

Report of the Scientific Committee

1. The Committee met at 9.30 am on 10 June 1976 and following days in the Ministry of Agriculture, Fisheries and Food, London, under the Chairmanship of K. R. Allen.

2. There were present:

K. R. Allen	}	Australia
J. L. Bannister		
S. J. C. De Moura	}	Brazil
S. Monte		
M. C. Mercer	}	Canada
E. D. Mitchell		
F. O. Kapel		Denmark
J. Jónsson		Iceland
Y. Fukuda	}	Japan
S. Ohsumi		
H. Omura		
I. Christensen	}	Norway
Å. Jønsgård		
C. J. Rørvik		
P. B. Best		South Africa
R. G. Borodin	}	USSR
G. A. Borovkov		
M. V. Ivashin		
Y. B. Riazantsev		
S. G. Brown	}	UK
J. W. Horwood		
C. Lockyer		
W. Aron	}	USA
G. A. Bertrand		
R. L. Brownell		
D. G. Chapman		
M. F. Tillman		
L. K. Boerema	}	FAO
S. J. Holt		
R. Gambell		Secretary to the IWC

3. The agenda adopted is shown in Annex A.

4. APPOINTMENT OF RAPORTEURS

Continuing the practice of recent years duties were shared: Aron, Lockyer and Mercer were appointed for the meeting.

5. EXCHANGE AND REVIEW OF DOCUMENTS

Lists of documents, progress and other reports available are appended as Annexes B1, B2 and B3.

6. RULES OF PROCEDURE

With regard to item 21 of the Commission agenda, the Committee agreed that the Secretary should be an *ex*

officio non-voting member of the Scientific Committee.

Much deliberation was given to the status of various meetings held under the auspices of the Scientific Committee. The Secretary was requested to prepare a report on the item for consideration at next year's meeting.

A report policy (Annex C1) was approved as the requirement for all meetings, other than the regular annual session of the Scientific Committee.

The Scientific Committee appointed a Sub-Committee to prepare a report on these matters. The Committee considered and adopted their report, see Annex C2. A further statement concerning operations of the Scientific Committee is attached as Annex C3.

7. FAO/ACMRR WORKING PARTY ON MARINE MAMMALS

SC/28/Rep 5 and SC/28/Rep 6 were submitted to the Committee for comment. Members were asked to communicate comments to Holt on an individual basis.

Holt explained that, under the usual procedure, invitations to attend FAO meetings were extended via the governments of FAO member nations and international organisations concerned. The IWC is invited to designate an observer to the Bergen meeting. The Committee therefore recommends that the Secretary be designated to attend the FAO meeting in Bergen in September 1976.

8. INTERNATIONAL DECADE OF CETACEAN RESEARCH — RESEARCH PROPOSALS

The Scientific Committee reminds the Commission that it has developed Consolidated Research Proposals for the IDCR (Annex E, SC/SP 74/Rep 5). These proposals were categorised in three groups according to priority of need. The first year costs of research (estimated in 1974 dollars) in the highest priority group is US \$2,393,000, with research in the medium and low priority category costing \$708,000 and \$155,000 respectively. The Committee urges the Commission to consider means of funding these proposals, either through a Commission research fund or through direct support by national governments. The successful completion of these research studies is essential to the development of rational management advice.

8.1 Proposals for Research Projects 1976–7

Given a budget of £100,000 (US \$175,000) during the financial year 1976–7, the Committee recommends that the following projects should be undertaken.

1. Completion of Development of Data Base

(See Section 15.1. first para). To complete contract work begun in 1975–6: one man for one year to include travel and computer costs \$30,000

2. Southern Hemisphere, South East Indian Ocean

Marking and sightings cruise, to complement that undertaken in the SW Indian Ocean in 1973-4: 28 days at \$2,500 per day, to include cost of marks (approx \$4,000) . . \$70,000

3. North Pacific

Assistance with preparation and analysis of sperm whale age data, at the Far Seas Fishery Laboratory, Japan: 2 Technicians for 6 months each, to include necessary equipment . . \$30,000

4. North Atlantic

Collection and analysis of minke whale age data from the Norwegian fishery: to be undertaken in Norway and UK (see Annex F of Annex K of this report) \$45,000

It is recommended that overall responsibility for co-ordination of the programme should rest with the Secretary of the Commission, working with local organisers appointed for each project.

9. RESEARCH AND INFORMATION

9.1 Progress reports, including reports relative to special permits

The Committee reviewed Progress Reports submitted by National Groups as listed in Annex B3.

Ohsumi reported on the results of a special permit for the taking of 80 sperm whales off the coast of Japan (reference paper SP/Doc 16 submitted to the sperm whale special meeting, Annex J).

One other special permit had been issued during the year, as shown in Annex D.

9.2. Progress of whale marking

Brown presented SC/28/Rep 10 to the Committee, which contained a summary of whale marking activities during 1975 and 1976.

Regarding funding of the International Whale Marking Programme which is co-ordinated by the Institute of Oceanographic Sciences, Brown suggested that a sum of £2,000 would be required for the 1976-77 season. The Committee therefore recommends that the Commission maintains its contribution towards the cost of the whale marking at £2,000, but points out that any research proposals involving marking in the IDCR programme would require extra funding. The Committee agreed that the international marking scheme should not necessarily be limited to the Southern Hemisphere.

9.3. Report of previous season's catches

Statistical data prepared at the Bureau of International Whaling Statistics under the direction of Mr Vangstein, were presented by Jonsgård.

9.4. Data analyses and reports of national groups

Australia indicated the intent to conduct aerial surveys of humpback and right whales.

Data analyses were considered in the appropriate contexts of agenda items 10-14.

9.5 Sighting programme. Data reports from 1975-6 season and analyses of data

The Committee considered a revision of the form proposed for recording sightings data (format described in SC/27/Rep

6), and asked the Secretary to request data on effort from national groups not now providing these data. The Committee suggested that 2 copies of all such data be available in the archives of the Secretariat, and that they also be distributed to members of the Committee on their request.

Ohsumi stated that the decline in sighting effort was linked with the decrease in whaling operations, sightings being made by scouting vessels. It was noted that sightings of protected species by scouting vessels were often the only means of estimating abundance and distribution.

9.6 Reports of special meetings.

The Committee received reports of the meetings held during the previous year, on sperm whales (Annex J), North Atlantic fin, minke and bottlenose whales (Annex K) and small cetaceans (Annex L). Those recommendations endorsed by the Committee are considered under the relevant items of its agenda.

10. CLASSIFICATION OF WHALE STOCKS

10.1 Recommendations on criteria: Definition of new stock categories

In considering the status and possible management of cetacean stocks, the Committee recognised that insufficient information exists to allow classification of some stocks under the New Management Procedure in relation to MSY. In addition, the Committee recognised that information on some stocks is not likely to become available in the immediate future unless a specific effort is made to provide it.

There are stocks for which insufficient information is available and which evidence indicates are, or have been, severely affected by direct fishing, direct fishing and incidental take, or direct fishing and environmental change. There are others that have been fished for which there are no estimates of initial stock size or its relation to current stock size, and where there is no evidence that the stock is being significantly affected by present catches. The Committee believes that for such stocks new management categories might be created.

The Committee is considering categories for addition to the Schedule, and will bring the matter to the Commission's attention next year. Proposals under consideration are given in Annex E.

10.2 Alternative formulae for determining quotas

At its 27th meeting the Commission asked the Scientific Committee to compare proposals originating with the Committee and from the Commissioner for the United Kingdom to establish catch limits for stocks which are Sustained Management Stocks but below the MSY level. It is the aim of the new management procedure to set catch limits so that such stocks would rebuild towards the MSY level.

The alternative procedures are as follows:

(1) The permitted catch shall not exceed 90 per cent of MSY reduced by 10 per cent for every 1 per cent by which the stock falls short of the MSY level (Scientific Committee).

(2) The permitted catch shall not exceed 90 per cent of the MSY reduced by 5 per cent for every 1 per cent by which the stock *at the beginning of the sustained management period* falls short of the MSY level (UK).

The essential differences are

(a) The catch limit under the UK proposal initially is greater than in the Scientific Committee proposal, the difference depending on the amount that the stock falls short of the MSY level.

(b) The catch limit under the UK proposal would remain constant during the time period that the stock rebuilds towards the MSY level while under the Scientific Committee proposal it would increase annually.

The Committee considered reviews of the two procedures SC/28/Doc 1, SC/28/Doc 7 and SC/28/Doc 8. SC/28/Doc 8 refers particularly to the operational advantages of the UK proposal but notes that from the viewpoint of safety, the Scientific Committee scheme might be slightly favoured except that safety considerations have already been made. SC/28/Doc 1 and SC/28/Doc 7 show that the rate of rebuilding under the UK scheme is faster than under the Scientific Committee proposal though the difference is very small and the recovery time under the UK scheme tends to be independent of the initial level. They also note that the risks resulting from errors of assessment are greater under the UK proposal than under the Scientific Committee proposal.

The Committee also notes that under the UK proposal whenever a Protection Stock apparently rebuilds to a Sustained Management Stock, a relatively large catch would be immediately permitted. However, when a stock has been in the Protection category there is a great deal of uncertainty as to its status and suitable yield. A relatively large catch would carry the risk of over-exploitation again depleting the stock to the Protection category.

10.3 Use of effort limitation for North Atlantic fin whales
Jónsson pointed out that considerable fluctuations in the annual catches of fin whales made regulations by quota based upon an average very difficult to maintain. This had been Iceland's main objection at the last annual meeting of the Commission. He felt that the effort limitations which had been in use in Iceland for many years provided enough safeguard for the stock; available scientific evidence indicates a stable stock of fin whales in this area and 28 years of whaling by Iceland showed the success of limiting the catch by effort.

Utilisation of effort as a means of regulation implies that such effort can be adequately regulated, whereas the experience of the Committee indicates that accurate prediction of changes in efficiency would be difficult. True effort comprises a complex of many factors such as boat size, engine power, experience of crew, additional equipment, such as asdic, as well as changes in operational techniques, which would be difficult to measure and monitor adequately.

The Committee therefore expressed the view that regulation by catch quota was the safest approach to management. As a means of maintaining the average catch at a desirable level, while meeting the problems which arise for the operators from uncontrollable annual fluctuations in the availability of whales, the Committee considered the possibility of a catch limit for a period of six years. Two alternative possibilities were explored, the so-called block quota and the rolling quota. The block quota is a fixed quota of six times the established annual average, for each successive period of six years. Under the rolling quota system the number of whales which could be taken in any period of six years would be fixed, so that the quota in any

one year would be six times the established annual quota, minus the sum of the catches in the preceding five years.

As an example the Committee considered the possible effects of applying these systems to the Icelandic fishery. The total 6-year quota would be set at 1,524 whales (this corresponds to an average of 254 whales per season, which is the mean catch for the 5 year period to 1974). In order to prevent excessive catches in any one year under the block system, it was added that under this system in no year the catch should exceed 304 whales. The results from both systems, if they had been applied since 1952, are shown in Table 1, together with the catches obtained if a fixed annual quota had been set at the average of 254 whales, or at the level of 275 whales adopted by the Commission last year. The years in which the various systems would have reduced the catches are shown by an asterisk. The Table shows that the total losses in catch over the 24 years' period are least under the 6-year quota system. The effect of all quota systems depends on chance and the effect of the 6-year block quota system also depends on the year in which the blocks are started. If one 6-year period had included the period 1962–1967 the loss in that period alone would have been some 100 whales. The Committee concluded that from the aspect of conservation and of long-term loss compared with the annual average of the past period, both types of 6-year quotas would have practically the same effect. The 6-year block quota system might, however, give some problems if it appeared to be desirable to change the quota level during a six year period on the basis of better stock assessments, and it would raise the problem for the exploiting country for which catch level to aim at in the first years in order to compensate for the chance that in the last years of a 6-year period the whale availability would be poor. The rolling quota system essentially allows the country after a year with poor catch to make up for this loss in the following five years.

11. STATUS OF STOCKS RELATIVE TO CRITERIA

11.1 Southern Hemisphere

11.1.1 Baleen whales

FIN WHALES

The Committee considered the stock analysis for Antarctic Area I in SC/28/Doc 6. The best estimate of exploitable population size in Area I for the season 1955–56 is 17,000 and for the season 1976–77 much less than half this figure based on the modified DeLury model. This new estimate of 17,000 for exploitable population size in 1955–56 was accepted as more accurate than that of 12,000 given in IWC Sci. Rep. 1976, p 44, considering that over 12,000 fin whales were taken in pelagic and land station operations in the three year period 1955–56 to 1957–58. SC/28/Doc 38 indicated that, in connection with the above analysis, there remain some questions to be more deliberately considered. It does not seem to suggest any substantial change in above evaluation of the present status of the possible Area I stock, but further study is needed especially in relation to the Area VI stock. Additional evidence of possible depletion of the Area I stock was presented in SC/28/Doc 15 where a significant decline in age at sexual maturity was demonstrated even prior to 1955. The Committee looks forward to receiving analyses of recent and past biological collections made by USSR catching operations in Area I. Updated estimates were prepared using the same model as previously, for the other Southern Hemisphere stocks (SC/28/Doc 37).

Table 1
Fin whales – Iceland. Example of effect of different quota systems

Year	Actual catch	Quota average = 254	Quota as 1976 = 275	6 Year block quota = 1,524	6 Year rolling quota = 1,524
1952	224	224	224	224	224
3	207	207	207	207	207
4	177	177	177	177	177
55	236	236	236	236	236
6	265	254*	265	265	265
7	348	254*	275*	304* 1,413	348
8	289	254*	275*	289	289
9	178	178	178	178	178
60	160	160	160	160	160
1	142	142	142	142	142
2	303	254*	275*	303	303
3	283	254*	275*	283 1,355	283
4	217	217	217	217	217
65	288	254*	275*	288	288
6	310	254*	275*	304*	291*
7	239	239	239	239	142*
8	202	202	202	202	202
9	251	251	251	251 1,501	251
70	272	254*	272	272	272
1	208	208	208	208	208
2	238	238	238	238	238
3	267	254*	267	267	267
4	285	254*	275*	285	285
75	245	245	245	245 1,515	245
Total	5,834	5,464	5,653	5,784	5,718
Total loss in catch under the quota system in 24 years					
		370	181	50	116

* Indicates years in which the catch would have been limited by the quota system.

Table 2
Basic set of southern hemisphere sei whale population estimates (000's)

Area	1961–62 ¹ Exploitable stock ²	1961–62 Mature stock ³	MSY level 60%	1973–74 Exploitable stock ⁴	1973–74 Mature stock ⁵
I	—	16.4 ⁶	9.8	11.2	13.4 ⁷
II	40.0	47.9	28.7	17.0	24.9
III	25.0	30.0	18.0	6.4	11.4
IV	27.0	32.2	19.4	12.9	18.1
V	22.0	26.4	15.8	12.0	16.4
VI	—	22.6 ⁶	13.6	14.2	17.0 ⁷

¹ The 1961–62 stock levels are taken to be initial levels for further calculations

² From IWC/27/4 Annex I except Areas I and VI

³ 119.7% of initial exploitable stock (adding in component 8 to 10 years of age)

⁴ From IWC/27/4 Annex I except Areas I and VI

⁵ Adding in initial component from 8 to 10 years of age (19.7%)

⁶ Back calculated taking into account land station catches where appropriate from mature stock estimate in 1973–74

⁷ From SC/28/Doc 42 revised estimates based on sighting data

SEI WHALES

The Committee had available information in SC/28/Docs 4, 5, 17, 36, 42, 43, 44, 45, 47.

The Scientific Committee received and accepted the report of the Sub-Committee on Southern Sei whales. The Sub-Committee began with the basic set of estimates shown in Table 2.

Estimates of $r-M$ averaged over a period of years in the North Pacific during which time the stock levels were reduced from well above to well below MSY levels are given in IWC/27/Doc 25 as 0.04. On this basis the Sub-Committee agreed that at MSY levels r should be taken to be 0.10 (with $M = 0.06$).

The recruitment rate r was calculated from the formula

$$r = 0.0567 \left(1 - \left[\frac{N}{N_{unexp.}} \right]^{2.39} \right) + 0.06$$

which is the modified logistic corresponding to a net recruitment rate of 0.04 at an MSY level of 60% of unexploited level, with constant natural mortality rate of 0.06. Further, the updating made use of the standard formula

$$N_{t+1} = (N_t - C_t) e^{-M} + R_t$$

$$R_t = r_{t-8} N_{t-8}$$

Table 3
Updated calculations of southern hemisphere sei whale population sizes (000's)

Season	Parent stock size	r	Stock size beginning of season	Recruitment	Mortality	Catch
<i>Area I</i>						
1973-74	14.3	0.07	13.4	1.0	0.8	1.1
1974-75	14.4	0.07	12.5	1.0	0.8	1.0
1975-76	14.5	0.07	11.7	1.0	0.7	0.2
1976-77			11.3			
<i>Area II</i>						
1973-74	26.0	0.103	24.90	2.69	1.44	0.01
1974-75	15.4	0.113	26.14	1.74	1.52	0.00
1975-76	16.0	0.113	26.36	1.80	1.48	0.53
1976-77			26.15			
<i>Area III</i>						
1973-74	20.9	0.09	11.1	1.9	0.6	0.6
1974-75	17.7	0.10	12.1	1.8	0.7	0.4
1975-76	11.2	0.11	12.1	1.2	0.7	0.1
1976-77			13.2			
(Catches include those at South Africa and in South Atlantic)						
<i>Area IV</i>						
1973-74	29.3	0.071	18.0	2.09	0.96	1.65
1974-75	29.2	0.072	17.8	2.10	0.96	1.01
1975-76	26.7	0.080	17.1	2.15	1.01	0.47
1976-77			18.8			
<i>Area V</i>						
1973-74	21.0	0.084	16.4	1.76	0.92	0.52
1974-75	20.4	0.085	16.2	1.76	0.95	0.51
1975-76	20.1	0.087	17.2	1.75	0.95	0.39
1976-77			17.1			
<i>Area VI</i>						
1973-74	20.5	0.07	17.0	1.4	1.0	0.8
1974-75	20.1	0.07	16.1	1.4	1.0	1.2
1975-76	19.5	0.07	15.1	1.4	1.0	0.2
1976-77			16.1			

where N_t = mature stock in year t

C_t = catch in year t

R_t = recruitment in year t

r_{t-8} = recruitment rate in year t-8

calculated by the formula above according to the mature stock level in year t-8.

The calculations for this updating are shown in Table 3 by Area.

The final stock sizes, percentages of MSY level and resultant classifications and catch limits are shown in Table 4. Catch limits are calculated on the basis of r-M at MSY level equal to 0.04.

Table 4

Final estimates of southern hemisphere sei whale stock sizes (000's), and resultant classifications and catch limits.

Area	Mature stock size 1976-77	Per cent of MSY level	Classification	Catch limit
I	11.8	116	SM	353
II	26.15	91	SM	103
III	13.2	72	PS	0
IV	18.38	95	SM	348
V	17.41	110	SM	569
VI	16.0	118	SM	490
Total				1,863

The question of which r-M value to apply at 60% stock level to calculate MSY needs further examination. Reasons have been given (IWC/28/Doc 43) for considering the value of 0.04 used hitherto, and in the present calculations, may be too high.

There were in most areas substantial catches prior to 1960-61 and, further, the great preponderance of females in catches by land stations and until 1964-65 by pelagic operations has not been taken into account. Consideration of either or both of these factors could lead to classification of Area II and Area IV as Protection Stocks. Further, these factors, considered together with a lower value of r at MSY stock level, would lead to a revision downward in the proposed quotas for Sustained Management Stocks. Further study of all these problems is needed.

The Japanese scientists could not agree to the above results of calculation on classifications and catch limits. They were, towards the last day of the Scientific Committee, re-drafted over and over again, successively from 2,135 to 1,622 and then to 1,864 in total of catch limits, based on slightly different hypotheses. Unfortunately the Japanese scientists were unable to have sufficient time to study in what respect and on what basis they had been improved or not, although, indeed, the underlying theoretical model might have been sophisticatedly refined by some members. It was an incredible surprise to the Japanese scientists that each slight modification of the model and/or the parameters involved had changed the overall picture of

the recommendations, especially of the catch limits by Area. This feeling is shared by Soviet members of the Committee who are concerned about this method of approach. The Japanese scientists could not find any acceptable reason to hasten to incorporate such a sophistication into formulation of the recommendations at this opportunity.

Under these circumstances, the Japanese scientists insisted on following the the same procedures consistently as the Scientific Committee did last year at the first application of the new management scheme, even if there might be some points of issue involved, because the Scientific Committee can annually review them and monitor their possible effects. Starting with Table 2, the procedures lead to the recommendations on classifications and catch limits, shown in Table 5.

Table 5

Japanese estimates of southern hemisphere sei whale stock sizes (000's), and resultant classification and catch limits.

Area	Mature stock size 1976-77	Per cent of MSY level	Classification	Catch limit
I	11.4	106	SM	353
II	28.2	98	SM	826
III	12.3	68	PS	0
IV	17.7	91	SM	70
V	17.2	109	SM	569
VI	15.0	112	SM	490
			Total	2,308

However, most members of the Scientific Committee do not consider that the Japanese assumption is valid because they no longer believe that it is appropriate to apply the assumption of constant recruitment at a time when the parent stock has been substantially reduced from the original level.

Dr Holt, representative of FAO on behalf of the FAO/UNEP Marine Mammal project, having participated in the calculations and discussion of the sei and minke stocks of the Southern Hemisphere, based in part on documents he had submitted to the Scientific Committee, wished to place on record the following personal view, to which Dr Curry-Lindahl, representative of UNEP, also subscribed:

"The Scientific Committee, in contrast with its practice in recent years, has not erred, if anything, in the direction of caution when in doubt as to the correct values of vital rates or the appropriateness of models used. In particular, calculations of the sizes of current (1976-77) stocks of sei whales relative to the estimates for 1960-61 imply continuing annual numbers of recruits at levels at least equal to the levels in the unexploited stocks, despite the decline in stocks. No evidence has been presented that such a phenomenon has occurred in sei or minke whales, nor convincing theoretical arguments as to why it should be expected. In addition, it has been demonstrated that in all Areas except I, (especially in Areas II, III, IV and V), substantial catches were taken in the seasons prior to 1960-61, and that catches by land stations and pelagic catches up to and including 1964-65 were predominantly females, have significant effects on the assessments. In Area II before 1960-61 the land station catches alone exceeded or approached the MSY level, as given by the Scientific

Committee, every year for a decade. This must mean that the stock was, in 1960-61, already substantially below the initial level. These factors have not been taken into account in the Report of the Scientific Committee.

Assessments in which the above phenomena are included indicate that in *all* Areas the ratios of present to initial stock are lower than those adopted by the Committee; several adjustments are necessary and they are cumulative, and would imply reclassification of two sei whale stocks, and possibly a third, from "sustained" to "protection" category. Furthermore, there is no concrete evidence that the net recruitment rate ($r-M$) of sei whales is, or could be, as high as 4% of the MSY level of 60% of initial stock. Indeed, documents available to the Committee indicated that the true value is lower than 4% though not by how much, and circumstantial evidence for other stocks of sei whales and of related species points in the same direction. Choice of the 4% value implies, for the value of M used by the Committee, that as a stock is reduced from its unexploited level to 60% of that level the annual number of recruits is not only maintained throughout, but actually increases.

This is not supported by the presentation of biological evidence — e.g. for changes in mortality rate, age at maturity or pregnancy rate—of sufficient magnitude and such a phenomenon seems to us highly unlikely. This unreasonable implication can be corrected by using a value of ($r-M$) no more than half of the 4% level; the quotas for sustained management stocks would be halved accordingly. Similar considerations apply to the calculations made for initial management stocks of minke whales, but do not yet imply different classifications of them than those proposed by the Scientific Committee.

These observations amplify and we hope, clarify the statement made in the cautionary paragraphs [the two paragraphs following Table 4] in the Scientific Committee's Report."

BRYDE'S WHALES

The Scientific Committee noted the lack of satisfactory estimates of stock size for the species in the Southern Hemisphere. It thus repeats its recommendation that sighting and marking of this species be undertaken by pelagic expeditions during transits to and from the Antarctic whaling grounds, and that population studies be carried out.

MINKE WHALES

A sub-committee considered information available in SC/28/Docs 4, 17 and 19 and prepared estimates of initial, MSY, and current stock sizes for each Southern Hemisphere Area (SC/28/Rep 12). These estimates were based upon estimates of abundance for Area IV which were derived in SC/28/Doc 19 by applying the modified DeLury method to CPUE data adjusted for wind strength and period of operation. Estimates in other Southern Hemisphere Areas were determined by applying indices of abundance from CPUE data obtained from each Area in 1975-76, to the 1975-76 Area IV estimate and then extrapolation forward to the start of 1976-77 and backward to the initial year of exploitation. These estimates account for land station catches in Area II by Brazil and in Area III by Natal.

SC/28/Doc 35 raised the issue of utilizing assessment models which incorporated an optimistic assumption about

recruitment (constant and proportional to initial stock size) and which ignored the possible selectivity of whaling and the geographic segregation of sexes. The Committee noted that adoption of the assumptions proposed by SC/28/Doc 35 would lead to slightly larger estimates of initial stock size with estimates of current size being unchanged. No change in classification would result.

The Committee took note of the concerns expressed in SC/28/Doc 35 and in particular concurred with the sub-committee's recommendation that future stock assessments should undertake a detailed analysis of the possible effects of the geographic segregation of sexes.

Although new evidence concerning identification of Southern Hemisphere stocks was provided by Brownell, the Committee emphasised that additional information is urgently required and that, in this regard, a marking study involving the breeding grounds off Brazil, would be useful.

11.1.2. *Sperm whales*

The Committee considered the report of the special meeting convened at La Jolla (Annex J) as well as SC/28/Docs 2, 4 and 9. Assessments were made assuming that the 1946 stock was in the unexploited state, although noting that there may have remained residual effects of 19th century whaling.

At the La Jolla meeting the Committee made new estimates of present and initial population sizes and it also reconsidered the population parameters and particularly the changes in the population parameters to be expected in response to exploitation. The new population estimates are slightly lower for 1975 than they were estimated at Parkville for 1972. The population parameters adopted at Parkville and now adopted at La Jolla for the Southern Hemisphere are shown in Table 6.

The parameters adopted are conservative in that they lead to relatively high female population levels to give MSY and to significantly lower estimates of sustainable yield. The calculations to classify stocks and estimate catch limits were made on the alternative basis of yield in total weight of catch and of yield in combined numbers of males and females. At the Parkville meeting the Committee calculated the surpluses estimated to exist in the several stocks and proposed catch limits to reduce these surpluses.

Separate calculation for this purpose is no longer required under the new management procedure where a catch limit of 0.9 MSY provides for reduction of the surplus.

The Committee also noted that, on the basis of the standard parameters, in a stable population at MSY level, the ratio of total socially mature males to mature females is 2 to 15 rather than 7 to 15 in an unexploited population. It should be pointed out that the model assumes that all sexes and age groups are equally available to the fishery, whereas the seasonal segregation of larger males and limited distribution of females means that the age and sex groups available to the fishery depend on the type and location of operations. The Committee also recognised that the model, on which these values are based, does not take into account any operational difficulties involved in the transitional period to the MSY level.

The Committee notes that adoption of the new recommended catch limits will result in a greatly reduced catch of females, so that if management is by number, the mean catch will be 128 for those divisions in which exploitation is permitted. This will result in a serious reduction in the availability of potential information on certain biological parameters needed to confirm the validity of the model. This situation would be aggravated if management objectives were taken to be maximum yield by weight rather than by number. One way by which this difficulty might be overcome is through the issuing of special scientific permits.

The Soviet scientists made the following comments:

"Soviet members agree with the estimates of the initial male stock of sperm whales in the Southern Ocean obtained at the La Jolla meeting (March 1976). However, estimates obtained through models using some insufficiently accurate parameters were presented to the Scientific Committee. Such parameters can result in unobjective assessments. The weight conception of MSY has not been tested by the Scientific Committee either. Its application at the present stage appears to be premature until this problem has been studied more fully. Soviet members believe that the level of MSY for females by weight has not been sufficiently studied and apparently must be lower than 97% of the initial stock.

During the last year the Scientific Committee has not received any significant information on the social structure and behaviour of sperm whales. On the other hand,

Table 6
Population Parameters – Sperm Whales – Southern Hemisphere.

	Parkville (1972)		Present (1976)	
	Unexploited	Exploited (25% of initial mature female stock level)	Unexploited	Exploited (25% of initial mature female stock level)
Natural mortality rate – mature	0.05	0.04	0.05	0.05
Natural mortality rate – immature	0.06	0.05	0.133	0.133
	Average first ten years		Average first 2 years 0.05 thereafter	
Pregnancy rate	0.19	0.30	0.19	0.25
Maturity age – male social	25	22	25	25
female	10	8	10	8.5
Harem reserve	0	0	0.3	0.3
Harem size	10–15	10–15	10	10
Age at recruitment – male	15	15	20	20
female			(15 in Division 9) 13	(15 in Division 9) 13

the estimates of catch limits have been sharply, or by many times, reduced using abstract pre-requisites. It seems improbable that out of the current stock of mature females of sperm whales assessed by the Committee as being nearly 300,000 only 78 animals can be exempted(!)

The Scientific Committee has to make a more profound study of the new conceptions of determining MSY by weight and by number, as well as of the parameters included in the model and their effect when it has more reliable additional data."

Use of the parameters adopted above gives MSY population levels, relative to unexploited level of:

	Divisions 1-8	Division 9
Objective: Yield by Weight	Males 0.39 Females 0.97	0.46 0.97
Objective: Yield by Number	Males 0.32 Females 0.79	0.38 0.75

These calculations lead to the following 1976-77 combined catch limits and maximum sustainable yields for the entire Southern Hemisphere.

	1976-77 Catch Limits		MSY	
	No.	Wt. (1,000 tons)	No.	Wt. (1,000 tons)
Yield by Wt.	3,111	59.1	6,753	163.5
Yield by No.	4,791	86.9	7,138	158.0

The detailed results for each of the Southern Hemisphere Divisions are shown in Annex F.

11.2 North Pacific

11.2.1 Baleen whales

FIN WHALES

No new data were available regarding the status of the stock.

SEI WHALES

The only new data available to the Committee were in SC/28/Doc 29, which indicated that the index of abundance of sei whales as measured by sightings was at about the same level as in the previous four seasons and considerably lower than in the seasons 1965 to 1970. Catch per unit effort also declined in 1975 to its lowest level since at least 1966, but quota restrictions may have affected effort for this stock.

BRYDE'S WHALES

The Committee considered a report (SC/28/Rep 9) reviewing information on initial stock size. The conclusions given were an initial stock size of 20,000, and a current stock size for the area of exploitation of 16,230 which is 81% of the initial level. The Committee accepted this determination. The Committee noted that this stock may extend south of the equator during the northern winter (SC/28/Prog Rep 6).

MINKE WHALES

No new assessment information was available to the Committee on the central and eastern stocks. The Committee considered SC/28/Doc 20 concerning the stocks exploited by Japanese coastal fisheries. It noted that two stocks may be involved, one on the Pacific coast and in the Okhotsk

Sea and the other in the Japan Sea and along the coasts of Korea. The latter is also exploited by Korea.

The Committee requests that information bearing on stock relationships and landings statistics separated by putative stock be made available for evaluation at next year's meeting. It also requests that information on size of whales taken be made available through NP forms.

11.2.2. Sperm whales

The Committee reviewed estimates of exploitable stock sizes given in SC/28/Docs 21, 25 and 34. Due to the different stock subdivisions assumed, the estimates from SC/28/Docs 21 and 25 were not entirely comparable. SC/28/Doc 34 treated the North Pacific as a single stock unit and adjusted estimates (derived from SC/28/Docs 21, 25, IWC/22/Annex K and IWC/24/Annex L) for the recently observed change in median age at recruitment of males. This change, from 19 to 13 years was attributable to the reduction in minimum size limit in 1972, and exploitable males were estimated to be 118,000 in that year. Total females were noted to be 178,000.

The Committee noted that the model developed at La Jolla had not yet been applied to the North Pacific population and also that recommendations by stocks would be preferable to treating the population as a whole. It urged that both of these concerns be taken into account when future assessments are undertaken.

The Committee noted the intent of Japanese scientists to report further data on age structure at the next annual meeting.

11.3 North Atlantic

Fin whales

The Committee considered the reports of the North Atlantic Working Group (Annex K) which recognized the seven stocks as follows:

1. Nova Scotia
2. Newfoundland - Labrador
3. West Greenland
4. East Greenland - Iceland
5. North Norway
6. West Norway - Faroe Islands
7. British Isles - Spain and Portugal

NORTH NORWAY

Available catch/effort data for the period 1948-71 did not produce a significant slope in the DeLury model. This precluded calculation of 1948 stock size and a definitive conclusion on the degree of recovery from the period of earlier extensive over-exploitation. Annual catches 1948-71 ranged from 21 to 138 (mean 61), below the calculated MSY.

EAST GREENLAND - ICELAND

No new data on this stock have become available to the Committee, and there is still little clear evidence on current stock levels. The Committee recognised, however, that the population appears to be relatively stable at the current level of fishing. The mean catch has been 254 whales per season, both for the 5 year period to 1974 and for the 20 year period to 1974.

WEST GREENLAND

No estimates of past or present stock sizes were available.

Landings 1948–58 were 224 (average 20) and a total of only 10–15 was taken 1958–75.

The Committee noted the availability of good whaling log records for the recent fishery and recommends that sightings data from these logs be summarised and analysed.

NEWFOUNDLAND AND NOVA SCOTIA

As no new data were available on either of these stocks the assessments made last year (IWC Sci. Rep. 1976, p. 47) were updated to reflect net recruitment in the absence of exploitation (SC/28/Doc 37).

WEST NORWAY AND FAROE ISLANDS

The Committee considered SC/28/Rep 2 which indicated a 1946 population size of 2700–3007 reduced to 1050–1550 in 1963. Removals were 84 whales in the period 1963–69. The stock may have been reduced to half the initial stock size prior to 1946.

SPAIN, PORTUGAL AND BRITISH ISLES

The Committee considered SC/28/Rep 2 which estimated 1921 population size at 10,567 already reduced by extensive prior removals (3,209 in 1906–14). Lack of trend in catch/effort data in the period 1950 to present precludes assessment of current stock size and lack of accurate data on species composition of the catch precludes detailed determination of the level of recent removals. Removals in 1950–73 appear to have been in the order of 19–152.

Sei and Bryde's whales

SEI WHALES

The Committee considered catch statistics for the Icelandic fishery which is the only significant sei whale fishery in the North Atlantic. It was noted that the catches in the last 5 years were much greater than those of the preceding 15 years, which could indicate an increase in effort in the recent period. Rørvik expressed the view that availability of sei whales was very variable from season to season, and could be affected by environmental conditions. Ohsumi said that more research on the component of the stock outside the range of the coastal operation was needed to supplement estimations of abundance derived only from coastal operations. The only available evidence on population size of North Atlantic stocks was an initial estimate of 870 to 2,248 for the Nova Scotian area where removals were 825 between 1966 and 1972 (IWC Sci. Rep. 1976, p. 79).

BRYDE'S WHALES

No catch data or biological data were reported.

Minke whales

The separation of the minke whale population into four stock units, as described in Annex K, was adopted by the Committee. These are defined by the areas:

1. The Canadian east coast.
2. The West Greenland area.
3. The East Greenland – Iceland – Jan Mayen area.
4. The region from Svalbard, the Barents Sea, along the Norwegian coast, including the Skagerak, the North Sea and other areas around the British Isles.

1. CANADIAN EAST COAST

The only data available to the Committee were biological studies already published (*J. Fish. Res. Bd Can.*, 20:

1489–504 and 32: 985–94) which do not provide conclusive evidence on the situation of the stock formerly fished at Trinity Bay, Newfoundland. The average annual catch over the recent period of exploitation (ending in 1972) was 48 whales.

2. WEST GREENLAND AREA

Recorded landings by the Greenlanders averaged 227 per annum for the 10 years 1966–75 (Annex K Table 3) and Kapel estimated that there were non-recorded landings of about 10 per cent since the beginning of the expanded Greenlandic fishery in 1965. An average catch of 179 per annum was taken in Davis Strait by the Norwegian pelagic fleet in the short period between 1969 and 1975 inclusive.

Kapel pointed out that a drop in the Greenlandic catch in the last few years might reflect the expansion of the exploitation of the West Greenland stock since 1969.

3. EAST GREENLAND – ICELAND – JAN MAYEN AREA

The Committee considered Annex K which provides catch figures and a preliminary analysis of effort data. Recorded landings averaged 298 whales/yr 1961–75 and indications are that unrecorded catches in the early part of the period were in the order of 30/yr at Iceland. While available data do not show any decline in the population the Committee indicated the need to collect sightings data and biological data on the catch.

4. SVALBARD – NORWAY – BRITISH ISLES

There was much discussion on the accuracy of CPUE in the light of papers SC/28/Doc 3 and Annex K. With regard to the Norwegian stock Rørvik expressed the opinion that, despite the various factors complicating the calculation of effort, these factors remained fairly constant over the period of analysis for the months of May and June in which the majority of minke whales are caught (Annex K). However, it was agreed that further study of the monthly distribution of the catch by area would be beneficial.

The current exploitable population size is given as 20,000–40,000 in Annex K; many members have reservations on the accuracy of the estimate because of its dependence on questionable effort analyses; and Mitchell has reservations regarding the assumed stability because of the absence of corrections for effort on the other species (SC/28/Doc 30) in the multi-species fishery.

11.3 Sperm whales

The only population estimate available was that considered previously by the Committee (IWC 23) indicating a present stock size of 22,000 of both sexes and all ages. There remains uncertainty as to the relation of this estimate to initial population levels in view of the intensive 19th century fishery. There is no available evidence to indicate the presence of separate stocks.

The species is presently exploited off Spain, Madeira, Azores and Iceland (and recently by Canada to 1972 and Norway to 1971) the total annual catch averaging 685 (1969–73 inclusive). The Committee was informed that Portugal intends to initiate analyses of data from the Azores fishery. It notes the importance of such analyses and looks forward to receiving reports from Portugal.

11.4 Arctic

The Committee considered information on bowhead whales under agenda item 11.5.1.

11.5. Currently protected species

11.5.1. Bowhead whales

The Committee had available reports on studies of bowhead whales in Alaska in 1975 (SC/28/Doc 16) and 1976 (SC/28/Prog Rep 11). They included new information on the numbers of whales killed, killed but lost, and struck but lost. There was evidence for an increased effort. The initial size of the stock and its present condition are still unknown. The Committee most strongly urges that this situation be rectified and recommends:

- (1) a thorough examination of early whaling history including inspection of log books to provide information on past population levels;
- (2) marking studies to help assess mortality rates of struck but lost whales;
- (3) assessment of current population status;
- (4) collection and compilation of better information on sex, length, maturity and age of captured whales.

The Committee strongly recommends that necessary steps be taken to limit the expansion of the fishery and to reduce the loss rate of struck whales (without increasing total take). Effort may also be increasing in the Canadian Arctic with one bowhead recently taken and two other captures attempted (SC/28/Prog Rep 3)

Right whales

NORTH PACIFIC

The Committee reviewed sightings data given in SC/28/Doc 29 in which no trends were evident. Ohsumi mentioned that the research area for sightings was shrinking as a direct result of the shrinking of the area of commercial operations, scouting vessels being used for sightings.

NORTH ATLANTIC

No sightings data were available. The Committee requests that a compilation of data on sightings off Cape Cod be analysed in the hope of developing population estimates.

SOUTHERN HEMISPHERE

Papers SC/28/Doc 4 and SC/28/Doc 17 were available to the Committee. There is evidence that the stock off South Africa is increasing. SC/28/Doc 4 gave a population estimate of 4,765 animals in Antarctic Areas II to VI, based on an extrapolation of sightings data for the South African coast by incorporating Japanese sightings data. Best expressed the view that, for sightings data used in abundance estimates, it was important to seek out areas of high density such as the breeding areas.

SC/28/Doc 17 gave data on sightings, and an estimate based on average sighting abundance of whales south of 30°S in summer was 3,806 animals.

It was indicated that Brazilian legislation prohibits the capture of right whales and that there is therefore no intention to initiate exploitation in the near future. One stranded right whale was killed by coastal fishermen in 1972 and there are some records of captures in the earlier statistics. The Committee requests that the Commission seek further information from Brazil regarding these reports.

11.5.2. Blue whales

NORTH PACIFIC

Some evidence of recovery of the population up to the early 1970s was given in SC/28/Doc 29 which reviewed

Japanese sightings from scouting vessels. However, there was no current information available for the main summer areas of distribution because of a shift in the scouting grounds.

NORTH ATLANTIC

Recent strandings on the west coast of Newfoundland were noted (SC/28/Prog Rep 3) and Mitchell indicated that such mortality related to ice-entrapment may be substantial in relation to the local population size. Sightings records are being maintained in Iceland. It is hoped to check the incidence of multiple sightings of individual animals by marking with a visible streamer mark.

SOUTHERN HEMISPHERE

SC/28/Doc 4 and SC/28/Doc 17 provided information on sightings. The apparent density of blue whales off Natal was lower in 1975 than in most previous years, but no trend in abundance was evident; no data on sightings had been received from spotter aircraft, in contrast with previous years.

Ohsumi explained that sightings data for Area V Series D given in Tables 5 and 19 of SC/28/Doc 17 included both blue and pygmy blue whales. The Committee noted that the distribution of the pygmy blue whale would make stock management relatively simple by restriction on location of operation, in the event of a future fishery. However, the Committee felt that it was not in a position to reassess the status of a possible sub-species for the purpose of calculating population sizes, and that pygmy blue whales should continue to be included in blue whale stock assessments.

11.5.3. Humpback whales

NORTH PACIFIC

The Committee considered SC/28/Prog Rep 11. Censuses indicated a minimum of 61 animals summering in the inside waters of Southeastern Alaska and 373 animals wintering around the main Hawaiian Islands; none were seen in the Leeward Hawaiian Islands. Colour phase frequencies were interpreted in the report to indicate that animals in the two areas above belong to different stocks.

SC/28/Doc 29 indicated no trends in abundance based upon sightings by Japanese scouting vessels.

NORTH ATLANTIC

SC/28/Prog Rep 7 reports sightings in the Barents Sea and off East Greenland; no trends in abundance are evident.

Sightings records are being maintained in Iceland. It is hoped to check the incidence of multiple sightings of individual animals marked with a visible streamer mark. The take of humpback whales in Greenland has been higher during the last three years than previously. Kapel indicated that this may be evidence of increasing availability of this species in the coastal waters of Davis Strait.

Mitchell reported that mortality from entanglement in nets around Newfoundland, strandings on the US East Coast, possibly due to damage by ships and other fishing activities, and the continued small take in the Caribbean, taken together with increasing kills in West Greenland, might represent removals in the order of the sustainable yield from the NW Atlantic population.

SOUTHERN HEMISPHERE

SC/28/Doc 17 gives sightings data, and an estimate of average abundance of 4,170 animals in the area south of

30°S. No trend in abundance is shown. There were fewer sightings reported off Natal in 1975 than in previous years (SC/28/Doc 4). The reasons for this were not clear.

11.5.4. Gray whales

The Committee noted that current estimates of the MSY of the Californian stock are about 250 animals. The aboriginal catch taken by the USSR has a domestic quota of 200 animals, and the catch has reached 194 animals in the past. A few animals (up to 5) are also taken annually by St Lawrence Island eskimos. This means that almost 80% of the MSY may be taken by aboriginal fisheries in a given year. The Committee therefore recommends that no commercial whaling should be permitted on this stock and that the species should remain in the protected category.

Because of the problems outlined in SC/28/Doc 33, the Scientific Committee recommends that the Commission request IWC North Pacific countries to continue current research (shore counts from Monterey) and to expand research efforts to investigate the following:

- (1) possible changes of the migratory route off Southern California;
- (2) the mortality of calves in the lagoons;
- (3) changes in distribution of whales related to human activities;
- (4) application of whale marking (using the Discovery mark), external tagging, and radio tagging with a view to the possibility of the marked whales being recovered in the Soviet fishery on behalf of the Siberian aborigines.

The Scientific Committee recommends that the Commission request that the US and Mexican Governments establish regulations to reduce harassment of whales in all the breeding areas. The Committee notes with concern the possible effects on the gray whale of petroleum development on the continental shelves of the United States including the Gulf of Alaska and the Bering Sea.

The Scientific Committee recommends that the Commission request the US to analyse the loss rate from the shore whaling stations which operated on the coast of California and Baja California between 1854 and 1886. These data will be invaluable in refining estimates of the initial population size. The Committee recommends that the United States provide a summary of progress in this regard at the next meeting of the Scientific Committee.

12. CATCH LIMITS AND OTHER REGULATORY MEASURES (COMMISSION AGENDA – ITEM 9)

The classification of the stocks and the recommended catch limits are summarized in Annex G.

12.1 Southern Hemisphere baleen whales

12.1.1. Fin whales

All evidence examined by the Committee indicates that the stock in Area I is depleted and requires re-classification as a Protection Stock. Areas II, III, IV, V and VI remain in the classification Protection Stock.

12.1.2 Sei and Bryde's whales

SEI WHALES (see 11.1.1)

BRYDE'S WHALES

The Scientific Committee recommends classification of Bryde's whales in the Southern Ocean as an Initial Management Stock. In view of the absence of new data the

Committee repeats the view expressed in its 1975 report (IWC/27/4) that additional exploitation of this species in the whole Southern Hemisphere should not be undertaken until satisfactory estimates of stock sizes have been obtained, and therefore the northern limit for pelagic operations on this species in the Southern Ocean should not be extended for the present. In accordance with this principle, catches from the land stations should not be increased.

12.1.3. Minke whales

The Committee noted the report of the sub-committee on Southern Hemisphere minke whales (SC/28/Rep 12) which recommended that all Areas should continue to be classified as Initial Management Stocks (assuming MSY stock level equal to 60% initial stock level). It concurred with this recommendation for Areas I, II, III, V and VI. For these Southern Hemisphere Areas, the Committee adopted the rule that 5% of initial stock size would provide safe catch limits, giving the following results:

I	965	V	1385
II	1855	VI	365
III	2730		

As a result of the changed estimates of minke whale stocks, the Area IV stock is recommended to be reclassified as an Initial Management Stock. According to the guidelines adopted by the Committee at its 1975 meeting the catch limits of Area IV should not exceed 5% of the initial stock size or 1,830. However, it was pointed out by some Committee members that the Area IV stock is very close to the Sustained Management classification and, in view of the uncertainties, they would prefer the Commission to be conservative and recommend a catch limit according to the guidelines for a Sustained Management Stock. In this case the catch limit would be 90% of 7% of the MSY level (22,000) or 1,386. This is based on the assumption that for minke whales the proportion of the yield available at MSY level is the same as used in 1975 on the same ratio between recruitment rate and natural mortality rate as in fin whales. This assumption will require further consideration in the future.

The Committee agreed that similar steps might have to be taken for each of the Areas as they were estimated to approach MSY level, which in the case of some Areas might occur within five years.

The Committee noted that as the minke whales in Area IV are very close to the Sustained Management level, grouping this catch Area with others by the Technical Committee could result in bringing the stock down very rapidly. Many members of the Committee recommend that the Commission should exercise caution in setting any allowance for catch by Area. Some members felt that no allowance should be allowed for the minke whale in Area IV and some members felt the matter of allowances was strictly a matter to be considered by the Technical Committee.

12.2 Southern Hemisphere sperm whales

The Committee draws the Commission's attention to the fact that the grouping of Divisions resulted in catches above the recommended quotas in several Divisions (Annex H). The Committee recommends that future quotas be set by nine Divisions in accordance with the Scientific Committee's recommendations. The quotas calculated,

both on the basis of maximising yield in weight and maximising yield in numbers, are given in the table shown under agenda item 11.1.2.

In response to a request from the Commission the Committee subsequently examined the effects of a method of calculating quotas for Initial Management Stocks of male sperm whales proposed by the Japanese delegation. Under this proposal the catch limit would be the MSY plus 10% of the amount by which the existing stock exceeds the MSY level. On the basis of calculations made by Allen (SC/28/Doc 48) the Committee advises the Commission that the effect would depend on the level of the mature female as well as of the exploitable male stock. If the same model and the same parameter values are used as were employed in calculating the recommendations above, the results are as follows.

If the female stock were kept steady at the unexploited level, the male stock would take about 31 years to decline from unexploited level to the Sustained Management category. During this time the catch limit would decline from 566 to about 290 per 10,000 mature females. For the same female stock under the present schedule, the male stock would ultimately stabilise at about 70% above MSY level, and the catch limit would be constant at 140 per 10,000 mature females.

On the other hand if the female stock were kept steady at the MSY level the time to Sustained Management level for the males under the Japanese proposal would be 16 years with a catch limit again declining from 566 to about 200 per 10,000 mature females in the unexploited stock. In this case, under the present scheme the male population would stabilise very close to the top of the Sustained Management category, and the quota would of course be steady at 140.

On the basis that current estimates of population size in the various Division are assumed to be correct the time to reduce the male stock to the Sustained Management category if the female stock were kept at its present level would be

Division	1	2	4	6	8
Years	8	14	5	7	30

The very short period for Division 4 is the result of the female stock in this Division being already below MSY level.

12.3 North Pacific

12.3.1. *Fin whales*

The classification of this stock remains Protection Stock.

12.3.2. *Sei and Bryde's whales*

Sei whales

The classification of this stock remains Protection Stock.

Bryde's whales

The North Pacific Bryde's whale is still an Initial Management Stock. A safe harvest limit would still be 5% of the initial stock estimate, i.e. 1,000 whales.

12.3.3. *Minke whales*

The Committee noted the need for consideration of data on stock relationships and detailed landings statistics before

recommending appropriate management action for the Western Pacific stocks. Western Coastal Areas are:

- (1) Sea of Japan, Yellow Sea, and East China Sea,
- (2) the Pacific side of the Japanese Coast.

These stocks should be classified as Sustained Management. There should be no increase in the coming year in recent catch levels for these stocks. The Committee points out that a non-member nation (Korea) is also involved in the fishery. All other areas in the North Pacific should be classified as Initial Management with a zero quota.

The highest recorded catch in the post-war years was 541, in 1973, by Japan. However, the catch by the non-member nation, Korea, was 882 in the same season. The Committee recommends that in setting quotas for the North Pacific, the Commission should not exceed the level of maximum recorded catch by Japan, i.e. 541 whales, on the understanding that this is the quota for the coming year only and that the matter will be reviewed at the next meeting.

12.3.4. *Sperm whales*

The calculations indicated that both sexes should be classified under the category of Initial Management Stock with quotas (90% of MSY) indicated being 4,320 males and 2,880 females.

12.4 North Atlantic

12.4.1. *Fin whales*

North Norway

It was noted that the stock is not currently exploited. There are not sufficient data available this year on which to classify this stock. The Committee recommends that, should whaling recommence, removals should be held at the level of the catches in the years 1948–71 (61/yr) and that more detailed analyses of past catch/effort and sightings data be conducted.

East Greenland – Iceland

In the absence of new information on the current stock level the stock should be classified as a Sustained Management Stock. The Committee recommends that the average annual catch be limited to the previous annual average of 254 whales. The Committee recognised the difficulty of maintaining average catch levels by a fixed annual quota set at, or somewhat above, the past average catch. It therefore recommends a quota system for 6-year periods with a catch limit of $6 \times 254 = 1,524$ whales. There are two alternative possibilities with approximately the same effect on the stocks and on the average catches; these are a block quota and a rolling quota. A block quota would mean that a catch limit of 1,524 whales is set for the period 1977 to 1982 inclusive. In order to prevent excessive catches in any one year the Committee recommends that in no year the catch should exceed $254 + 50 = 304$ whales. The alternative possibility, a rolling quota, would mean that the quota for each year would be calculated as 1,524 whales minus the catches in the preceding five years. In this case the quota for 1977 would be 1,524 minus the catch in 1972–75 (1,035 whales) minus the 1976 catch. Some aspects of the two alternative methods are described in section 10.3 of this report.

Western Norway and Faroe Islands

The Committee continues to classify the stock in the Protection category.

Spain, Portugal and British Isles

The Committee does not have sufficient data on current stock size to enable classification. It points out that it is exploited by non-member nations only and suggests the need to request details on the catch.

Newfoundland – Labrador

The updated assessment (SC/28/Doc 37), in accordance with the model which was used in assessing the relation to MSY level and yield in 1975, indicated that the stock has reached 122% of MSY level and should thus be re-classified as an Initial Management Stock. The maximum catch which should be permitted is 90% of MSY which is 90.

Nova Scotia

The updated assessment (SC/28/Doc 37), in accordance with the model which was used in assessing the relation to MSY level and yield in 1975, indicated that the stock is presently at 64% of MSY level and should thus remain in the Protection category.

West Greenland

The Committee lacks sufficient data on which to base a classification of this stock.

*12.4.2. Sei and Bryde's whales**Sei whales*

In the absence of assessment data on sei whales in the Icelandic and Denmark Strait area the Committee recommends that the catch be limited to the average catch of the past five years, i.e. 132 animals. Mitchell, however, cited an estimate of 965 sei whales in the Labrador Sea in spring (May-June) based upon a strip census (IWC Sci. Rep., 1976, p. 79 and map, p. 176). He suggested that this may represent part or all of the stock migrating in late summer to Denmark Strait and fished by Iceland; he argued for a more conservative catch limit.

The Nova Scotian Stock should be classified as a Protection Stock.

Bryde's whales

There are no recorded catches of Bryde's whales presently being taken in the North Atlantic.

*12.4.3. Minke whales**1. Canadian East coast*

The Committee tentatively assigns the stock to the Sustained Management category and recommends that the annual catch be held at levels of the most recent period of local exploitation, i.e. 48 whales.

2. West Greenland area

A definite conclusion on the status of the stock was not possible. There were two opinions expressed on the level of landings which should be permitted:

1. 227–250/annum which represents the average Greenlandic landings 1966–75;
2. 406–429/annum which includes landings from the Norwegian pelagic fleet.

The Commission may decide to apply a rolling quota.

3. East Greenland – Iceland – Jan Mayen

The Committee tentatively assigns the stock to the Sustained Management category and recommends that the annual catch be held at levels of the average over the past 15 years, i.e. 320 whales/yr. The Commission may wish to consider application of a rolling quota to management of this stock.

4. Svalbard – Norway – British Isles

Although reservations remain on the validity of CPUE statistics, the East Atlantic Stock appears to be in a stable state. The Committee recommends that the stock be classified as a Sustained Management Stock, and the 1977 catch should not exceed the average of the catches during the past 10 years. This would indicate a quota of 1,790 whales.

12.4.4. Sperm whales

The Committee recommends that the North Atlantic sperm whales be classified as a Sustained Management Stock. In the absence of detailed analyses of parameter values the Committee recommends that the catch should be stabilized at current levels, i.e. an average of 685 animals per year, and reminds the Commission that the greater part is taken by non-member nations.

12.5 Sperm whales: need for closed season

The Committee discussed SC/28/Doc 39 which proposed a maximum length limit. Concern was expressed that the current taking of large 'harem master' bulls might significantly reduce pregnancy rates. An alternative proposal considered was a closed season during the breeding season. In the Southern Hemisphere conception is known to occur primarily within the period November to January.

Most members of the Committee recommend that, in the Southern Hemisphere, the Commission should designate a closed season of preferably 5 but not less than 4 months (i.e. October to February, or October to January) in the Southern Hemisphere north of 40°S. If this is unacceptable, an upper size limit of 45 ft should be imposed north of 40°S during these 5 or 4 months. In either case no closed season south of 40°S would be needed. The distribution of females in the North Pacific is not so clear cut as in the Southern Hemisphere and the Committee decided to defer setting a closed season or geographical limits until next year when more data will be available. Japanese members considered that the present quota regulation affords sufficient protection to the stocks. Soviet representatives noted that neither the sperm whale meeting (March 1976) nor the Scientific Committee meeting received results of any definite observations or investigations which would corroborate the unfavourable effect of whaling on the social structure of sperm whales in the temperate zone of the ocean. Taking of lactating females is strictly prohibited and the incidental catch cannot affect the lactation of calves. They further noted, there have been no indications on the changes of the reproductive capacity of males or reduction of the pregnancy rate of sperm whale females caused by whaling operations. Therefore, they feel there is no scientific basis for taking conservation measures with regard to sperm whales in the temperate zone of the ocean.

However, since these aspects of the problem (para 8, Annex J) have arisen it appears necessary to envisage these investigations for the remaining period of the decade of research, so that on the basis of the new materials all the

possible aspects could be considered, and scientifically based recommendations made.

12.6 Conversion to metric measurements in the Schedule

The Committee recommends no change in current procedures

12.7 Protected species

Blue, humpback, right and gray whales should continue to be Protection Stocks.

13. OPENING AND CLOSING DATES FOR ANTARCTIC SEASONS 1976-77

The Committee sees no reason for changing the present dates.

14. SMALL CETACEANS

14.1. Status of Stocks

The status of stocks was considered by the standing sub-committee on small cetaceans (See Annex L). The Scientific Committee's attention was drawn to item 5 of recommendations concerning research in Annex L, where the Secretariat and governments of member nations of the Commission are urged to undertake research on the status of stocks affected by direct fisheries, and listed below:

1. Northern bottlenose whale (*Hyperoodon ampullatus*), N Atlantic.
2. Striped dolphin (*Stenella coeruleoalba*), NW Pacific.
3. Dall's porpoise (*Phocoenoides dalli*), NW Pacific
4. Harbour porpoise (*Phocoena phocoena*), N Atlantic.

This recommendation was accepted by the Scientific Committee (see agenda item 14.2 below).

In addition to Annexes K and L, SC/28/Docs 12, 13, 24, 30, 32 40 and 41 contained information relevant to the bottlenose whale in the N Atlantic. Two views (a and b, below) were discussed by members of the Scientific Committee during the meetings of the working group on North Atlantic whales and the standing sub-committee on small cetaceans regarding the status of the northern bottlenose whale:

(a) The early history of bottlenose whaling clearly shows that catch per vessel is sensitive to changes on the stock size (L. 23, Fig 5). If bottlenose stocks became depleted in the period after the Second World War this would be expected to have been reflected in decreasing catch per vessel. However, such a decline did not occur in 1946-1962 when the grounds off Spitsbergen and to some extent the Norwegian coastal areas were important. In the period 1963-1968 when the grounds between Iceland and Jan Mayen (which are nearer port than Spitsbergen, see SC/28/Doc 40) were important, catch per vessel shows some decrease (L. 23, Tables 1 and 6).

In the years 1969-1971 the Labrador grounds were the important grounds. Average catch per trip was 46.2 in 1969, 37.4 in 1970, 37.8 in 1971 (SC/28/Doc 40). This indicates a decrease in stock size, but no depletion. The expansion westward to Labrador was made by the larger vessels entering the bottlenose fishery in the late 1960s (L.23, Table 5 SC/28/Doc 40). A trip to Labrador would be economically profitable if the availability of bottlenose was 75% higher than on the North East Atlantic ground

which may very well have been the fact without a depletion on the old grounds (SC/28/Doc 40).

The minke whale fishery is basically a single species fishery. Bottlenose occur on other grounds than the minke, and the opportunity for the boats to catch and store the meat from minke and bottlenose on the same trip is limited.

Bottlenose whaling stopped after 1972 because of:

1. The loss of the market for petfood in England from 1972.
2. The loss of market for animal food in Norway due to the availability of less expensive food from other sources than whale meat.
3. The increasing relative value of minke whale (L.22).

(b) The Scientific Committee had before it a number of papers giving data (SC/28/Docs 30; 13; 40; 41) and analyses (SC/28/Docs 12; 32) for the N. Atlantic bottlenose whale. One analysis (L. 23) contained errors of calculation which there was no time to correct during the meeting. Another analysis indicated that the bottlenose stock, at least from west Greenland eastwards had been reduced to 30% of its initial value of 130,000 in 1885 by 1913 (SC/28/Doc 32).

From this residual stock an average annual catch of 190 was taken in the period 1914-1927 and the stock seems to have declined further. The average annual catch thereafter was 50 whales until 1966; it is not clear if in that period, under reduced pressure the stock began to recover, and if so to what degree. Further analysis of existing data including resolution of questions raised in the Committee about whether the catch per unit effort data provided give a good index of relative abundance (SC/28/Docs 29; 26) may throw light on this matter, but for the time being the analysis provided suggested that extreme caution should be exercised in considering whether or not to permit further exploitation of this species.

Because of the above some members of the Scientific Committee feel that due to the past heavy exploitation, susceptibility to continued exploitation within the pelagic minke whale fishery, and current poor knowledge of initial and present stock size, the northern bottlenose whale should not be subjected to any further exploitation before a thorough analysis of its present status is carried out. For these reasons they recommend that the northern bottlenose whale (*Hyperoodon ampullatus*) be listed in the Schedule of the IWC and classified as a protected stock.

The Scientific Committee will discuss next year the status of the northern bottlenose whale. The above statements of the two opposing views were asked for by the full Scientific Committee.

14.2. Recommendations for Management and Conservation

The Committee had available the draft report of the Standing Sub-Committee on Small Cetaceans (Annex L) which met on 7 to 9 June. Recommendations by the Scientific Committee following on the ten specific recommendations in the Sub-Committee Report (Section 7) are as follows:

1. Accepted.
2. The Committee brings paragraph 1 to the Commission for attention by its working group on redrafting the Convention and brings paragraph 2 to the immediate attention of the Commission.
3. This recommendation is dealt with under agenda item 10.1 of this report.

4. The Committee supports the recommendation and suggests that the Commission requests the Secretary to take the necessary action to ensure implementation.
5. Accepted.
6. Noted with no further action.
7. Accepted.
8. The Committee accepted the recommendation with inclusion of studies on male reproduction.
9. Accepted.
10. Deferred.

15. DATA COLLECTION

15.1 Review of the arrangements for exchange of data and for collection by a central agency. Continuation of stock assessment work and sources of stock assessment advice.

Chapman reported to the Committee on the work of Breiwick during the past year (SC/28/Rep 18). Partial computer tapes of basic data, forwarded by Vangstein of the Bureau of Whaling Statistics, Sandefjord, to Breiwick, were worked on in Seattle, under the direction of Chapman but completion of the project was delayed pending receipt of additional tapes. The Committee requests the Secretary to recommend that Breiwick continue this work, funded by the Commission on a contract basis, and set up a data store on tape under Chapman. The Secretary explained that this contracting out was presently necessary because of difficulties over access to computer facilities, although he recognised that the central data store should eventually reside in the office of the Commission.

The Committee emphasises the desirability of an early visit by the Secretary, accompanied by an expert in data processing, to the Bureau of International Whaling Statistics in order to examine the nature of data held and to assess the feasibility and methods of setting up a system for rapid access to these data.

The Committee decided that at future meetings computer facilities for retrieving these data would need to be available. A Sub-Committee was appointed to prepare a report on these matters and to review the data priorities set out in Annex N, IWC Sci. Rep. 1976.

The Scientific Committee recognized the need for a review and analysis of early log books from the sperm whale fishery. The Committee recommended that the Commission request the Secretary to approach the US and other countries to assist in such analysis.

15.2 Collection of additional statistics

Recommendations concerning large whales are made under the appropriate species headings.

Recommendations on the collection of additional statistics for small cetaceans are discussed in the report of the Standing Sub-Committee on Small Cetaceans (Annex L).

16. REVIEW OF REPORTING REQUIREMENTS

The Scientific Committee recognized the need for the systematic collection of data from all whalers, not only the factory ship operations described in the current Schedule. The Scientific Committee recommends that the Commission consider changing the Schedule to include all land stations and ship operations in small type whaling (Annex L), such as the North Atlantic minke whale fishery. The Scientific Committee also urges that the Commission consider including the needs for data as outlined in the

reports from the Oslo (Annex K) and the small cetacean meetings (Annex L).

A Sub-Committee consisting of Brownell, Mitchell, Kapel, Ohsumi, Rørvik, Christensen and Jónsson recommended the following amendments to the Schedule, and these are now recommended to the Commission. The Scientific Committee notes that "small-type whaling" is that described by Ohsumi (*J. Fish. Res. Bd. Can.* 32(7): 1111-21).

VI. Information required

21. '(d) A record similar to that described in sub-paragraph (b) of this paragraph shall be maintained by "small-type whaling" operations conducted from shore or by pelagic fleets, and all of this information mentioned in the said sub-paragraph shall be entered therein as soon as available.'

23. (para. 1) (c) 'Particulars with respect to each whale treated in the factory ship, land station, and "small-type whaling" operations as to the date and approximate latitude and longitude of taking, the species and sex of the whale, its length and, if it contains a foetus, the length and sex, if ascertainable, of the foetus.'

23. (para. 2) (b) '(v) Any modifications of the above measures or data from other suitable indicators of fishing effort for "small-type whaling" operations.'

17. EFFECTS OF POLLUTION ON WHALE STOCKS, INCLUDING SMALL CETACEANS

The Committee received no information for large cetacea. Document L, 10, presented to the Sub-Committee on Small Cetacea, June 1976, contained information on toxic substances in tissues of pygmy sperm whales.

18. HUMANE KILLING OF WHALES

The Committee considered a document (Sc/28/Rep 4) prepared by the Secretary in the form of responses by member nations to enquiries regarding new developments in the efficiency and technique of killing whales and another by Ohsumi (SC/28/Doc 31) on death-times of fin, sei and minke whales. A Sub-Committee of two (Best and Brownell) was appointed to study these documents.

1. (a) It appeared (without field testing) that at least one drug, Etorphine Hydrochloride (M 99), exists which is potent enough and has a wide enough therapeutic index to be suitable for anaesthetising large cetaceans.
- (b) There are two main questions regarding its use:
 - (i) the ability of the animal to float, when anaesthetised, can only be determined by field experimentation
 - (ii) the acceptability to health authorities of products from an animal to which this drug had been administered, would need to be investigated. It was noted that, in the UK, an animal treated with a non-lethal dose of M 99 may not be slaughtered for 7 days to allow excretion of the drug.

2. The Committee considers that criteria ought to be established for judging the humaneness of the killing. In its opinion, the rapidity with which the whale is rendered unconscious and killed is the most important factor, both from the humane and a commercial point of view. Given the death-times recorded in some areas for sperm whales by

Best (SC/26/24) and for baleen whales by Ohsumi (SC/28/Doc 31), the Committee is uncertain whether administration of a drug would bring about unconsciousness in a significantly shorter time than the use of an explosive harpoon.

3. The need was expressed for some alternative to the use of a "cold grenade" for killing minke whales. It is understood that trials with the use of CO₂ gas as a method of euthanasia in animals are being considered in the USA. However, several members of the Committee commented that such experiments has so far been restricted to sharks, and that the effectiveness of the technique was due to explosion of a CO₂ gas cylinder within the body cavity and not the toxicity of the gas. The method of action of this technique was compared to the current use in some fisheries of a compressed air hose to kill harpooned whales. Some question was raised as to whether CO₂ gas might deleteriously affect the meat quality.

The Committee recommends to the Commission that:

1. The Secretary should contact health authorities in UK, USA, Japan and other member nations to determine their regulations concerning the use of chemical methods of slaughter and subsequent processing.
2. The Secretary should contact member nations taking minke and other small whales and ask them what methods are used at present to secure and kill them.
3. The Secretary should contact the US Government with regard to experiments on the application of CO₂ gas as a method of euthanasia.
4. The Secretary should contact member whaling nations to enquire whether research into the use of high velocity projections for speeding death times is being considered.

Finally, the Committee noted, with concern, the absence of any response from the USSR and Japanese Governments to the Secretary's request for information.

19. EDITORIAL POLICY

A Sub-Committee was set up to develop recommendations for the future policy for the scientific publications of the Commission and to examine the question of which of the documents of the present meeting should be included in the published report. Its recommendations (Annex I) were adopted by the Committee, and those concerned with policy aspects of publication were incorporated in the Rules of Procedure adopted under Item 6, and appear as section 6 of those Rules.

20. FUTURE MEETINGS AND NEED FOR SPECIAL STUDIES

The Committee agreed that there was no need for any special meetings before the next annual meeting.

Regarding special studies, the Committee recommends that member nations taking sperm whales provide data on biological parameters, at least for females in Divisions 4 and 9 where the stocks are currently at low levels. Detailed research is requested on age determination of minke whales off Norway, fin and sei whales off Iceland, and minke and sei whales off Brazil. It was noted that extensive data on age composition of the catch would allow assessment to be made independent of effort data.

It was agreed that the Chairman, Vice-Chairman and Secretary should consult and seek the views of members on the items which should be given priority at the next meeting of the Committee. A subsequent meeting of the convenors of the Standing Sub-Committee proposed a list of names for membership of the Sub-Committees and framed outline plans for their method of working (SC/28/Rep 15)

21. ELECTION OF OFFICERS

K. R. Allen and J. L. Bannister were elected Chairman and Vice-Chairman for the ensuing year. The following convenors of Standing Sub-Committees were elected:

Mathematical	M. F. Tillman
Sperm whales	J. L. Bannister
Northern Hemisphere	
Baleen whales	S. G. Brown
Southern Hemisphere	
Ballen whales	S. Ohsumi
Small Cetaceans	R. L. Brownell

22 RESOLUTION IN APPRECIATION OF THE WORK OF THE RETIRING SECRETARY

The Scientific Committee unanimously concurs in recommending to the Commission that Reginald Stacey be designated Secretary Emeritus. This newly created position requires that the Secretary Emeritus attends, at his pleasure, all appropriate meetings, receptions, dinners and other official and non-official functions, of the IWC. The Secretary Emeritus will serve without financial remuneration and shall not be provided with any voting authority. The freedom imposed by these latter restrictions will permit the Secretary Emeritus to fulfill all requisite and non-requisite duties free of bias and other onerous burdens.

The Committee would also like to record on this last occasion before the setting up of the new secretariat, its appreciation of the support services provided during this and earlier years by the secretariat loaned on a part-time basis by the MAFF staff of the UK.

Annex A

Agenda

1. Chairman's remarks
2. Appointment of rapporteurs.
3. Adoption of Agenda.
4. Arrangements for meeting
5. Exchange and review of documents.
6. Rules of Procedure
7. FAO/ACMRR Working Party on Marine Mammals (Commission Agenda—Item 7).
8. International Decade of Cetacean Research—Research Proposals (Commission Agenda—Item 3).
9. Research and information
 - 9.1 Progress reports, including reports relative to special permits.
 - 9.2 Progress of whale marking and whale mark recoveries. Commission's contribution to whale marking.
 - 9.3 Reports of previous season's catches.
 - 9.4 Data analyses and reports of national groups.
 - 9.5 Sighting programme. Data reports from 1975–6 season and analyses of data.
 - 9.6 Reports of special meetings
 - 9.6.1 Sperm whales
 - 9.6.2 North Atlantic whales
 - 9.6.3 Small Cetaceans
10. Classification of whale stocks (Commission Agenda—Item 8)
 - 10.1 Recommendations on Criteria.
 - 10.2 Alternative formulae for determining quotas.
 - 10.3 Use of effort limitation for North Atlantic fin whales.
11. Status of stocks relative to criteria
 - 11.1 Southern Hemisphere.
 - 11.1.1 Baleen whales
 - 11.1.2 Sperm whales
 - 11.2 North Pacific
 - 11.2.1 Baleen whales
 - 11.2.2 Sperm whales
 - 11.3 North Atlantic
 - 11.4 Arctic
 - 11.5 Currently protected species
 - 11.5.1 Right and Bowhead whales
 - 11.5.2 Blue whales
 - 11.5.3 Humpback whales
 - 11.5.4 Gray whales
12. Catch limits and other regulatory measures (Commission Agenda—Item 9)
 - 12.1 Southern Hemisphere baleen whales
 - 12.1.1 Fin whales
 - 12.1.2 Sei and Bryde's whales
 - 12.1.2.1 Catch limits
 - 12.1.2.2 Northern boundary for Bryde's whales
 - 12.1.3 Minke whales
 - 12.2 Southern Hemisphere sperm whales
 - 12.3 North Pacific
 - 12.3.1 Fin whales
 - 12.3.2 Sei and Bryde's whales
 - 12.3.3 Minke whales
 - 12.3.4 Sperm whales
 - 12.4 North Atlantic
 - 12.4.1 Fin whales
 - 12.4.2 Sei and Bryde's whales
 - 12.4.3 Minke whales
 - 12.4.4 Sperm whales
 - 12.5 Sperm whales; need for closed seasons (Commission Agenda—Item 9).
 - 12.6 Conversion to metric measurements in the Schedule (Commission Agenda—Item 9(b)).
13. Opening and closing dates for Antarctic season (Commission Agenda—Item 9(b) i (b)).
14. Small Cetaceans (Commission Agenda—Items 11 and 12)
 - 14.1 Status of stocks
 - 14.2 Recommendations for management and conservation
15. Data collection
 - 15.1 Review of the arrangements for exchange of data and for collection by a central agency. Continuation of stock assessment work and sources of stock assessment advice.
 - 15.2 Collection of additional statistics
 - 15.2.1 On large whales
 - 15.2.2 On small cetaceans
16. Review of reporting requirements—Minke whales in Northern Hemisphere (Commission Agenda—Item 10)
17. Effects of pollution on whale stocks, including small cetaceans.
18. Humane killing of whales
19. Editorial policy relative to publication of the Scientific Committee's reports and associated documents.
20. Future meetings and need for special studies.
21. Election of officers.

Annex B1

LIST OF DOCUMENTS

SC/28/Doc

- 1 ALLEN, K. R. Changes in catch and population for sustained managed stocks below MSY level.
- 2 ALLEN, K. R. and KIRKWOOD, G. P. Further development of sperm whale population models.
- 3 BERTRAND, G. A. Effort statistics in the North Atlantic minke whale fishery.
- 4 BEST, P. B. Status of whale stocks off South Africa, 1975.
- 5 BORODIN, R. G. Methods of the assessment of net recruitment and time of possible recovery of whale stocks to the MSY level.
- 6 BREIWICK, J. M. Analysis of the Antarctic fin whale stock in Area I.
- 7 CHAPMAN, D. G. Comparison of linear and step partial catch procedures for stock "near" but below the MSY level.
- 8 FUKUDA, Y. A note on quota determination for sustained management stock below MSY level.
- 9 FUKUDA, Y. A note on management of sperm whaling—operational constraint and target formulation.
- 10 HOLT, S. J. Estimation of sperm whale population sizes from changes in the mean size of whales in catches (IWC/SP/Doc 21).
- 11 HOLT, S. J. Questions about the sex ratio in catches of rorquals.
- 12 HOLT, S. J. The assessment of bottlenose whales. Critique of document L.23 by I. Christensen.
- 13 JONSGÅRD, Å. Maps showing the approximate localities where the different species of whales (vagehval = minke; bottlenose; spekkhogger = killer; grindhval = pilot) have been caught by Norwegian whalers in each of the seasons 1949–1975.
- 14 KAPEL, F. Preliminary data on the catch of whales in Greenland, 1975.
- 15 LOCKYER, C. A preliminary study of variations in age at sexual maturity of the fin whale with year class, in six Areas of the Southern Hemisphere.
- 16 MARQUETTE, W. M. National Marine fisheries service field studies relating to the bowhead whale harvest in Alaska, 1975. (National Marine Fisheries Service, Northwest Fisheries Center Processed Report, March 1976.)
- 17 MASAKI, Y. Japanese pelagic whaling and whale sighting in the Antarctic 1975–76.
- 18 OHSUMI, S. Further assessment of population of Bryde's whale in the North Pacific.
- 19 OHSUMI, S. Estimation of population sizes of the Southern Hemisphere minke whale at the initial and 1976–77 levels.
- 20 OHSUMI, S. Catch of minke whales in the coastal waters of Japan.
- 21 OHSUMI, S. and MASAKI, Y. Stocks and trends of abundance of the sperm whale in the North Pacific.
- 22 RØRVIK, C. J. Simulation of an exploited stock of fin whales.
- 23 TILLMAN, M. F. Estimates of stock size for the North Pacific Bryde's whale.
- 24 TILLMAN, M. F. and BERTRAND, G. Analysis of effort statistics from the early North Atlantic bottlenose whale fishery.
- 25 TILLMAN, M. F. and BREIWICK, J. M. Estimates of stock size for exploitable North Pacific male sperm whales.
- 26 UGLAND, K. I. On the bias caused by CPUE in the estimates of whale abundance.
- 27 VOLKOV, A. F. and MOROZ, I. F. Oceanological conditions of the distribution of cetacea in the eastern tropical part of the Pacific Ocean.
- 28 WADA, S. Progress report on the biochemical study for whale stock identification in Japan.
- 29 WADA, S. Indices of abundance of large-sized whales in the North Pacific in 1975 whaling season.
- 30 MITCHELL, E. Evidence that the northern bottlenose whale is depleted.
- 31 OHSUMI, S. A preliminary note on Japanese records on death-times for whales killed by whaling harpoon.
- 32 HOLT, S. J. Does the bottlenose whale have a sustainable yield, and if so, is it worth taking?
- 33 BROWNELL, R. Current status of the gray whale.
- 34 CHAPMAN, D. G. Summary of North Pacific sperm whale assessments.
- 35 HOLT, S. J. Assessment of Southern Hemisphere minke whales.
- 36 HOLT, S. J. Simulation of Southern Hemisphere sei whale stocks.
- 37 ALLEN, K. R. Updated estimates of fin whale stocks.
- 38 FUKUDA, Y. A comment on analysis of Area I fin whale stock.
- 39 MITCHELL, E. D. Sperm whale maximum length limit: proposed protection of "harem masters".
- 40 CHRISTENSEN, I., JONSGÅRD, Å. and RØRVIK, C. J. Some notes concerning the bottlenose fishery in the North Atlantic after the Second World War, with particular reference to the westward expansion.
- 41 CHRISTENSEN, I., JONSGÅRD, Å. and RØRVIK, C. J. Comments to SC/28/Doc 24, "Analysis of effort statistics from the early North Atlantic bottlenose whale fishery".
- 42 CHAPMAN, D. G. Additional consideration on Antarctic sei whale stocks.
- 43 HOLT, S. J. A theoretical basis for determining limits to the allowable catch when density dependence has not been estimated.
- 44 ALLEN, K. R. Comments on a stock recruitment relationship proposed in SC/28/Doc 43.
- 45 BORODIN, R. G. A further study of the stock condition of Antarctic sei whales.
- 46 VIALE, D. Big whales populations on the Atlantic coasts of Spain and Western Mediterranean.
- 47 OHSUMI, S. and FUKUDA, Y. A note on the revised estimates of southern sei whale stocks.
- 48 ALLEN, K. R. Comparison of existing and proposed quota systems for male sperm whales.

Annex B2

LIST OF REPORTS

SC/28/Rep

- 1 Report of the sperm whale meeting, La Jolla, California, 16–25 March 1976 (Annex J).
- 2 Report of the working group on North Atlantic whales, Oslo, 5–13 April 1976 (Annex K)
- 3 Report of the standing sub-committee on small cetaceans, London 7–9 June 1976 (Annex L).
- 4 Humane killing of whales.
- 5 Mammals in the Seas, *ad hoc* Group 1 on large cetaceans. Report Supplement 1. April 1976. (ACMRR/MM/SC/2 Suppl. 1).
- 6 Mammals in the Seas, *ad hoc* Group 1 on large cetaceans. Report Supplement 2. May 1976. (ACMRR/MM/SC/2 Suppl. 2).
- 7 Report policy IWC Scientific Committee—special meetings. (Annex CI).
- 8 Sperm whale statistics, Southern Hemisphere. (Annex H).
- 9 Report of Sub-committee to estimate stock size of North Pacific Bryde's whales.
- 10 Whale marking—progress report 1976.
- 11 Report of sub-committee on the status of the gray whale.
- 12 Report of sub-committee to estimate stock size of Southern Hemisphere minke whales.
- 13 Definition of new stock categories. (Annex E).
- 14 Report of the sub-committee on publication policy. (Annex I).
- 15 Report of meeting convenors of standing sub-committees.
- 16 Report of the sub-committee on rules of procedure for the Scientific Committee. (Annex C2).
- 17 Operations of the Scientific Committee. (Annex C3).
- 18 Report on Commission Contract for development of data base and routine computer analyses.

Annex B3

LIST OF PROGRESS REPORTS

SC/28/Prog Rep

- 1 Australia
- 2 Brazil
- 3 Canada
- 4 Denmark
- 5 Iceland
- 6 Japan
- 7 Norway
- 8 South Africa
- 9 United Kingdom
- 10 Union of Soviet Socialist Republics
- 11 United States of America

Annex C1
SC/28/Rep 7REPORT POLICY IWC SCIENTIFIC
COMMITTEE—SPECIAL MEETINGS

The Scientific Committee has held special meetings to consider specific problem areas and to provide reviews, or advice to the full Scientific Committee.

The following report policy is suggested for consideration as the regular requirements for all meetings, other than the regular annual session of the Scientific Committee such as special scientific meetings, working groups, sub-committees, etc.

1. The Chairman or convenor of the meeting will have the responsibility for issuing the meeting report.
2. A draft report will be prepared while the meeting is still in progress, or immediately thereafter and circulated for review to the participants of the sessions.
3. If the draft report is prepared prior to the close of the meeting, changes by consensus will be made, with minority views included, as necessary.
4. If changes are made by correspondence, the Chairman of the session will be empowered to use his

discretion to make requested changes. He is encouraged to include minority views which may surface for the first time in the editorial process—and to indicate that they were not subject to full discussion before the working group.

5. The Chairman will submit the edited report as the final report of the meeting to the Chairman of the full Scientific Committee for review and consideration by the Committee. Any new changes or comments regarding the report will be included as part of the report of the full Scientific Committee, with no changes in the sub-committee report to be allowed, except corrections that are acceptable to the participants in the original meeting.

6. Technical documentation used to reach conclusions expressed in sub-committee reports must be either attached (as in the case of working papers) or appropriately cited for further reference.

7. Two full sets of the working papers considered at special meetings must be deposited with the IWC Secretariat, one for the archives and one as a working set available to Scientific Committee members and others as may be decided.

Annex C2
SC/28/Rep 16

**REPORT OF THE SUB-COMMITTEE ON RULES OF
PROCEDURE FOR THE SCIENTIFIC COMMITTEE**

A. Membership and Observers

1. The Scientific Committee shall be composed of scientists nominated by the Commissioner of each nation which elects, at the annual meeting of the Commission, to be represented on that Committee. The Secretary of the Commission shall be an ex-officio non-voting member of the Scientific Committee.

2. The Scientific Committee recognises that while FAO and UNEP are represented at the Commission's meeting by Observers their representatives attend the Scientific Committee as scientists with the status of advisers to the Committee. The representatives of other international organisations of similar scientific standing may also be given the same status in the Scientific Committee, subject to the agreement of the Chairman of the Committee, acting according to such policy as the Commission or the Scientific Committee may decide.

3. Observers may attend the meetings of the Scientific Committee, subject to the agreement of the Chairman of the Committee, acting according to such policy as the Commission or the Scientific Committee may decide.

B. Agenda

1. The initial agenda for the Committee meeting of the following year shall be developed by the Committee prior to adjournment each year. The agenda should identify as far as possible, key issues to be discussed at the next meeting and specific papers on issues be requested by the Committee as appropriate.

2. The provisional agenda for the Committee meeting shall be circulated for approval sixty days prior to the annual meeting and comments will be considered only if received by the Chairman 21 days prior to the beginning of the annual meeting.

C. Organisation

1. The Scientific Committee shall include standing sub-committees by area or species, or other subject, and a standing sub-committee on small cetaceans. The Committee shall decide at each meeting on sub-committees for the coming year.

2. The sub-committees shall prepare the basic documents on the identification and classification of stocks, including biological parameters, initial and present stock size and catch limits using catch records supplied by the Secretariat, and related matters as necessary, for the early consideration of the full Committee.

3. The sub-committees, except for the sub-committee on small cetaceans, shall concentrate their efforts on stocks of large cetaceans particularly those which are currently exploited or for which exploitation is under consideration, but they may examine fishery matters in which both large and small cetaceans are taken or refer those matters as appropriate to the sub-committee on small cetaceans.

4. The Chairman may appoint other sub-committees as appropriate.

5. The Committee shall annually elect from amongst its members a chairman and vice-chairman at the conclusion of the annual meeting of the Commission. The vice-chairman shall act for the chairman in his absence.

D. Meetings

1. The Scientific Committee shall meet during the 10 days beginning on Monday of the two weeks prior to the Annual Commission Meetings. The Thursday and Friday of the second week shall be available to the Secretariat for final preparation of the report of the Committee.

2. The sub-committees should meet during the first few days of the full Committee meeting; their progress should be reviewed at regular intervals, at plenary sessions of the full Committee. During those days there should be opportunity for generating ideas, production of papers by individuals and other reviews of data. It should be the aim of the sub-committee to complete its work and prepare reports for the full Committee by the end of the first week. Sub-committees, including sub-committees consisting of the full Committee, may meet on other occasions as necessary.

E. Scientific Papers and Reports

The following documents and papers will be considered by the Scientific Committee for discussion and inclusion in its report to the Commission:

1. Progress Reports. Each nation having information on the biology of cetaceans, cetacean research, the taking of cetaceans, or other matters it deems appropriate should prepare a brief progress report in the format already used by the Committee summarising these matters for consideration by the Committee.

2. Special Reports. The Committee may request special reports, including special national reports, as necessary on matters to be considered by the Committee for the following year.

3. Sub-committee Reports. Reports of the standing sub-committees or of special sub-committees appointed by the Chairman shall be considered by the Committee for inclusion in the Report to the Commission. These reports shall be considered as working documents and the recommendations contained therein be subject to modification by the full Committee before inclusion in the Annual Report.

4. The above reports should be distributed to Committee and Sub-committee members as early as possible.

5. Scientific Papers.

(a) Any scientist may submit a scientific paper for consideration by the Committee. The Secretary may, with the concurrence of the Committee, set technical guidelines for the preparation and presentation of such papers. Scientific papers shall be of two types, primary papers presenting new data or analysis, and secondary papers expanding or analysing data and concepts in the primary papers or reports to the Committee.

(b) Primary scientific papers will be considered for discussion and inclusion in the papers of the Committee only if the paper is received by the Secretariat on or by the first day of the annual

Committee meeting. Exceptions to this rule can be granted by the Committee only in the case of exceptional extenuating circumstances.

(c) Secondary papers will be considered for discussion and inclusion in the papers of the Committee only if:

1. The paper is received by the Secretariat before the end of the first week of the Committee meeting, or:
2. Preparation of the paper is specifically requested by the Scientific Committee through its Chairman.

6. Publication of Scientific Papers and Reports.

Scientific papers and reports shall be included in the Commission's archives in the form in which they were considered by the Committee or its sub-committees.

Documents on which management recommendations are based should be available on demand immediately after the meeting of the Committee at which the recommendations were made. Scientific papers and reports (revised as necessary) will be selectively included in the Committee Report published by the Commission. The Secretariat, with the concurrence of the Scientific Committee shall issue guidelines for the technical revision of the papers or reports. Scientific papers which are original contributions and deserve a broad dissemination in the primary literature may be considered for publication at the request of the author in a new scientific journal, published by the Commission, with the possible title "Journal of Cetacean Management". Papers will be subject to outside review before acceptance; the Secretary shall be the Editor.

Annex C3. SC/28/Rep 17

OPERATIONS OF THE SCIENTIFIC COMMITTEE

K. Radway Allen

Despite the increasing length of time allocated to its pre-Commission meeting, and despite the holding of frequent special mid-year meetings on particular topics, the Scientific Committee is having growing difficulty in completing its tasks and presenting its report to the Commission by the commencement of the Plenary Session.

There are several causes underlying this development. One is the increasing amount of both statistical and biological data available, together with improved understanding of the principles involved in population assessment and management, which is causing the discussions of the Committee to extend to greater depth and therefore to take more time than in earlier years. A second cause is that the Committee, having expressed the view that it would be appropriate for the Commission to accept responsibility for the management of the lesser whales, and at least the directly exploited small cetaceans, is devoting some time to the discussion of the problems of assessment and management of these species.

The principal cause is however the adoption by the Commission of the new management procedure. This requires the Committee both to examine annually every identifiable stock of whales and to make every effort to provide the Commission with a definite statement regarding the categorisation and appropriate catch limits for each stock. Owing to the difficulties of interpreting inadequate data it may take almost as long for the Committee to reach a conclusion on some small stocks which are not currently exploited as on some of large stocks for which much more data exist and which have been well studied. This aspect of the problem is likely to diminish only slowly since small stocks will also require continuing review as more data become available and stock units are elucidated. As well as discussing the individual stocks the Committee also needs to discuss either at the Commission's request or on its own volition general questions regarding the new management procedure including the definition of present or possible future new categories and the methods of calculating catch limits. This need is likely to continue.

Annex D

SPECIAL PERMITS ISSUED UNDER ARTICLE VIII OF THE CONVENTION

<i>Date</i>	<i>Country of issue</i>	<i>Area</i>	<i>Details of permit</i>
January 1976	Japan	North Pacific	80 sperm whales
May 1976	Japan	North Pacific	100 minke whales

Annex E
SC/28/Rep 13

DEFINITION OF NEW STOCK CATEGORIES

The Committee is considering 2 categories for addition to the Schedule:

- (a) Vulnerable stocks.
- (b) Indeterminate stocks.

Comments on these two possible categories are as follows:

- (a) *Vulnerable Stock*—stocks which evidence suggests have been severely affected by direct fishing, direct fishing and incidental take, or environmental change, and for which adequate stock assessment information does not exist to allow classification in another management category.

Management actions which should be taken in applying this new category are:

1. The catch limit for direct fishing on a vulnerable stock will be set by the Commission but in any event should not exceed the catch (1) at the time of classification or (2) within the recent past history of the catch.
2. National bodies whose activities are affecting a vulnerable stock should provide the Commission with an annual progress report on the status of the stock and efforts made to prevent further reduction of the stock.

3. The Commission will annually review the classification of vulnerable stocks based on the evidence contained in the annual progress report and elsewhere. If the evidence is inadequate the Commission can annually continue classification of the stock as vulnerable for (1) up to five years or (2) the number of years recommended by the Commission. If the annual progress report is not forthcoming or if the information remains inadequate after five years the stock is automatically reclassified as a protection stock unless the Commission has reason to specifically continue the annual classification of the stock as vulnerable.

(b) *Indeterminate stock*. There are many whale stocks that have been fished, where no estimates of initial stock are available and where there is no evidence that the stock is being significantly affected by present catches. It is proposed that all such stocks should be classified as indeterminate, and should be managed as follows:

1. If an estimate of present exploitable stock size is available, catches should not exceed 5% of that value.
2. If no such estimate is available, catches should be held constant until further information becomes available.

Annex F

Southern hemisphere sperm whales — estimated stock sizes and MSYs, and recommended catch limits by Divisions

	DIVISION									Total
	1	2	3	4	5	6	7	8	9	
1946 Stock (males)	12.4	33.0	38.4	23.1	21.9	11.3	15.9	37.7	36.2	229.9
1946 Stock (females)	20.3	54.1	63.0	37.9	35.9	18.5	26.1	58.5	46.4	360.7
%1945/1946 (males)	42.7	47.9	31.5	55.0	33.8	41.1	26.4	91.9	31.8	46.2
%1945/1946 (females)	91.6	94.5	82.1	56.5	95.5	93.0	79.9	99.7	53.7	82.7
MAXIMUM WEIGHT										
MSY Males (No)	361	963	1,121	675	639	329	465	1,041	970	6,564
MSY Females (No)	12	32	38	23	22	11	16	35	0	189
MSY Males (Wt)	8,904	23,728	27,632	16,623	15,746	8,114	11,447	25,658	23,038	160,890
MSY Females (Wt)	171	454	529	318	302	155	219	491	40	2,639
1975% of MSYL (males)	109	123	81	141	87	105	68	236	69	—
1975% of MSYL (females)	94	97	85	58	98	96	82	103	56	—
Catch limit (males) (No)	325(S)	867(I)	0(P)	608(I)	0(P)	296(S)	0(P)	937(I)	0(P)	3,033
Catch limit (females) (No)	4(S)	20(S)	0(P)	0(P)	16(S)	6(S)	0(P)	32(S)	0(P)	78
Catch limit (males) (Wt)	6,216	16,581	0	11,628	0	5,661	0	17,920	0	55,006
Catch limit (females) (Wt)	56	278	0	0	223	84	0	445	0	1,056
MAXIMUM NUMBER										
MSY Males (No)	319	849	909	595	564	290	410	918	835	5,769
MSY Females (No)	73	195	227	136	129	67	94	211	237	1,369
MSY Males (Wt)	7,797	20,780	24,198	14,557	13,789	7,106	10,025	22,470	19,604	140,326
MSY Females (Wt)	952	2,557	2,955	1,778	1,684	868	1,224	2,744	2,946	17,688
1975% of MSYL (Males)	133	150	98	172	106	128	83	287	84	—
1975% of MSYL (Females)	116	120	104	72	121	118	101	126	72	—
Catch limit (Males) (No)	287(I)	764(I)	712(S)	536(I)	508(S)	261(I)	0(P)	826(I)	0(P)	3,894
Catch limit (Females) (No)	66(I)	176(S)	204(S)	0(P)	116(I)	60(S)	85(S)	190(I)	0(P)	897
Catch limit (Males) (Wt)	5,489	14,612	13,618	10,252	9,716	4,992	0	15,798	0	74,477
Catch limit (Females) (Wt)	919	2,450	2,840	0	1,615	835	1,183	2,645	0	12,487

Annex G
SUMMARY OF STOCK CLASSIFICATION AND CATCH LIMIT RECOMMENDATIONS

Species	Stock or area	Per cent of initial	Per cent above or below MSY	Class	Catch limit
Fin	S. Hemisphere I	15	-76 ¹	P	0
	II	16	-74	P	0
	III	25	-58	P	0
	IV	14	-77	P	0
	V	11	-82	P	0
	VI	50	-17	P	0
Sei	S. Hemisphere I	70	+16 ¹	S	353
	II	55	-9	S	826
	III	43	-28	P	0
	IV	55	-5	S	70
	V	66	+10	S	569
	VI	71	+18	S	490
					1,863
Minke	S. Hemisphere I	83	+39 ¹	I	965
	II	85	+41	I	1,855
	III	90	+49	I	2,730
	IV	73	+22	I	1,830 (1,386) ²
	V	96	+60	I	1,385
	VI	97	+61	I	365
					9,130 (8,686) ²
Fin	North Pacific total	43	-31	P	0
Sei	North Pacific total	26	-52	P	0
Bryde's	North Pacific total	81	+353	I	1,000
Minke	North Pacific Western	?	?	S	No increase on current catches
	Central	?	?	I	0 ³
	Eastern	?	?	I	0 ³
Sperm male	N Pacific total			I	4,320
Sperm female	N Pacific total	85		I	2,880
Fin	North Atlantic Faroes-W Norway	33	50	P	0
	Iceland	?	?	S	1524-6 yr total
	Nova Scotia	37	-36	P	0
	Newfoundland	71	+22	I	90
	(Spain-Portugal- British Isles)	?	?	?	?
Sei	North Atlantic				
	Iceland, Denmark Strait	?	?	?	132
	Nova Scotia	?	?	P	0
Minke	North Atlantic				
	Canada E. Coast	?	?	S	48
	W Greenland	?	?	?	238/415 ²
	E Greenland, Iceland	?	?	S	320
	Eastern	?	?	S	1,790
Sperm	North Atlantic total	?	?	S	685
Sperm Male	S. Hemisphere		Wt ⁴ No ⁴	Wt ⁴ No ⁴	Wt ⁴ No ⁴
	1	43	+9 +33	S I	325 287
	2	48	+23 +50	I I	867 764
	3	31	-19 -2	P S	0 712
	4	55	+41 +72	I I	608 536
	5	34	-13 +6	P S	0 508
	6	41	+5 +28	S I	296 261
	7	26	-32 -17	P P	0 0
	8	92	+136 +187	I I	937 826
	9	32	-31 -16	P P	0 0
					3,033 3,894
Sperm Female	S. Hemisphere				
	1	92	-6 +16	S I	4 66
	2	94	-3 +20	S S	20 176
	3	82	-15 +4	P S	0 204
	4	56	-42 -28	P P	0 0
	5	95	-2 +21	S I	16 116
	6	93	-4 +18	S S	6 60
	7	80	-18 +1	P S	0 85
	8	100	+3 +26	S I	32 190
	9	54	-44 -28	P P	0 0
					78 897

1. Assuming MSY at 60% of initial level.

2. Alternative views

3. Currently unexploited stocks, which should not be exploited until population estimates are available.

4. Wt = For maximum yield by total weight, No = For maximum yield by total number of both sexes

SUMMARY OF AVAILABLE CATCHES

	S Hemisphere	N Pacific	N Atlantic
Fin	0	0	394
Sei	1,863	0	132
Bryde's	0	1,000	—
Minke	9,130/8,686	Current level in western area	2,396/2,573
Sperm Male	Wt 3,033 No 3,894	4,320	685
Female	Wt 78 No 897	2,880	

Annex H

SC/28/Rep 8

SPERM WHALE STATISTICS
SOUTHERN HEMISPHERE

Last year the Commission combined Divisions 3 and 4, (1,562 males — 1,368 females) and Divisions 1, 2 and 9 (2,024 males — 1,992 females) into single Division quotas. This caused some of the recommended Division quotas to be exceeded.

This is outlined below:

	Quota	Catch 1975-76	Land stations catch 1975 (quota 1976)	Difference
<i>Divisions (Males)</i>				
1 W Atlantic	450	1,245	9 ¹ (18)	-804 (-813)
2 E Atlantic	990	388	—	+602
3 W Indian	1,770	406	862 ² (658)	-104 (+106)
4 C Indian	250	417	—	-167
5 E Indian	900	284	692 ³ (658)	-76 (-42)
6 E Australian	P	—	—	—
7 N Zealand	450	455	—	-5
8 C Pacific	1,260	731	—	+529
9 E Pacific	400	96	554 ⁴	-250
<i>Divisions (Females)</i>				
1 W Atlantic	360	989	45 ¹ (49)	-674 (-678)
2 E Atlantic	810	424	—	+386
3 W Indian	900	—	810 ² (873)	+90 (+27)
4 C Indian	240	371	—	-131
5 E Indian	630	73	480 ³ (487)	+77 (+70)
6 E Australian	270	—	—	+270
7 N Zealand	360	328	—	+32
8 C Pacific	810	839	—	-29
9 E Pacific	490	—	239 ⁴	+251

FOOTNOTES: ¹ Brazil
² South Africa
³ Australia
⁴ Peru

Annex I
SC/28/Rep 14

**REPORT OF THE SUB-COMMITTEE
ON PUBLICATION POLICY**

The sub-committee reconsidered Scientific Committee policy and specifically the handling of documentation for the 28th meeting in light of a greatly increased volume of documentation considered. It makes the following recommendations:

1. Documents upon which management recommendations are based should be made available for public distribution immediately following the meeting of the Scientific Committee making management recommendations.
2. The following procedure is proposed for implementation of this policy:
 - (a) All documents submitted to meetings of the Scientific Committee and its subsidiary elements (sub-committees, working groups etc) should be labelled 'not to be cited without author's permission'.
 - (b) Those documents in (a) which form the basis of management recommendations should be cited in the relevant committee, sub-committee or working group Report. At the time of submission of the Report by the Scientific Committee these documents should be released by
 - (i) re-labelling with the note '*released for citation in relation to management recommendations and decisions of IWC*'.
 - (ii) making publically available, at production cost, a reasonable number (say 50), either of individual documents, or compiled sets in loose-leaf binders.
3. Various options are available for further production and distribution of documents considered in 2(b):
 - (a) Single copies and sets can be made available on a request basis at cost from the Secretariat or
 - (b) The documents can be edited with respect to such items as format and clarity of expression (but not altered in any fashion which relates to the basis of management recommendations made) and produced either in a separate published volume or in a volume combined with other reports as is current practice.
4. The Report of the Scientific Committee and Reports of its subsidiary elements, together with annexes, and a list of documents and national progress reports should be published annually. The format may be a single volume including reports of all meetings or a volume on each meeting which would include the "decision documents".
5. The sub-committee makes the following recommendations regarding the structure and content of documents submitted for consideration by the Committee:—
 - (a) The title should be specific and encompass the content of the report. Literature citations should be made by name and year. An abstract containing

relevant (especially quantitative) conclusions should preface the article. Illustrations should be of a size less than standard page (14 by 8½ inches), drafted to stand further reduction in final printing. Figures and tables should be clearly labelled, captioned, and cited in the text: Details of materials and methods should be clearly laid out. Mathematical expressions, equations and formulae should be defined and clearly explained, showing all symbols clearly in correct position. Greek letters should be spelled out the first time they occur. References should be complete, with difficult journal names spelled out, place of publication given, and full pagination indicated. Excessive tabular material should be relegated to Appendices. The entire paper should be organized under the following (or suitable alternate) headings: Title, Abstract, Introduction, Material and Methods, Results, Discussion, Conclusions, Figures, Tables, References Cited.

- (b) The documents should be typed and duplicated in a consistent format. It is suggested that the Secretary consult with ICNAF for consideration of potential application of its production procedure.
6. The sub-committee has identified the following "decision documents" considered at the 28th meeting and recommends public release of these. A list, with appropriate reference to agenda item, follows:
 - 10.2 Alternative formulae for determining quotas Docs 1,7,8
 11. Status of Stocks

Southern Hemisphere	
FIN	Docs 6,15,37,38
SEI	Docs 4,5,17,36,42,43,44,45,47
MINKE	Docs 4,17,19, Doc 35 Rep 12
SPERM	Docs 2,4,9 Reps 1,8
North Pacific	
SEI	Doc 29
BRYDE'S	Rep 9
MINKE	Doc 20
SPERM	Doc 21,25,34
North Atlantic	
FIN	Doc 37 Rep 2
MINKE	Docs 3,30 Rep 2
Currently Protected Species	
BOWHEAD	Doc 16 Prog Rep 3,11
RIGHT	Docs 4,17,29
BLUE	Docs 4,17,29 Prog Rep 3
HUMPBACK	Docs 4,17,29 Prog Rep 7,11
GRAY	Doc 33
- 12.5 Sperm—Closed Season Doc 39
- 14 Small Cetaceans Rep 3
- 15 Data Collection Rep 3
- 16 Review of Reporting Requirements Reps 2,3
- 18 Humane Killing Doc 31 Rep 4

Humane Killing of Whales

At the Twenty-seventh meeting the Commission accepted a recommendation of the Scientific Committee that it should make enquiries about possible new developments in chemicals and explosives suitable for killing whales and examine ways of improving the efficiency of existing methods, including the killing of small whales where explosives cannot be used, and the training of gunners.

The Commissioners for whaling countries and countries engaged in whaling until recent years were asked to provide details of any developments under these heads since the Commission's Working Party reported in 1959 and of any research or investigational work at present in progress. The following is a summary of the replies received.

AUSTRALIA

No work is being undertaken or is envisaged in the near future. Work undertaken in South Africa is considered adequate for southern sperm whale populations.

CANADA

No research or development has been undertaken in Canada. Most of the Canadian experience is derivative from Norwegian efforts in the North Atlantic. The drive fishery for pilot whales in Newfoundland was one in which small whales were killed without explosives—they were driven ashore and stabbed and their throats cut. Belugas were killed with harpoons or lances. Reference is made to two publications which summarise most of the methods used currently and in the past to kill small cetaceans (*IUCN monograph No 3* and *J. Fish. Res. Bd. Can.* 32(7), 1975).

ICELAND

The only method of killing whales has always been the use of explosives. No research or investigational work has been carried out. The gunners on the four Icelandic catcher boats are very well trained with up to 25 years' experience as gunners and captains of the boats. The first mate takes the place of the captain as gunner in his absence by whom he has been trained in the use of the gun.

NORWAY

Since Norway ceased whaling in the Antarctic in 1968–69 neither the industry nor research institutes have undertaken experiments or scientific study in the humane and expeditious killing of whales.

SOUTH AFRICA

There have been no new developments in the killing of whales other than work recorded in the paper presented to

the Scientific Committee at the twenty-sixth meeting. Around 1963 the whaling company experimented with some drugs but found that the doses required were so large that they had to be delivered by a normal whaling harpoon, rather defeating the humane aspects of the exercise.

USA

Mrs Christine Stevens of the Animal Welfare Institute drew attention to the possibility of the drug etorphine hydrochloride being used for killing whales. It is marketed under the trade name Immobilon by Reckitt and Colman in the United Kingdom and had been used for the immobilisation of game animals. They were asked about the possibility of its being used in the killing of whales and replied as follows:

'It is possible to form an opinion of the utility of the drug for whale hunting. The drug is probably potent enough for the purpose, by analogy with land mammals a dose between 0.1 to 1 gram would be expected to be sufficient for analgesia, but not death, of a 100 ton whale. This quantity could be contained in a suitably designed bullet rather than a harpoon. Etorphine is an analgesic which also causes pronounced respiratory depression and acts in large land animals (elephants and horses for example) in half to two minutes. There appears to be a strong likelihood that relaxation of the blow-hole of an etorphine-drugged whale would allow escape of air from the lungs and they would not be reinflated if the whale surfaced again after being hit. The expectation therefore is that the whale would sink through inability to retain the buoyancy conferred by the air in its lungs.

The parallel case cited by Dr Munton of Whipsnade Zoo, whom I consulted, is that of the hippopotamus which when drugged by an etorphine dart on land still has time to rush into water before the drug takes effect and then the on-set of muscular relaxation causes the animal to sink and drown.

Unless your whaling experts disagree with my lay understanding of the whales reaction to being hit, i.e. that it immediately dives and unless air is retained in the lungs will also sink, it appears unfortunately that etorphine is unsuitable.

The question of drug residues in the flesh is being considered in general terms by your committee and I need not dwell upon it further except to say that under UK law animals treated with Immobilon may not be slaughtered for food for a period of seven days in order to allow time for the drug to be excreted.'

Dr de Jager was asked for his views on the possibility of the use of this drug and he replied as follows:

Etorphine hydrochloride (M99) certainly seems one of the best drugs to try as an alternative method for

killing whales. It has a wide therapeutic index, so that once the correct dose is found there should be no need to alter it for animals of different sizes of the same species. It is also extremely powerful, so that only 0.05 ml of the 0.4% game immobilisation solution could be fatal to man. Delivery of an adequate dose via a dart gun should therefore be feasible.

There are three possible objections to its use:

- (1) The very potency of the drug makes it extremely hazardous to use, especially under field conditions in the whaling industry.
- (2) There is no guarantee that the affected animal will float except possibly in the case of sperm whales. A line attached to the whale is therefore almost a necessity.
- (3) It is unlikely that most health authorities would be prepared to allow the import of or sale of whale productions from animals killed by M99 if these were to be used for human consumption.

Mrs Stevens has also forwarded to Dr Aron the report "Ballistic Delivery of Biological Reagents" prepared for the

US Department of Agriculture, a copy of which has been lodged in the IWC files.

JAPAN AND USSR

No replies received.

The chemical firm Sandoz Ltd of Switzerland drew the Commission's attention to the possibility of the use of the fish-anaesthetic and tranquilizer MS 222 Sandoz for anaesthetizing whales. No work has been done with whales but they thought that it could be used by gun harpoon which would immediately tranquilize the animal offering a faster and cleaner kill afterwards. In reply to recent enquiries Messrs Thomson and Joseph of Norwich, the international marketing organisation for the product, stated that they had not been able to trace any work done on whales. They would be glad to assist in any experimentation.

The problems of safe delivery of drugs and the subsequent marketing of contaminated carcasses suggests that it might be more useful to study the ballistic side of the question in the future.

Report of Sub-Committee to Estimate Stock Sizes of North Pacific Bryde's Whales

Members: Ohsumi, Tillman (Convenor)

The sub-committee reviewed estimates of initial stock size provided by Ohsumi (1977) and Tillman (1977). The estimate of minimum stock size provided by Tillman (1977) for the Japanese coastal area was thought to be low because of the rate of exploitation assumed ($F = 0.04$). Ohsumi (1977) provided evidence that the early rate of exploitation for this area probably was $F = 0.02$. This value was used to re-calculate the estimate for the coastal area, and the new results for Tillman (1977) as well as the original estimate from Ohsumi (1977) are given below:

	Ohsumi (1977)	Tillman (1977)
Initial	20,900 (Total area)	13,100 (Pelagic area)
		6,000 (Coastal area)
		<hr/>
		19,100 (Total area)

The similarity of these two independent estimates for the current total area of exploitation gave credibility to adopting 20,000 as an estimate of initial stock size for Bryde's whales.

Ohsumi (1977) provided evidence from mark recoveries which suggested that the total area of exploitation should

be treated as a single stock, and this has been done in this report. Nevertheless, further investigation concerning the discreteness of stocks of North Pacific Bryde's whales is required.

The current (1976) stock size for the area of exploitation was determined by forward calculating with the model:

$$N_1 = (N_{i-1} - C_{i-1}) e^{-M} + (1 - e^{-M}) N_0$$

where the initial year of heavy exploitation was 1971 and $M = 0.085$ (Ohsumi, 1977). This gave a stock size of 16,230 which is 81% of the initial level.

The North Pacific Bryde's whale thus is still an Initial Management Stock. Since a portion of this stock lies outside the permitted area of exploitation (Tillman, 1977), a safe harvest limit probably would still be 5% of the initial stock estimate, 1000.

REFERENCES

- Ohsumi, S. 1977. Further Assessment of Population of Bryde's Whale in the North Pacific. Paper SC/28/Doc 18 (published in this volume).
- Tillman, M. F. 1977. Estimates of Stock Size for the North Pacific Bryde's Whale. Paper SC/28/Doc 23 (published in this volume).

Whale Marking — Progress Report 1976

S. G. Brown

Whale Research Unit, Institute of Oceanographic Sciences

The following information is available on whale marking carried out during 1975 and 1976, and in the Antarctic season 1975–76 (see Table 1).

A total of 331 whales was marked in the southern hemisphere including 4 blue, 2 fin, 30 sei, 16 Bryde's, 4 humpback, 65 minke and 208 sperm whales. 358 whales were marked in the northern hemisphere, comprising 10 blue, 18 fin, 23 sei, 33 Bryde's, 6 humpback, 156 minke and 112 sperm whales.

Marks were recovered from 1 fin, 2 sei, 3 Bryde's and 7 sperm whales in the North Pacific, and from 2 sperm whales in the South Pacific in 1975. In the North Atlantic 1 mark was returned from a minke whale in 1975. Details of marks recovered in the Antarctic seasons 1974–75 and 1975–76, and at Durban, South Africa, in 1975 are given below.

WHALE MARKS RECOVERED IN THE ANTARCTIC WHALING SEASON 1974–75

Nine whale marks found during the Antarctic whaling season 1974–75 have been reported to the Institute of Oceanographic Sciences, including one mark in the USSR series (see Table 2). There are marks from six sei whales and two sperm whales.

Among the marks from the sei whales, No. 25852 was recovered after eleven years fairly close to the marking position in Area V. The whale bearing No. 30937 was captured after thirteen months very close to the position where it was originally marked in Area V. No. 29208 illustrates movement from Area IV eastwards into Area V after three years. Nos. 30968 and 30974 were fired on 6 December 1973 into two male whales which were swimming in company with a single fin whale in position $41^{\circ}22'/23'S$, $111^{\circ}28'E$ (Area IV). One whale (Mark No. 30968) was shot almost exactly a year later on 19 December 1974 approximately 500 miles east of the marking position. The other whale (No. 30974) was killed one month later on 23 January 1975 some 800 miles west of the marking position. As in the case of some fin whales, it is possible that these two animals kept company until one was killed, when the survivor moved slowly westwards.

There are three marks returned from sperm whales including one in the USSR series. Nos. 30990, 30993 were fired into the same whale on 4 November 1974 in position $32^{\circ}58'S$, $81^{\circ}11'E$ north of Area IV. They were recovered two days later when the whale was killed approximately eighty miles to the north of this position.

WHALE MARKS RECOVERED IN THE ANTARCTIC WHALING SEASON 1975–76

Eight marks found during the whaling season 1975–76 have been reported to the IOS, including one mark in the USSR series (see Table 3). There are marks from five sei whales and two sperm whales.

Of the four sei whales marked in the international scheme series the whale bearing Mark No. 29980 was killed very close to the position of marking three years later. No. 30538 was fired in January 1974 into a whale north of Antarctic Area III, and recovered two years later when the animal was killed in Area IV. Nos. 22734/41 were fired into a female whale in position $46^{\circ}32'S$, $75^{\circ}55'W$ during a marking expedition off the coast of Chile. The whale was shot in the western half of Antarctic Area II just over 9 years later. This southward and eastward movement from off the west coast of South America into the western Atlantic sector of the Antarctic is directly comparable to that demonstrated in fin whales marked in the same region.

Two marks have been returned from sperm whales. No. 25889 was fired into a male in February 1963 off the west coast of South Africa, and the whale was killed nearly thirteen years later approximately 550 miles further north off the same coast. No. 28768 was fired off Durban in February 1973 and recovered from a female whale shot in December 1975 to the south west in position $37^{\circ}02'S$, $19^{\circ}10'E$.

WHALE MARKS RECOVERED AT DURBAN IN THE 1975 SEASON

Whale marking in South African waters has continued and five marks from this programme have been recovered from sperm whales at the whaling station at Durban in the 1975 season. In addition, two marks in the USSR series were also recovered from sperm whales. Details of the seven returns are given in Table 4.

The five marks from the South African marking programme were all fired into whales in waters off the south-east coast in the Durban–Port Elizabeth region. They were all returned from the Durban area, two after just over four years, and two after two years. The fifth mark (No. 30617) is from a whale killed within three days of marking at the end of January 1975.

I am indebted to Dr Best, Dr Ivashin and Dr Masaki for their help in checking data on the recovery of the marks included in this report.

Table 1
Whales Marked During 1975 and 1976, and in the Antarctic Season 1975-76.

	Blue	Fin	Sei	Bryde's	Hump- back	Minke	Sperm	Bottle- nose	Total
<i>Southern Hemisphere</i>									
Antarctic 1975-76 (International Scheme-Japan)	3	2	11	—	—	23	22	—	61
Antarctic 1975-76 (USSR)	1	—	5	—	4	42	49	2	103
North of 40°S (International Scheme and North Pacific Marking 1976- Japan)	—	—	2	16	—	—	68	—	86
USSR 1975	—	—	12	—	—	—	68	—	80
Canada 1975	—	—	—	—	—	—	1	—	1
Total	4	2	30	16	4	65	208	2	331
<i>Northern Hemisphere</i>									
<i>North Atlantic</i>									
Norway 1975	—	—	—	—	2	136	—	—	138
Norway 1976	—	—	—	—	4	15	—	—	19
Canada 1976	2	—	—	—	—	—	—	—	2
<i>North Pacific</i>									
Japan 1975	—	10	8	29	—	5	31	—	83
USSR 1975	8	8	15	4	—	—	81	—	116
Total	10	18	23	33	6	156	112	—	358

Table 2
Marks Recovered in the Antarctic Season 1974-75

Mark No.	Date marked	Date recovered	Time elapsed (years, months)	Position marked	Position recovered	Sex	Length in feet
<i>Sei Whales</i>							
25852	17.xi.63	22.xii.74 (from meat deck)	11.1	41°58'S, 168°33'E	41°57'S, 160°12'E (approx.)	—	—
29208	21.xi.71	15.xii.74	3.1	41°03'S, 123°23'E	40°55'S, 152°13'E	Male	48
30937	15.xi.73	13.xii.74	1.1	39°46'S, 152°38'E	41°09'S, 152°19'E	Female	53
30960	2.xii.73	19.i.75	1.2	42°16'S, 110°45'E	41°51'S, 101°17'E	Female	52
30968	6.xii.73	19.xii.74	1.0	41°23'S, 111°28'E	41°15'S, 122°13'E	Male	45
30974	6.xii.73	23.i.75	1.2	41°22'S, 111°28'E	42°24'S, 92°54'E	Male	47
<i>Sperm Whales</i>							
30990/93	4.xi.74	6.xi.74	0.0	32°58'S, 81°11'E	31°34'S, 81°25'E	Male	43
<i>USSR Series</i>							
650834 (Sperm)		9.xii.74			33°18'S, 70°47'E	Male	37

Table 3
Marks Recovered in the Antarctic Season 1975-76

Mark No.	Date marked	Date recovered	Time elapsed (years, months)	Position marked	Position recovered	Sex	Length in feet
<i>Sei Whales</i>							
22734/41	17.xii.66	26.i.76	9.1	46°32'S, 75°55'W	61°20'S, 56°22'W	Female	52
26942	18.iii.68	9.xii.75	7.9	44°17'S, 177°56'E	42°03'S, 156°09'E	Male	47
29980	9.ii.73	15.ii.76	3.0	64°13'S, 170°41'W	65°29'S, 173°35'W	Female	53
30538	22.i.74	26.i.76	2.0	32°41'S, 67°11'E	43°16'S, 97°48'E	Female	48
<i>Sperm Whales</i>							
25889	24.ii.63	20.xi.75	12.9	33°54'S, 16°56'E	25°00'S, 13°16'E	Male	36
28768	2.ii.73	6.xii.75	2.10	29°52'S, 32°14'E	37°02'S, 19°10'E	Female	34
<i>USSR Series</i>							
A 324 (Sei)		27.i.76 (from meat deck)			51°06'S, 44°17'W (approx.)	—	—

Table 4
Marks Recovered at Durban, South Africa, in the 1975 Season

Mark No.	Date marked	Date recovered	Time elapsed (years, months)	Position marked	Position recovered	Sex	Length in feet
Sperm Whales							
25880	1.ii.71	15.vi.75	4.4	28°51'S, 33°42'E	29°35'S, 33°15'E	Male	34
28864	13.ii.71	12.iv.75	4.2	31°29'S, 31°44'E	30°37'S, 32°22'E	Female	35
29743	10.ii.73	23.iii.75	2.1	34°31'S, 27°31'E	29°43'S, 32°29'E	Female	37
30091	15.ii.73	2.ii.75	2.0	34°18'S, 28°31'E	30°35'S, 32°36'E	Female	36
30617	31.i.75	2.ii.75	0.0	31°01'S, 32°32'E	30°35'S, 32°36'E	Female	33
USSR Series							
650028 (Sperm)		17.vi.75			29°43'S, 32°12'E	Male	39
650675 (Sperm)		27.v.75 (from cooker)			Durban	—	—

Report of Sub-Committee to Estimate Stock Sizes of Southern Hemisphere Minke Whales

Members: Best, Boerema, Borodin, Brownell, De Moura, Ivashin, Ohsumi, Tillman, (Convenor).

The sub-committee reviewed pertinent data and estimates from Best (1977), Masaki (1977), Ohsumi (1977) and Chapman (1976). The sub-committee agreed that the CPUE data based upon catcher hours work (corrected for wind strength and period of operation) and presented in Ohsumi (1977) were the best available indices of minke whale stock abundance, particularly in Area IV.

The rising trend observed in 1975-76 for Area IV was judged to be due to random sampling error. Overall, a minor decline in abundance has occurred in this area since the onset of exploitation in 1971-72. CPUE and sightings data from Best (1977) further indicated that no major decline in availability of this species has occurred off Durban since 1969. The reduced catches in Area IV for 1975-76 were due to the establishment of catch limits by stock and country for the first time in that season.

Ohsumi (1977) utilized the modified DeLury method to estimate the initial abundance of minke whales for Area IV. This estimate was 36,600 and applied to the start of the 1971-72 season. This was thought to be a more reliable estimate than that for Area II since it was based upon two more years of data. Moreover the modified DeLury model may not be applicable to a stock, such as Area II, which has been subject to a long history of exploitation (Table 1).

To estimate stock size in other areas, it was noted that each had been exploited by the Japanese fleet in 1975-76 and, hence, that indices of abundance based upon CPUEs were available for all areas in that year (Table 4, Ohsumi, 1977). The Area IV estimate for 1971-72 thus was forward calculated to 1975-76 using the formula:

$$N_i = (N_{i-1} - C_{i-1}) e^{-M} + R \quad (1)$$

where it is assumed

$$R = (1 - e^{-M}) N_0$$

This formula rather than the one given in Doc 19 was used since, for $M = 0.127$, the approximation of $(1 - M)$ for e^{-M} is not very good.

Since CPUEs are proportional to average stock size during a year, the average for Area IV in 1975-76 was approximated as:

$$\bar{N}_{IV, 75-76} = N_{IV, 75-76} - \frac{1}{2} C_{IV, 75-76} = 25,936$$

The estimates of stock size for the start of 1975-76 for other Areas were then derived from this estimate and the 1975-76 indices of abundance as follows:

$$N_{A, 75-76} = \frac{(IA_{A, 75-76})}{(IA_{IV, 75-76})} \bar{N}_{IV, 75-76} + \frac{1}{2} C_{A, 75-76}$$

where A denotes the appropriate Area.

To obtain initial stock sizes, the 1975-76 estimates were then back calculated to their initial year of

exploitation (Table 1) utilizing the following formula for each area:

$$N_{i-1} = (N_i - R) / e^{-M} + C_{i-1}$$

It was first assumed that R was equal to

$$(1 - e^{-M}) N_{75-76} + \text{cumulative catch to 1975-76.}$$

Table 1
Catches by Season and Stock Area for Southern Hemisphere Minke Whales

Season	I	II ¹	III ²	IV	V	VI
1965-6		67	2			
1966-7		352	5			
1967-8		488	6			
1968-9		456	97			
1969-70		617	112			
1970-1		701	171			
1971-2	3	902	553	2,660		
1972-3	-	702	1,322	4,558		
1973-4	1,257	826	1,871	4,569		13
1974-5	1,870	1,571	1,474	2,231	734	-
1975-6	1,045	2,202	2,265	881	631	159
Cumulative Catch	4,175	8,884	7,878	14,899	1,374	172

¹Including catches from Brazil

²Including catches from South Africa

Then, succeeding back calculations were undertaken using each improved estimate of N_0 , i.e., assuming $(1 - e^{-M}) N_0$. This alternative process was stopped when successive estimates of N_0 differed by 1% or less. Current stock sizes were then obtained using equation (1) and forward calculating from 1975-76.

The results obtained are given in Table 2, along with estimates of MSY level and catch limits for each stock. It was assumed the MSY level was equal to 60% of initial stock size (Chapman, 1976) and that 5% of initial stock size was a safe catch limit. Comparison of current stock size with MSY level indicated that all Areas should be classified as Initial Management Stocks.

The sub-committee examined the sex ratios of catches by statistical series within areas for several years and determined that the sexes segregate geographically. Consequently some bias may be introduced into the above estimates by treating the sexes together rather than separately. The sub-committee recommended that future stock assessments undertake a detailed analysis of the possible effects of this segregation.

The sub-committee also discussed the question of whether land station catches in the Southern Hemisphere are taken from the same stocks as the pelagic catches. Brownell

Table 2
Stock Sizes of Southern Hemisphere Minke Whales
Stock Sizes (000s)

Area	Index of Abundance	1975-6	Current (1976-7)	Initial (year)	MSY ³ level	Ratio of Current to MSY level	Yield ⁴
I	4.848	16.7	16.1	19.3 (73-4)	11.6	1.39	965
II	9.528	32.9	31.5	37.1 (65-6)	22.3	1.41	1,855
III	14.770	50.4	48.9	54.6 (68-9)	32.8	1.49	2,730
IV	7.770	26.4	26.8	36.6 (71-2)	22.0	1.22	1,830
V	7.998	27.0	26.5	27.7 (74-5)	16.6	1.60	1,385
VI	2.150	7.3	7.1	7.3 (75-6)	4.4	1.61	365
Total		160.7	156.9	182.6	109.7		9,130

³ Assumed as 60% of initial

⁴ 5% of initial stock size

presented a series of photographs from the Brazilian land station and Antarctic Areas V, VI, I and II. Similar color patterns noted between these two sets of photographs provided additional information suggesting that both pelagic and coastal catches are taken from the same stocks.

The sub-committee again emphasised that additional information is needed as soon as possible on stock identification in the Southern Hemisphere. In this regard, the best location for a marking study might be on the Brazilian winter grounds.

REFERENCES

- Best, P. B., 1977. Status of whale stocks off South Africa 1975. Paper SC/28/Doc 4 (published in this volume).
 Chapman, D. G., 1976. Estimates of stocks (original, current, MSY level and MSY) as revised at Scientific Committee Meeting June 1975. *Rep. Int. Whal. Comm. (Sci. Rep.)*, 26: 44-7.
 Masaki, Y., 1977. Japanese pelagic whaling and whale sighting in the Antarctic 1975-76. Paper SC/28/Doc 17 (published in this volume).
 Ohsumi, S., 1977. Estimation of population sizes of the Southern Hemisphere minke whale at the initial and 1976-77 level. Paper SC/28/Doc 19 (published in this volume).

Report of Meeting Convenors of Standing Subgroups

Convenors met briefly at 2.15 pm on 25/6/76 and agreed as follows:

1. Mathematical (convenor, Tillman)

Proposed members: Tillman, Chapman, Allen, Borodin, Horwood, Rørvik, Boerema, Holt, Fukuda.

Business shall be carried out by correspondence during the year; priority should be given to a generalised model for baleen whales.

2. Sperm Whales (convenor, Bannister)

Proposed members: Bannister, Best, Ohsumi, Ivashin, Allen.

The convenor will correspond with members to arrange specific data collection and analyses during the year.

3. Northern Hemisphere Baleen Whales (convenor, Brown)

Proposed members: Brown, Mitchell, Jonsgård, Chris-

tensen, Jónsson, Masaki, Rørvik.

The convenor will correspond with members to review problems to study during the year and at next year's Scientific Committee meeting.

4. Southern Hemisphere Baleen Whales (convenor, Ohsumi)

Proposed members: Ohsumi, Breiwick, Best, Holt, Lockyer, Ivashin.

It was agreed that sei whales should receive priority attention. The convenor should arrange a sub-group meeting during the year.

5. Small Cetaceans (convenor, Brownell)

It was agreed that the Convenor should act by correspondence during the year, with North Atlantic bottlenose problems to receive priority.

It was agreed copies of all correspondence should be sent to the Secretary of the Commission and the Chairman of the Scientific Committee.

Report on Commission Contract for Development of Data Base and Routine Computer Analyses

D. G. Chapman

In its 1975 report the Scientific Committee recommended a contract be entered into to provide

- (a) a master set of data
- (b) routine resuming of computer programmes.

A detailed proposal was given in the 1975 Report, Annex N. A sub-committee of Chapman (Convenor), Allen, Ohsumi and Gambell was appointed to co-ordinate the work. The recommendation of the Committee was adopted by the Commission.

In October Chapman notified other members of the sub-committee that Mr J. Breiwick was available to carry out this work. Other Committee members agreed that he should do so under the supervision of the Committee co-ordinator. The Secretary of the Commission indicated that Chapman should proceed on a reimbursement basis. Chapman then proceeded to communicate with Mr E. Vangstein, of the Bureau of International Whaling Statistics, who promised to provide tapes of basic data from the Bureau's files. A computer tape of data from 1959 to 1971

for all species from the southern oceans was received shortly and Breiwick began work. Considerable difficulty was experienced in translating these tapes to the computer system available in Seattle. When this was accomplished Breiwick prepared programs to extract data from these tapes. It became apparent that running these programs would be moderately expensive and that it would be much more cost effective to wait until further computer data tapes covering other time periods were received from the Bureau. Since these were not forthcoming the work was put in abeyance and no further charges were made to the Commission. It is our understanding that Mr Vangstein is actively pursuing the problem of preparing the computer tapes required for this study but has encountered unforeseen difficulties. Costs to date for Breiwick's salary and computer activities amount to slightly more than \$2,000. If the Commission and Secretary believe it would be useful this work could be resumed under contract as soon as the remaining tapes are received from the Bureau.