be preferable to compile statistics both by year and by season but noted that the basic data required for a re-arrangement of the catch and effort statistics were not available at this meeting. The Committee recommends that this compilation should be carried out within the next

year, and preferably be made available to the sub-committee Chairman in advance of the next annual meeting. Valdivia indicated that this would be done and that the data would be presented by month.

There was considerable discussion over the analyses of sightings data presented to the meeting (SC/34/Ba11 and SC/34/Ba18, Annex F, Appendices 7 and 8) but no agreement was reached.

Cooke (Annex F, Appendix 9) presented updated stock estimates of the exploitable stock for 1968 and 1983 using the DeLury model with the 1981 data point added. The analysis based on the first two effort series indicated a significant decline in the stock in the period 1968–82, so that it now appears to fall in the protection category. The third series did not indicate any significant decline.

Valdivia and Landa repeated their criticisms of the effort series 2 as being biased (Annex F, Appendix 10). In their opinion the third effort series was preferable since it used the measured searching time and they also believed that the DeLury method was not applicable as noted by the sub-committee in 1979, 1980 and 1981. This view was supported by Ohsumi.

Some other members stated that there were three reasons why the DeLury model had been successfully applied this year. Firstly some technical errors in the previous computations had been corrected, secondly the effort series had been extended, and thirdly adjustment had been made to change effort in boat days to searching hours.

Most members were of the opinion that the second effort series was preferable as it was based on a generally accepted method used for many other stocks in recent analyses. This series gave a 1982 stock estimate in the range 21.1%–29.7% (depending on age at recruitment) relative to the 1968 stock (Annex F, Appendix 9). Some members stated that these estimates of 1981 stock size from the analyses of CPUE data were compatible with the sightings analyses given in Annex F, Appendix 7. Other members stated that the apparent compatibility of the results between the DeLury and that sighting analysis was meaningless, because the latter calculation was based on an unreasonable method. The Committee was unable to reach agreement on a recommendation. Two alternatives are therefore presented:

- (i) Some members believed that on the basis of the results of analyses using two separate sets of CPUE data, the stock should be classified as a Protection Stock with a zero catch limit.
- (ii) Other members believed that owing to the lack of a trend in the third CPUE series, the existence of some bias in the first two series, and the evidence of bias in the sightings cruises, a safe course is for the stock to be Unclassified with a catch limit of 340 whales, the average catch from 1973–81.

9.3.8 *Bryde's whales, North Pacific*

9.3.8.1 *Western stock*

Mark-recapture and sightings estimates were updated (Annex F, Appendix 6). Beddington, de la Mare, van Beek, Tillman and Holt expressed concern that the sightings estimates were used without detailed information on the cruise tracks followed, which may have led to an upward bias if the tracks were not random. The marking and sightings estimates together with a CPUE estimate were used to obtain an average estimate of 24,820 for the

stock size in 1970. This was then extrapolated forward to provide an estimate of 18,692 for 1983. Using the same assumptions as used in the extrapolation procedure to calculate MSY, the Committee recommends that this stock remains classified as an Initial Management Stock with a catch limit of 536 (i.e. 29 whales greater than last year due to the updating of the estimates).¹

9.3.8.2 *Eastern stock*

SC/34/Ba17 reported that no sightings of Bryde's whales had been made by Japanese scouting boats in surveys conducted in part of this stock area (150°W–160°W, 35°N–45°N) for the period 1974–81. This stock has never been substantially exploited and the Committee recommends that it remains classified as an Initial Management Stock with a zero catch limit.

9.3.8.3 *East China Sea stock*

This stock was exploited by Japan from 1955–74 with an average annual catch of 19 whales; since that time there have been no reported catches from this stock until 1981 when the Republic of Korea took one whale. In response to a request for information last year concerning possible catches, the People's Republic of China replied that they do not undertake commercial whaling. The Committee recommends that this stock should be Unclassified but it was unable to agree on an appropriate catch limit. Some members believed the recommendation should be as last year, i.e. that the catch limit should not exceed 19 whales. Other members believed that last year's recommendation was open to misinterpretation (Annex F, p. 128) and that the catch limit should be zero pending the availability of new information.

9.3.9 *Bryde's whales, North Atlantic*

The Committee did not discuss this stock and therefore recommends that it remains classified as an Initial Management Stock with a zero catch limit, pending a satisfactory estimate of stock size.

9.3.10 *Bryde's whales, Northern Indian Ocean*

SC/34/ProgRep Japan reported on sightings made by two scouting vessels in the southern part of this area in March 1982. Sightings of animals from this stock were also reported in SC/34/O 24. The Committee recommends that this stock remains Unclassified with a zero catch limit.

9.4 *Bottlenose whales* (see also Annex H)

The small cetaceans sub-committee considered the status of the northern bottlenose whale, *Hyperoodon ampullatus*, in the North Atlantic and Baird's beaked whale, *Berardius bairdii*, in the North Pacific (see Annex H).

9.4.1 *Northern bottlenose whale*

The programme of research recommended by the IWC to obtain information necessary to carry out an assessment of this stock has not been implemented, and therefore the Committee recommends that this stock remains a Protection Stock.

9.4.2 *Baird's beaked whale*

The Committee has not previously considered this species in a substantive way. Two documents on the Japanese fishery for beaked whales were available, SC/34/SM8, which contained a CPUE analysis and SC/34/SM11, which

¹ Editor's note: but see Annex F p. 128.

described the fishery, listed catches and included a stock assessment and a proposal for management.

On review, the CPUE analysis in SC/34/SM8 proved to be faulty in that it assumed that beaked whale and minke whales are sought at the same time. In fact although the same boats are involved, the two species are hunted in different areas and for the most part in different seasons.

The main conclusions of SC/34/SM11, were:

1. the decline in catches from hundreds in the 1940s–1960s to tens in the 1970s, was primarily due to market (in particular the increasingly high value of minke whales) and other economic and sociological factors;
2. CPUE has been constant or increasing over at least the period 1947–75, and sightings per effort (SPUE) have increased from 1977–81;
3. based on sightings from scouting vessels, the species probably comprises a single population which ranges from Japanese waters across the North Pacific to the North American continent;
4. on the basis of a long history of catches and recent exploitation in only part of its range, the stock (species) should be classified SMS and a 5-year block quota of 953 established (with a maximum catch for one year of 256).

Extensive discussions of these conclusions centred around two points: stock identity and validity of the measures of effort. On the question of stock identity, it was noted that a gap in SPUE in a north–south band to the east of Japan may indicate isolation of the exploited population (although effort there had been low), and that mis-identification may be responsible for sightings in the warmer central North Pacific and Western Pacific (although some Baird's beaked whales have been taken off Honshu during the presence of the warm Kuroshio Current). The discussions of effort revolved mainly around the operational nature of the beaked whale fishery and behaviour of the whales.

The Committee agreed to the following conclusions:

1. The limits of distribution of the population exploited by Japan are largely unknown. Although Baird's beaked whales occur across the North Pacific, it is possible that the whales exploited by Japan comprise a discrete stock.
2. The initial and current population sizes, their relative levels and the MSY level are unknown.
3. The average annual catches in the 1950s of about 250 whales were followed by a decline in catches during the 1960s and early 1970s to present levels of about 30 per year.
4. In one area, the nominal catch per boat increased over the period 1947 to about 1974, and possibly declined from about 1975 on. The number of whales sighted per hour of operation off Southern Hokkaido may have increased over the period 1977–81.
5. The validity of the measures of effort employed in SC/34/SM11 is uncertain for several reasons: fluctuations in the number of vessels hunting Baird's beaked whales; changes in the vessel-tonnage composition of the fleet; the operational nature of searching effort (e.g. waiting at the surface for long periods while whales are submerged); the aggregating behaviour of the whales; the sharp change in sex ratio in the catch; and the high apparent rates of increase in CPUE.

The Committee could not recommend a classification for the Baird's beaked whales exploited by Japan on the basis of current knowledge. If the Commission should wish to

establish a catch limit on the basis of recent catches, the catches in the last ten years are as listed in Annex H, Table 8 (the annual average for 1972–81 is 39 whales). The Committee believes that such catches over a short period would not seriously affect the stock, but that research should proceed to obtain the information necessary to assess the status of the stock. This research should include the following four items:

1. Refinement and reanalysis of CPUE data, including segregation of beaked whale and minke whale effort, inclusion of confidence intervals about the estimates, description of the searching and catching operations, and reanalysis of vessel tonnage effects. Other possibly relevant technological factors should be examined including: acoustic equipment (type, when installed, and how used); speed, size and age of vessel; crew size; and gun equipment.
2. Reanalysis of scouting vessel data to delineate range and estimate population density, including evaluation of sample size and seasonal effects, elimination of records likely to have been based on erroneous identification, and presentation of data on miles of effort and actual sightings (including school size), by 5° block or smaller stratum if possible.
3. Additional research to determine the identity and range of the stock(s). Potential methods include tagging (on the grounds and in adjacent pelagic areas to the east and north—the latter by scouting-vessels) and aerial survey.
4. Investigation of population dynamics based on analysis of samples and data from the fishery, on field observations (including analysis of aerial photographs) of age and sex structures of schools and the population, and on comparative studies of other related and ecologically similar species.

The Committee recommends that Japan should be urged to provide the results of Items 1 and 2 to the next meeting of the Scientific Committee.

9.5 Other protected species and aboriginal/subsistence whaling (see also Annex G)

9.5.1 Bowhead whales

9.5.1.1 Bering – Chukchi Seas stock

The Committee noted that the Alaskan Eskimo harvest for 1981 was 17 landed and 28 struck (US internal allocation, 28 struck) and that in the 1982 spring hunt 6 animals had been landed and 16 struck, from the annual quota of 19 struck. It was pleased to note that under the NOAA-AEWC management agreement the 'struck' quota had not been exceeded.

An estimate of mortality of struck and lost animals in spring 1982 was 50–60%. Reported figures for the struck and lost rate were higher in 1982 than in 1978, 1980 and 1981.

The Committee noted a review of biological parameters for this species but recognized that most conclusions were still based on very small sample sizes. Estimates of gross annual recruitment rates from calf counts were available from ice camp censuses near Barrow and systematic aerial surveys in the Beaufort Sea and Amundsen Gulf, though both estimates (2–3.5%, 3.4%) may be low because of differential effective sightability of calves for which only partial corrections might have been made.

The Committee recommends that aerial photogrammetric work in the East Beaufort Sea be continued and expanded to cover a wider proportion of the

population to avoid possible bias in the estimated size composition due to possible size segregation in the population. The work could be combined with more directed effort to obtain calf counts, and with photographic identification work, which the Committee strongly believes could provide information on a number of biological parameters. It also recommends that harvested whales be photographed for comparison with animals photographed elsewhere.

Estimates of stock size obtained from observations of animals passing the ice camps near Barrow in 1978, 1980, 1981 and 1982 were reviewed. Those available to the Committee this year were somewhat higher than those previously accepted, chiefly because of changes in analysis methods. These included reassessment of a 'missed whale' correction factor used in 1978, correction for decreased sightability during fair or poor weather, and correction for whales passing on days when less than 2 hours' watch was possible because of bad weather. A further correction had been applied during the meeting to allow for whales missed by both camps, previous corrections only allowing for whales missed by the first camp, based on additional whales seen by the second camp. However, as estimates for all years except 1982 were based on a correction factor applied to a total count already corrected for whales missed in poor or fair conditions, the stock size estimate for 1982 is regarded as the most accurate available.

The Committee recommends further investigation of this correction factor for whales missed, and that in future censuses, as much time as possible should be devoted to such experiments.

The Committee concluded that very few animals pass the ice camps before they open, and few after they close, but that aerial surveys are effective in determining how many may pass outside the range of ice camp observers. It recommends that such surveys be carried out in 1983. It noted also the possibility that a few animals may remain in the Bering Sea and Chukchi Sea and not migrate past Barrow; it is pleased to hear of a joint US/USSR cruise planned for this year to establish the density of whales in the Chukchi Sea. It also noted ongoing work on censusing whales acoustically.

Reviews of population projections demonstrated their crucial dependence upon the level of initial population size and parameter values used, particularly adult survival rate. The Committee recommends revision of the model predictions in the light of population size estimates at this meeting.

The Committee believes the best estimate of present stock size is 3,857 (range 3,390 to 4,325), which is 21.4–42.9% of the estimated range of initial population size (9,000–18,000 in 1848). Because of the large catches during early exploitation the Committee believes the initial size to be nearer the top of the range given, so that present stock size will be nearer the lower percentage of initial stock size. It therefore recommends that the stock continue to be classified as a Protection Stock.

Given the Commission's 3-year quota for the stock from 1981, the Committee reviewed the effect of this take on the stock. The effect depends on the level of current absolute gross recruitment, for which the best estimate is 3.2–3.5%, in which case the stock size may only be stationary or even decreasing, and any kill whatsoever would increase the risk of this already small population declining further. The population simulations using known catches, and values of biological parameters to give a population size of 3,000 in

1978, imply a very low maximum net recruitment rate, of around 0.01, from its minimum size in 1909–15 to 1978, during which time average estimated removals were 23–24 per year. But these simulations suggest an initial population size of only about 17,000; given a higher estimate (of 18,000 or more), the maximum net recruitment rate would be less than 0.01, so that the population might not, in those circumstances, have increased over the period.

It could therefore not be conclusively determined whether the population had increased or decreased since 1915. There is thus a contradiction between the low gross recruitment rates observed from calf counts, suggesting no positive net recruitment, and the historical record results, suggesting a small positive net recruitment rate for 1915 to 1978. In these circumstances the Committee recommends that the safest course for the recovery of the stock is for the take to be zero.

The Committee notes in this connection an additional proposal for a take from this stock off the Siberian coast.

Should the Commission continue with the current quota, the Committee strongly recommends that removals be restricted to sexually immature animals of either sex (less than 13 m) to maximise population growth.

Given the possibility of risks to bowhead whales from proposed off-shore oil and gas developments, particularly in the Beaufort Sea, the Committee recommends continuation of research to define migration routes precisely, and critical habitats for this species. It also strongly recommends investigation of the effects of such developments on whale behaviour and survival, and looks forward to receiving the results of relevant current research, particularly from US reviews of the problem.

9.5.1.2 Other stocks

The Committee would be pleased to receive details of bowhead sightings from aerial surveys carried out on the Hudson Bay/Davis Strait stock by a consultant company.

The Committee recommends that these stocks should continue to be classified as Protection stocks with a zero catch limit, and that they should continue to be given complete protection from all forms of hunting.

Due to the apparently low level of all these stocks, and the unknown effects of oil and gas development in particular, including the proposed year-round tanker traffic, the Committee recommends that national groups undertake research on the distribution of bowhead whales and the impact of such activities, as well as submitting reports of research already being carried out.

9.5.2 Right whales

The Committee noted sightings of right whales off the coast of Japan and the western coast of the USA. It believed that the North Pacific population remained small.

In the North Atlantic 59 individual right whales were photoidentified, including six cow and calf pairs. The Committee welcomed this work, and recommended continuation of such studies in order to monitor population status, especially in view of proposals by the USA for accelerated petroleum transportation and refining in the immediate area, and the fact that these important feeding and calving areas encompass both US and Canadian waters.

The Committee welcomed the survey for right whales undertaken by a Japanese scouting vessel south of Western

Australia in December/January 1981/82, in which 75 right whales were seen.

Forty-two right whales were seen off Western Australia and 298 right whales off South Africa in aerial surveys during 1981. There were also 264 right whale sightings in the New Zealand region. About 203 individuals have been photoidentified in these regions.

The Committee recommends that:

- (a) all stocks of right whales should continue to be classified as Protection Stocks;
- (b) national groups should undertake further research on the status of populations in their area, in view of the apparent increase in abundance of several populations;
- (c) consideration should be given to the production of a catalogue of photoidentified individuals, as already exists for North Atlantic humpback whales;
- (d) the proposed special meeting (see *Rep. int. Whal. Commn* 32: 63) should take place in 1983 (and see Item 16.2).

9.5.3 Blue whales

During 1981, 267 sightings of 562 blue whales were made from catchers from the Icelandic whaling station. The Committee recommends that the 1980 data from this source be provided next year.

The Committee also recommends that sightings of this species from catchers attached to the Spanish land stations should be forwarded to the Secretariat.

In response to a recommendation from the Committee last year, time budget data were submitted for a Japanese Antarctic expedition taking blue whales during seven seasons. The Committee considered these data to be potentially most valuable if and when a reanalysis of southern blue whale stocks is undertaken.

The Committee recommends that:

- (a) all blue whale stocks should remain as Protection Stocks;
- (b) a reassessment of Antarctic and pigmy blue whale stocks should be undertaken as soon as possible.

9.5.4 Humpback whales

During June and July 1981, 71 humpback whales were individually identified off West Greenland and population estimates of 182 (95% CL 0-426) and 130 (95% CL 85-175) obtained from resightings. Three of these animals had been previously photographed on the Caribbean breeding grounds but none on other Northwest Atlantic humpback feeding grounds, implying that those off Greenland might be a separate 'feeding stock'.

During 1981, 33 humpback whales became entangled in fishing gear off the Canadian east coast, nine of which are known to have subsequently died. The 1981 catch of humpback whales by Greenlanders was 11. No information on possible catches at Bequia was available. Total known removals from this stock in 1981 were therefore 20.

Last year the Committee had accepted 2,000 as a minimum estimate of the current population size. As there was now a total of 2,000 known individuals from fluke photographs, the Committee felt a more reasonable estimate of current population size might be 2,300-4,100. Taking minimum estimates of both current and initial population size (estimated last year as 4,400-4,700), the Committee concluded that the northwest Atlantic stock is now about 52% of its initial level.

Given the reduction in total removals during 1981, and the fact that the current population is probably larger than estimated last year, the Committee felt that the situation of this stock is not as serious as it had believed last year.

The Committee was pleased to note the reduction in net entanglements off the Canadian coast, and recommends that the study of the incidence of such encounters and means to reduce the mortality therefrom should be continued.

The Committee also noted that there are still uncertainties surrounding estimates of both initial and current population size, present recruitment rates and stock identity. Furthermore, if the humpbacks visiting Greenland in summer are essentially a separate 'feeding stock', the effect of the Greenland aboriginal take will obviously have a greater local impact than if these animals were drawn from the entire breeding stock. Given these uncertainties, the Committee recommends that the safest course would be to remove the exemption for a Greenland catch of 10 humpback whales.

In response to its request last year, the Committee received information on humpback whale abundance off Peru. Changes in the timing of the whaling season seemed likely to be responsible for the overall decline in the number of sightings noticed previously.

The Committee recommends that all humpback whale stocks should remain as Protection Stocks.

The Committee also recommends that:

- (a) further research should be carried out on the problems of stock identity and population estimation in the North Atlantic, especially on the summer feeding grounds, and including surveys to determine the existence of possible breeding stocks in lower latitudes of the eastern North Atlantic;
- (b) information on sightings of humpback whales from catchers attached to Spanish land stations should be systematically collected and forwarded to the Secretariat;
- (c) all active researchers on humpback whales in the North Pacific should meet to discuss setting up a catalogue of known animals similar to that now available for the North Atlantic;
- (d) aerial surveys off Australia should continue on an annual basis, and the possibility of expanding the photoidentification programme to include vertical photographs from the air should be investigated;
- (e) all available data from the New Zealand region (including Tonga) should be examined in order to determine trends in abundance;
- (f) and all scientists with access to either live or dead humpback whales should be encouraged to obtain photographs of the ventral surface of the tail flukes (as well as to investigate the feasibility of using aerial photographs for individual identification), and to exchange these photographs with other interested observers in the area (possibly via a catalogue).

9.5.5 Gray whales

9.5.5.1 Eastern Pacific stock

The Soviet take of gray whales from the Eastern Pacific stock for its aboriginal people totalled 135 animals in 1981. Females again predominated in the catch (73.4% of the 94 animals sexed). The Committee expresses its concern that a larger proportion of the catch had not been examined, especially for sex and length, and it stresses the scientific importance of this catch to an understanding of the biology

and population dynamics of the species. The Committee was pleased to receive the quantitative information on feeding that it requested last year, and looks forward to seeing the results of US funded studies on gray whale feeding and food.

Total removals for 1981 (135) represented 0.9% of the best estimate of current population size (15,587). At this catch, and according to the model used last year, the population should continue to increase despite the current level of the harvest.

The Committee recommends that the Eastern Pacific stock of gray whales should remain a Sustained Management Stock. Any catch should be held at the same level as recommended last year (179 animals), for the following reasons:

- (a) the high proportion of females in the catch;
- (b) the present estimate of initial stock size is very sensitive to certain parameters; and
- (c) further growth of this stock should be encouraged to increase the possibility of repopulation of the area once occupied by the West Pacific stock.

The Committee also recommends that the Commission urges Soviet authorities to continue investigating means by which the sex ratio of the catch could be adjusted towards parity, although the inherent difficulties of the situation are recognised.

The Committee was disappointed to hear that USA participation in joint research with Mexico ended in 1981. It recommends that the Mexican government's programme of research into the gray whale should continue, and the results should be submitted to the Scientific Committee at its next meeting.

Because this is the whale stock for which the most information on recovery rates is available, the Committee strongly recommends the resumption of periodic systematic counts of gray whales.

9.5.5.2 Western Pacific stock

The Committee had no new information on the status of this stock, although it believes it is extremely depleted. The Committee therefore recommends that it should remain a Protection Stock.

10. SMALL CETACEANS

10.1 Review of stock assessments for exploited dolphin populations

10.1.1 Small cetaceans in the Black Sea

No new stock assessments were available for the Black Sea populations of common dolphin, bottlenose dolphin and harbour porpoise. The small cetaceans sub-committee (see Annex H) reviewed reports of work carried out by the Soviet Union when the fishery by that nation still operated (up to 1966, when the populations apparently declined rapidly) and fragmentary information from various sources on these populations and on the continuing Turkish fishery.

The fishery by Turkey is not well documented. Catches have been reported in 'centners' (undefined, but possibly not 100 kg units) and conflicting figures have appeared in reports and summaries.

The reported catches in the 1960s and 1970s have been high, possibly in the hundreds of thousands in some years, but have not been broken down by species. The reported catch in 1981 was only 325 centners, at most about 600–700

animals. The abrupt fall-off in the catch was probably caused by a ban on importation of oil and meal by customer nations.

Recent (1974) population estimates based on aerial surveys, for the three species in the aggregate, have ranged from 264,000 to 432,000. These estimates do not agree well with the estimates of catches, and it is likely that there are problems with both (discussed in detail in Annex H).

Because very large catches of dolphins and porpoise have been taken in proportion to estimated population sizes, because the populations are of unknown status but likely to be depleted, and because catches continue, the Committee recommends that:

- (1) since improvement in harvest statistics is needed, in defined units, to determine (a) whether the assumed value of centners of 100 kg is correct, (b) whether the levels reported correctly represent the fishery and (c) the species composition of the catch, the Commission should request the assistance of Turkey and FAO in obtaining original Turkish documents reporting catch levels, with translations, for the Committee's use;
- (2) since the series of aerial sighting surveys from 1967 to the present provides a possible basis for population monitoring, the data from these surveys should be presented by the Soviet Union for analysis;
- (3) since the fishery is not well understood despite discussions in several forums in recent years (see Annex H), individuals in Turkey with knowledge of the fishery and its statistics should be invited to participate in the next Committee meeting;
- (4) since the dolphins feed on anchovies, the history and present status of the anchovy fisheries throughout the Black Sea should be described for Committee use;
- (5) since there are no available recent biological studies on these cetaceans, Turkey and FAO should be approached concerning the sampling of the Turkish fishery to determine the length, sex and reproductive condition of the catch.

10.1.2 *Stenella* spp. in the Eastern Tropical Pacific

The small cetaceans sub-committee reviewed available information on three major stocks of dolphins involved in the international tuna purse-seine fishery: the northern offshore form of the spotted dolphin, *Stenella attenuata*, and the eastern form and northern whitebelly form of the spinner dolphin, *S. longirostris* (see Annex H).

Estimates of kills (of all species and stocks) in the last three years have ranged from about 22,000 to about 50,000, by 12 nations. In 1981, about half were taken by the US fleet and half by non-US vessels. A major problem in estimating the non-US kill is that the number of cruises sampled is very small. IWC members fishing on dolphins but not co-operating in the IATTC sampling programme are the Netherlands, Spain and Mexico; until they do, the variance of the estimates will be very large.

The most recent stock assessment (SC/34/SM6) places the eastern spinner population at 20% of initial, the northern off-shore spotted dolphin at 40–50%, and the northern whitebelly spinner at 70–80%.

An analysis of sightings data from tuna seiners (SC/34/SM1) suggests that estimates of school size show decreasing trends over the period 1977–81 for the three stocks.

The sub-committee discussed the assumptions and results of the assessments at some length and concluded

that re-assessment is needed. Their recommendations were all endorsed by the Committee and are given below.

- (1) Member nations of the IWC should be urged to participate in the data collection programme of the Inter-American Tropical Tuna Commission. Members fishing on dolphins but not currently participating are Mexico, the Netherlands and Spain.
- (2) Research into ways of reducing incidental mortality should continue, and crews of vessels of member nations of the IWC should be encouraged by member governments to participate in the seminars held by IATTC.
- (3) Since there is uncertainty about the assessments which have been made and consequently the status of the stocks, the US should be urged to continue with plans for reassessment.
- (4) Incidental catch statistics should be included in Progress Reports to the IWC as required by the Schedule. Mexico, especially, has a large and growing fleet and should be approached directly by the Secretary and urged to participate.

10.1.3 *Stenella coeruleoalba* in the Western North Pacific
A large catch by Japan in 1980 (approximately 16,000—*Rep. int. Whal. Commn* 32: 179–83) considered in relation to estimated MSY of 5–6,000 led the small cetaceans sub-committee to place this item on its Agenda for 1982. The Committee notes that in 1981 the fishermen voluntarily held the catch to 4,710 under advice offered by the Japanese Fisheries Agency (SC/34/SM10).

Annual catches have fluctuated greatly over the last few decades, ranging from near-zero to over 20,000, apparently for a large variety of reasons. These include market demand, starting and stopping of fisheries at various villages, competition or co-operation between villages, changes in numbers of teams per village, changes in speed of scouting vessels, long- and short-term oceanographic variations, fluctuations in mean school size and in timing of seasons and, most recently, advice by the Japanese Government that catches be reduced. Interaction of these factors flaws the available analyses of CPUE (SC/34/SM10).

There is some evidence that some reproductive parameters may have changed since the 1950s, but these analyses suffer from problems of sample size, and, possibly, changing sampling methodology.

The Committee agreed that:

- (1) total catches have declined over a long period on the Izu Peninsula (at least 19 years);
- (2) there is no clear trend in CPUE as reported;
- (3) some reproductive parameters have probably changed in a way consistent with density-dependent response;
- (4) it is very difficult to assess a migratory population at one point along its migration route, as is the case here;
- (5) there are considerable uncertainties and problems involved in the analysis of the CPUE, and more detailed data and re-analyses are needed.

The Committee recommends that Japan be urged to collect and analyse more detailed effort data and other relevant information. This should include if possible:

- (a) effort data in hours and days, by vessel, area, season and year;

- (b) detailed oceanographic data;
- (c) data on other major fisheries in the area, especially for squid, and;
- (d) information on yearly changes in seasonal abundance, effort and catch.

10.2 Other species

Because of shortage of time due to major concentration on the pelagic dolphins and the beaked whales, the sub-committee on small cetaceans only very briefly reviewed new information on other small cetaceans (Annex H).

10.2.1 *White whales and narwhals*

The Committee noted that research recommendations made in previous years have been acted on by the USSR and Canada. The research (reported in the ProgRep and SM series) includes studies of population size, productivity and exploitation in waters of the USSR, and population size, discreteness, exploitation history and loss rates in Quebec, Hudson Strait, Northeast Hudson Bay, the Canadian High Arctic and West Greenland.

In view of the new information available to the meeting this year the Committee makes three recommendations:

1. Noting the uncertainty in stock identity, stock size estimates and catch data, the absence of estimates of net recruitment rates and the fact that these stocks may also be hunted in Canada, the Committee viewed with concern the provisionally reported US catch of over 600 white whales. It recommends that catches be minimised until these problems are resolved. It also recommends that the Government of the USA be encouraged to initiate appropriate field studies, and submit complete catch statistics and any available survey data for this species [but see note on p. 160].
- Kapel agreed that there was an urgent need for full information on the US fishery to be made available so that the situation could be examined, but found it premature and inappropriate to recommend minimisation of catches on the basis of the preliminary information presented at this meeting.
2. Noting the quota of 40 set for the Cumberland Sound population of white whales and the take of 45 in 1981, the Committee again recommends that Canada be urged to afford complete protection to this severely depleted population, and also to the Eastern Hudson Bay and Ungava Bay stocks.
3. The Committee recommends that the USSR be asked to make available catch information for its white whale fishery.

10.2.2 *Killer whales*

In 1981, Norway acted on the Committee's recommendation of last year that the killer whales along the Norwegian coast be censused. Based on reports of fishermen completing questionnaires (332 of 5,000 distributed) the minimum population of killer whales in Norwegian coastal waters was estimated at 1,115 individuals (SC/34/SM4). No sightings were made in off-shore waters during the survey. Plans are to repeat the census.

A continuing problem in killer whale assessment is the wide discrepancy between apparently high pregnancy rates in catches and low calf production as observed over time in pods in the wild. Discussions in the small

cetaceans sub-committee centred around possible biasing factors in the catch, such as size-selection by harpooners and evasive behaviour by the whales, but no conclusion was reached.

The Committee noted that the USSR provided considerable data on the 1980 Antarctic catch of 906, as requested last year by the Committee. The Committee recommends that the sample be aged to allow better analysis of the reproductive data.

10.2.3 *Dall's porpoise*

The small cetaceans sub-committee pointed out (Annex H) that incidental kills of this species in salmon gillnets have not been reported for some areas. The Committee recommends that the USA and Japan be urged to do this.

10.3 Fishery interactions

The small cetaceans sub-committee reviewed new information on incidental takes and direct conflicts in British waters (involving British and Dutch fishing operations), in Spain, Japan, Hawaii and France. It noted two types of incidental take thought to occur but not reported in the ProgReps. These are in fisheries of several types and of several flags operating in US waters in the North Pacific under US Marine Mammal permits and in the Japanese gillnet fishery for red squid in the northeastern North Pacific. The Committee recommends that the nations involved be urged to report these takes if they do exist.

10.4 1983 Meeting of the Sub-committee on Small Cetaceans

The sub-committee proposed that it should focus next year on the status of populations of phocoenids, including those taken incidentally, on *Cephalorhynchus* spp. and on populations of small cetaceans involved in live capture fisheries. The Committee recommends that member countries be urged to bring relevant information and analyses to next year's meeting.

10.5 Statistics

The Committee repeats its recommendation of previous years that member nations be urged to collect and submit in their Progress Reports, full statistics as detailed in *Rep. int. Whal. Commn* 30: 124, including statistics for incidental and live capture fisheries.

11. DATA COLLECTION, STORAGE AND MANIPULATION

A sub-committee was appointed to examine items 11.1, 11.2 and 11.3. The Committee endorsed its report which is given in Annex J. The recommendations are given under the relevant agenda items below.

11.1 Computer needs

The Committee recommends that two staff be recruited for a period of two years to complete the catch data tapes. However it was noted that there would still be much work for the IWC computer staff to do and that priorities for this work are necessary. The Committee recommends that convenors meet to set priorities for the forthcoming year¹. A list of programs that are still unverified is given in Annex J, Appendix 2.

¹ Editors note: the convenors met in Brighton and their report is given in Annex J, Appendix 3.

The Committee noted that involvement with the BIOMASS programme would be restricted to no more than three or four days this year. It was agreed that such involvement should have a low priority in relation to IWC work.

The Committee noted that in the past year the IWC computing facility had been utilised by Committee members. In this regard the Committee recommends that:

- (i) the facility should be available for use by members for the testing of developed programs prior to meetings;
- (ii) research funds should be made available to pay for computer time and telecommunication costs for this purpose—the fund should be limited to a maximum of £1,000 with an individual limit of £200; a short report on each usage should be provided;
- (iii) use of the facility for other purposes or that would exceed £200 should be handled under the standard research consideration procedure.

11.2 Exchange and centralisation of existing data

Although previous specifications had agreed that the IWC systems as a whole should facilitate use on other machines, Free reported that this was time consuming and difficult to implement, and largely unnecessary with the advent of IPSS. Noting the already heavy workload of the facility, the Committee recommends that the IWC system as a whole be based on the Cambridge facility although the main components of the system should be in such a form as to allow their use on other systems.

11.2.1 Data base management

The Committee draws the Commission's attention to its discussions on the work of the IWC computing facility, in particular to Item 11.1.1 and Annex J.

The Commission has previously agreed that the computing facility shall encode the BIWS data in an accessible form. This is fundamental to the work of the Committee. Since then a considerable amount of additional work has been placed on the facility, particularly documentation of data banks and validation and documentation of computer programs which the Committee acknowledges is essential to its work. In view of this the Committee strongly recommends that the Commission recruits two extra members of staff as detailed below, to complete the work of encoding the BIWS data within two years. The budget for the first year of this work is given below:

(i) Staff	2 full-time equivalent		£10,000
(ii) Equipment:	multiplexer	£2,000	
	Phoenix ports @ £300	£1,000	
	Line drivers	£500	
	3 terminals	£1,500	£5,000
(iii) Maintenance			£500
(iv) Consumables:	up to 100 magnetic tapes	£1,000	
	other	£500	£1,500
(v) Running costs			£3,300
(vi) Travel (BIWS Norway 2 people for 10 days)			£1,100
			£21,400

Notes:

- (ii) The equipment listed is needed to upgrade the communications to the IWC office to add extra terminals. However, the possession of additional Phoenix ports would substantially reduce the cost of connection for a Scientific Committee meeting. Of the figure of £5,000 stated, only £1,000 is incurred solely for this study. The remainder of the equipment would pay for itself in a short period of about 4–5 years.
- (vi) The item for travel is included in the expectation that BIWS will not release large quantities of archive material unless it is collected in person.

11.3 Policy on availability of data

Three categories of data were recognised by the Committee:

(i) *Data required under the Schedule*

The Committee recommends that the Commission clarifies the position on access to such data that have not yet been published or have only been published in summary form (e.g. catch positions of individual whales are submitted by latitude and longitude but are only published in summary form by the BIWS).

(ii) *Data requested but not required under the Schedule* (e.g. effort data collected since 1979)

Some governments believe that such data are their property and that access to them is subject to their approval, whereas others believe that such data are in the domain of the Commission and should therefore be as accessible to 'accredited persons' (see recommendation below for definition of this term) as category (i) data. The Committee recommends that the position be clarified by the Commission.

(iii) *Data not requested nor required by the Schedule* (e.g. international or national marking and sightings data, detailed biological information)

Although data gathered or submitted under the international schemes are understood to be available to 'accredited persons'; the Committee recommends that this should be confirmed by the Commission.

Data gathered by nationals or under national programmes are considered the property of that nation and access to them is only through the general or specific permission of the government concerned. It was noted that although some governments have issued guidelines on the availability of such data others have not.

There was considerable discussion regarding access to data (and computer programs) essential for assessments and management advice (particularly concerning category (iii) above). The Committee draws the Commission's attention to Annex J, pp. 173-6 and particularly to the section 'Response to the problems' on pp. 174-5 of that Annex. The Committee strongly recommends that the issue of access to data is discussed as a matter of urgency by the Commission and that (i) at least interim guidelines are provided to the Committee and (ii) the question of the definition of 'accredited persons' is resolved, perhaps in the light of the Rules of Procedure of the Scientific Committee, Section A paragraphs 1, 2, 3 and 6. The guidelines are required to determine the nature of the work of the IWC computing facility in the forthcoming year (e.g. whether or not work on restricted data sets received should be carried out). The Committee draws attention to discussion documents, prepared by Free, which detail his proposed programme for 1982/83 and associated problems².

11.4 Schedule Appendix A: review of requirements

The Committee had no additional requirements to add to the check list given as Annex A of IWC/33/9 which had been referred to it by the Infractions sub-committee.

11.5 Review of biological material awaiting treatment

This was discussed in the relevant sub-committees.

² Editor's note: the Commission accepted the report of a Technical Committee sub-group which discussed the question of access to data. This report is given on p. 39 of this volume.

12. IMPACT OF NON-WHALING FACTORS ON EXPLOITED POPULATIONS (See Annex H, Item 8)

12.1 Effects of pollution on whale populations, including small cetaceans

In response to last year's recommendation, the Committee received two papers SC/34/O 9 and SC/34/O 14, and information concerning pollution studies was presented in SC/34/ProgReps Australia, Canada, Denmark, France, Iceland and Spain. Samples from stranded or harvested animals are being collected and analysed in Australia, Canada, France, Iceland and Spain. It seems particularly important that monitoring is not confined to stranded animals in view of the report (IWC/34/11) that PCB levels in seals found dead were significantly higher than those caught in nets or shot. A three-year study examining heavy metals in all trophic levels in Greenland waters will be carried out by the Greenland Fisheries Investigations starting in 1983.

SC/34/O 9 examined levels of pollutants in whales taken off Durban and compared these with the available published data. The levels of DDT and its metabolites in minke, fin and sei whales were similar to those found in Antarctic blue and sei whales in the 1950s and North Pacific gray whales in 1968-69, and were on average much lower than those found in fin or humpback whales in the North Atlantic. A similar pattern was found for PCB, which was not present in detectable levels in the Durban baleen whales. This appears to reflect the contrasting environmental and industrial situations in the different ocean areas. Levels of Dieldrin were relatively low in all areas. The relatively low levels of DDT and its metabolites and the absence of detectable levels of PCB in Durban sperm whales may reflect the fact that the majority of animals sampled there were young males, whereas samples from other areas were presumably from older mature animals.

SC/34/O 14 examined some implications for population modelling of the effects of organochlorine compounds in cetaceans. There is evidence from striped dolphins that PCBs pass rapidly from mother to calf during suckling. This may affect the survival of calves, particularly first born animals. The authors suggested that this may cause a bias in model estimates which calculate juvenile mortality rates from the balance equation or an assumed pregnancy rate. Holt believed that in view of this, pollution studies should concentrate on immature animals.

Klinowska stressed the importance of not simply monitoring levels (for which there should be a standardisation of the type of tissues sampled) but of investigating the effects of these various pollutants. She pointed out that standardisation formed an important part of the Intergovernmental Oceanographic Commission's Recommendation on pollution (IWC/34/28).

The Committee noted information in SC/34/Mi29 on foetal deformities which in the case of Antarctic Area IV minke whales the authors believe may have been influenced by mutagenic factors in feeding and reproductive areas. It also noted that a revised version of a report on pollutant effects for the US Marine Mammal Commission is now available on request from that organisation.

The Committee recommends, as last year:

- (i) that member nations should ensure that appropriate sampling and analysis of effects is carried out, especially in regard to organochlorine compounds and particularly with respect to toothed whales;

- (ii) that relevant studies should be listed in Progress Reports and the results of studies of particular interest should be presented more fully;
- (iii) that the IWC should co-operate with ICES on this matter (and see Item 6.9) and that documents available to the Scientific Committee should be forwarded to ICES.

12.2 Other factors

Last year the Committee agreed that it should discuss the effects of industrial development and environmental degradation (*Rep. int. Whal. Commn* 32: 61). The potential risks to certain protected species posed by industrial development are the subject of discussion and recommendations in Annexes G (pp. 142–51) and H (pp. 152–70). Fortom-Gouin suggested several other factors which may affect cetacean populations including reduction of food supply by fishing, entanglements with fishing gear, oil and mineral exploitation and vessel traffic. Holt stressed that although it was at present difficult to quantify such factors they should not be ignored. He had particularly in mind depletion of the food of whales by fisheries. The Committee agreed that the matter should be discussed more fully next year and recommends that:

- (i) member nations should present relevant information to the next meeting;
- (ii) the Secretary write to FAO seeking information on relevant aspects of changes to fishery stocks which contribute to the diet of cetaceans.

The Committee noted that some information is available in the Report of the IUCN Fisheries/Marine Mammal Workshop but that it is limited in scope.

13. BEHAVIOURAL STUDIES: REPORT OF 1982 MEETING

Tillman reported on the Workshop on the Behaviour of Whales held at Seattle, 19–23 April 1982. A draft report was available (SC/34/Rep 2).

The workshop had concentrated on three problem areas identified as of current major importance to the Commission: minke whales subject to pelagic whaling, sperm whales subject to coastal whaling and western Arctic bowhead whales. The aim was to provide advice on how current assessment methods or management measures for those stocks might be revised to account for cetacean behavioural phenomena. While most behavioural research had concentrated on coastal species, e.g. gray, right, humpback and bowhead whales, analogies with pelagic species were considered useful.

The main conclusions and recommendations of the workshop were:

- (i) *Minke whales*. The major problem is to determine the changes that may have occurred, e.g. in pregnancy rates or age at sexual maturity, as a result of reductions in other Antarctic baleen whale species. Views have been expressed that trends reported in such parameters may have resulted from bias in age readings or errors in examination of biological material. The workshop recommended the establishment of a working group to re-evaluate the proposed density dependent responses of Antarctic baleen whales, to report to the Committee by the 1983 Annual Meeting (see also Items 9.2.1 and 16).
- (ii) *Sperm whales*. Much information has come from

examination of biological material and extrapolation of the results rather than field observations of behaviour. The workshop recommended: (a) that as a priority, field studies of sperm whale social behaviour be carried out, particularly within mixed schools and associated schools of adult males during the breeding season, and (b) that the pregnancy rate model used in current sperm whale estimation models be examined to take account of the possibility of medium-sized males playing a more extensive role in breeding than currently allowed for.

- (iii) *Bowheads*. Recognising the serious lack of data on this species' general biology and biological parameters, the workshop recommended that aerial surveys be undertaken as soon as possible to give information on, for example, gross production (from calf counts), population structure, age and sexual segregation, core feeding areas, size and age at sexual maturity, calving interval.

The Committee noted that other recommendations had been included, in priority order, in the report. It endorses these and the main recommendations outlined above, which are also discussed in the relevant Annexes.

14. HUMANE KILLING

Last year the Committee supported a proposal to send a British veterinarian to examine the Icelandic fishery (*Rep. int. Whal. Commn* 32: 62). It noted that this study had not been carried out.

The Committee had before it reports of three ongoing studies into humane killing, from Norway (SC/34/O 10 and O 11), Japan (SC/34/O 18) and the USSR (SC/34/O 23). It noted that it was only competent to consider the scientific aspects of these essentially technical reports.

SC/34/O 10 described investigations into several alternative techniques:

- (i) Electricity: the author concluded that such methods were too unpredictable to be used in Norwegian whaling operations.
- (ii) Drugs: there are severe legal problems concerning the use of drugs for killing animals for human consumption in Norway, and such techniques therefore cannot be used as alternatives to current killing methods in Norwegian small-type whaling.
- (iii) Grenade harpoons: there are technical and practical problems in the use of these in the Norwegian fishery; safety and efficiency must still be improved before grenade harpoons are introduced in Norwegian small-type whaling.
- (iv) High velocity projectiles: this appeared to be a promising approach and further work will be carried out in 1982. A prototype CO₂ harpoon has also been constructed.

SC/34/O 18 described the progress being made in the use of penthrate harpoons in the Japanese pelagic minke whale fishery. Of the 116 cases of successful detonation inside the whale, 48 whales (over 40%) were killed instantly but the problem of ensuring detonation inside the whale and safety problems with the use of the grenade require further study.

SC/34/O 23 described the results of Soviet experiments into the use of explosive grenade harpoons. The author concluded that the use of explosive grenade harpoons did not reduce the death times from those obtained with 'cold' harpoons. He felt that the experiments with the use of an electric lance would yield the most positive results in reducing death times.

The Committee noted that in all three studies the most important factor appeared to be accuracy of shooting.

Jordan drew attention to the report of the Technical Committee Working Group which met in November 1980 (IWC/33/15) which had concluded that the 'humaneness' of the use of electricity for killing animals was in serious doubt and which did not consider the use of CO₂ harpoons to be promising.

He reported that although the use of drugs (such as M99) posed practical and, in certain countries, legal difficulties, no systematic experiments had been carried out to determine the levels of residues these may leave in the meat.

The Committee concluded that it did not have the required expertise to review these detailed technical documents adequately. It draws the Commission's attention to these documents and recommends that the Commission sets up a working group of experts to examine such work, with expertise similar to that of the 1980 workshop.

15. RULES OF PROCEDURE: SUBMISSION OF WORKING PAPERS AT SHORT SPECIAL MEETINGS

This matter arose out of problems concerning the submission of working papers at a very late stage of the Special Meeting on Western North Pacific Sperm Whale Assessments in Cambridge earlier in the year. It was noted that the current Rules of Procedure concerning working (secondary) papers (Rule E5(c)) were formulated with annual meetings in mind.

The discussion broadened to include more general comments on meeting procedures and means by which the efficiency of the Committee may be improved. It was agreed that a working group would be convened by Tillman in Brighton to produce a discussion document to be considered at the next annual meeting; in particular the provisions of Annex I last year (*Rep. int. Whal. Commn* 32: 127) should be reviewed.

16. FUTURE MEETINGS AND THE NEED FOR SPECIAL STUDIES

16.1 Workshop on the age determination of minke whales (also see Annex E, p. 92)

The Committee recommends that a workshop be held before the next annual meeting (possibly in March–April in Japan) to undertake a comprehensive review of the problem of errors in the age determination of minke whales possibly including: examination of bias with respect to the size of the animal and between readers; the form of any underlying error model; and the effect of any bias on trends in life history. The workshop would be convened by Butterworth and Ohsumi. Funds (about £5,000) would be required. The Committee agreed that this workshop is of higher priority than that outlined in 16.2.

16.2 Workshop on the biology and past and present status of right whales

The Committee recommends that as discussed last year (*Rep. int. Whal. Commn* 32: 63, 110–11) a workshop on right whales should be held to assess the degree to which the Commission's actions in extending protection have resulted in the intended recovery of such species. The right whale was chosen because it is known that data exist and are being, or would be, analysed to provide the

information required. The Committee noted that the meeting might be held in late May/early June at the New England Aquarium Boston, to be convened by Brownell. Funds (about £8,500) would be required.

16.3 Dates of annual meetings

The Committee agreed that it would discuss at the next Annual Meeting, the possibility and implications of changing the dates of the Annual Meeting (e.g. to April or October) so that it did not clash with the (Northern) summer field season.

16.4 Meeting procedures

Taking note of the concerns of the Working Group on Working Languages, and based on the provisions of Annex I of the Scientific Committee's Report last year, and adopted by the Commission, the Committee strongly believes that it should continue to take steps to reduce its work load and increase its effectiveness. This will be done in the coming year by consultation between the Chairman of the Committee and the Chairmen of the sub-committees as early as possible, and if possible before the end of 1982. In particular they will determine stocks for which priority should be given in work leading up to, and to be carried out at the 1982 Annual Meeting. In addition the Committee has agreed that while its meeting should extend for the same period of time as this year and in 1981, and with sub-committees completing their work by the end of the first full week, a full day shall ensue between the receipt of any sub-committee report and its consideration by the full Committee.

17. INITIAL AGENDA FOR 1983 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 Agenda for next year's meeting.

18. PUBLICATIONS

The Committee agreed, in accordance with the procedure adopted last year (*Rep. int. Whal. Commn* 32: 63) that the editorial board should comprise Bannister, Best, Chapman, Donovan, Gambell and Tillman and that it should meet in Brighton.

19. WORKING LANGUAGES

The Committee considered what advice it might give to the Technical Committee Working Group due to meet at Brighton on 12 July. Several members commented on their experiences on other Commissions where from two to four official languages were used.

The Committee noted the considerable financial implications of providing translation and interpretation facilities. It believed that consideration could be given to providing interpretation facilities for discussion sessions only. In such cases, simultaneous translation is essential. It agreed that, if necessary, documents could continue to be provided in one language, as could the main report, although consideration could be given to summaries, or extracts of the main conclusions, being provided in one or more alternative languages.

The Committee further agreed that if it was not possible to provide simultaneous translation, there would need to be an improvement in procedures and documentation, particularly towards the end of the meeting, when non-English speaking participants had great difficulty in keeping up with the discussions.

20. ELECTION OF OFFICERS

On his election as Chairman in 1979, Bannister had informed the Committee that he could only accept the post for a maximum period of three years; he duly offered his resignation at this meeting. The Committee accepted his resignation with regret and thanked him warmly for his exhaustive work as Chairman, during a period when the number of participants at the Scientific Committee had increased from 65 for the meeting at which he was elected to 91 at the present meeting.

Tillman and Best were then elected 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
- Shimadzu; other baleen whales
- Bannister; protected species and aboriginal/subsistence whaling
- Perrin; small cetaceans.

21. ANY OTHER BUSINESS

21.1 Press reports and allied matters

The attention of the Committee was drawn to accounts of its deliberations which had appeared in the press (*The Times* of London, Monday, 12 July 1982, 'Japan refuses to give whale information'); members also expressed concern about reports which had reached them through other channels as to the Committee's activities. The Committee recalled the opinion which it had expressed in *Rep. int. Whal. Commn* (special issue 2): 116-17, of its need to operate in an atmosphere of confidentiality in order to preserve its freedom to discuss the many and complex matters on its agenda.

This atmosphere of confidentiality is necessary to allow for free and open discussion without fear of misrepresentation; the Committee recognises that individual members

are responsible to their own governments or organisations but it reiterates its view that its code of ethics does not condone public statements concerning the details of its deliberations, particularly as they relate to an attitude or statement attributed to particular individuals or groups, or public release of material from the report before it is publicly available.

The Committee feels that it should again draw the Commissioners' attention to its serious view of this matter.

Some scientists expressed their great concern that the particular incident leading to this situation might not have occurred accidentally but rather may have been organized by someone present at the meeting to state their personal views. They also noted that this might cause unnecessary concern to some nations whose members participate in Committee meetings. Such actions reflect on the credibility of the Committee's work.

The Committee stresses that events of this kind should not take place again.

The Committee recognises that this problem is related in part to the question of when the formal report of the Scientific Committee becomes available for public distribution. It requests advice from the Commission concerning this latter problem.

The attention of the Committee was drawn to an 'Annotated Report to Commissioners of the Scientific Committee Meeting of the International Whaling Commission, July 1982, New Hall, Cambridge, prepared by Independent Scientists'. This document had had a limited distribution to certain Commissioners and delegates. The Committee was concerned that some delegations may have believed this document to be officially connected with the Committee. The Committee wishes to point out that the comments in the 'Annotated Report to Commissioners of the Scientific Committee Meeting of the International Whaling Commission' in no way reflect the views of the Committee.

The Committee also noted with concern that the document is anonymous; this is contrary to accepted scientific practice.

21.2 Acknowledgement

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