Review of IWC Scientific Committee's assessments of issues from 1986 to 2012 and recommendations to increase support for conservation-related issues

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Abstract
The International Whaling Commission's Scientific Committee provides important advice to the Commission on a large variety of cetacean species, sub-species and populations and the issues affecting them. Cetaceans are facing increasing threats and the Scientific Committee, in accordance with the Commission's requests, has strengthened its conservation-oriented research work. A selection of the reports of the Scientific Committee from between 1986 and 2012 was assessed for its primarily (i) scientific, (ii) management, (iii) conservation-focused and (iv) administrative content. We also examined recommendations and their urgency, as implied from the phrases used by the SC in its reports, and determined that increased support for conservation-related research projects is warranted. This will promote the long-term survival of cetacean species, sub-species and populations. The work of the Scientific Committee oriented toward conservation issues has increased over the period reviewed but has received little funding. This includes the work of the Small Cetacean sub-committee which makes important contributions to the conservation agenda of the Commission, but is funded from the Small Cetacean Voluntary Fund. This funding source varies significantly from year to year, making planning difficult. Based on our review of the content and focus of the Committee, we urge that the advice issued by the Committee is made clearer where possible and that consideration is given to enhanced and more consistent funding of all conservation-related research.

Introduction

In recent decades, the rate of biodiversity loss has increased and human activities have caused the extinction of countless species (MEA, 2005). Cetaceans are no exception: about 34 species, subspecies and subpopulations are classified by the IUCN as Critically Endangered or Endangered. The baiji (*Lipotes vexillifer*), a freshwater dolphin from the Yangtse River in China, was declared functionally extinct in 2006 (Turvey *et al*., 2007) and several other cetaceans are in immediate danger of extinction. Furthermore, the status of most small cetacean populations is poorly known, with 58% of species classified by the IUCN as data deficient (IWC, 2010), and it is likely that many of the populations of these species are also threatened.

Cetaceans face an array of existing and emerging threats from anthropogenic activities that include direct removals, bycatch in fisheries, entanglement, ship strikes, habitat loss, pollution, outbreaks of infectious diseases and epidemics, climate change, acidification and marine noise pollution, among others (DeMaster *et al*., 2001; Laist *et al.,* 2001; Read *et al*., 2006; Van Bressem *et al.,* 2009; IWC, 2013a; Simmonds *et al.,* 2014). Some species are threatened across most of their distributions, some across only part of their ranges, while for others there is too little information about their distribution and abundance to be able to assess their conservation status. Therefore, responding to the conservation needs of cetaceans poses a number of difficulties. Among them, impacts may be cumulative and/or synergistic and they are difficult to monitor and assess in relatively short periods of time. In order to avoid extinction a precautionary approach is necessary whenever a species, sub-species or population is likely to be threatened or known to be declining. However, human-induced mortality of cetaceans continues to increase in many cases.

The IWC established the Conservation Committee in 2003 in order to facilitate the implementation of a Conservation Agenda and to make conservation-related recommendations to the Commission. In 2009 it endorsed Conservation Management Plans as a practical tool for improving the conservation status of the most at-risk cetacean populations (IWC, 2009a). In addition, the IWC Scientific Committee (SC) has been requested to provide advise to the Conservation Committee in its task of implementing the Conservation Agenda (IWC, 2004a), which also includes the review of Conservation Committee draft documents.

The increasing amount of work of the SC on conservation-oriented topics has been extensively influenced by the Commission itself, through the adoption of a number of resolutions fostering the establishment of several sub-committees and working groups, as well as to direct the work of the SC on a number of issues, including those in the Arctic, whale watching, environmental threats, small cetaceans, etc. In return, the SC has very regularly provided important management as well as conservation recommendations to the Commission on a large variety of species. When the Commission adopts the SC report, it usually agrees to all or at least the majority of the recommendations in the SC report. The statements made by the SC are very important for the work of the Commission, influencing the Commission's work e.g. when identifying species of special concern, highlighting specific threats or recommending mitigation measures.

The SC regularly receives and reviews scientific documents that cover a wide range of cetacean research topics. Here we present a basic historical analysis of statements in the SC reports from 1986 to 2012 and make suggestions to increase support for those issues for which some of the most urgent statements have been made, for example those related to the long-term conservation of cetacean species and populations.

This review and its recommendations below are intended to stimulate discussions over the role and purpose of SC conservation-oriented work and lead to the improvement of the SC communication with the Commission and enhance actions to benefit cetacean conservation.

Methods

The SC meets annually and provides advice to the International Whaling Commission on many issues concerning cetaceans. Thirteen SC reports from the annual meetings spanning the period 1986 (when the moratorium was implemented) and 2012 were selected randomly in order to cover each sample period (three from 1986-1989, four from 1990-1999 and 2000-2009 respectively, and two from 2010-2012) and to ensure a uniform and continual overview of the SC's work. The reports were analyzed for statements made in four categories:

- scientific matters - when a comment/conclusion is primarily aimed at gathering new scientific information, ongoing research projects, etc.;
- management matters - when a comment/conclusion is primarily aimed at giving advice regarding direct removals of cetaceans;
- conservation matters - when a comment/conclusion is primarily aimed at bringing attention to threats and/or status, or improving the conservation of a species/subspecies/population;
- administrative matters - when a comment/conclusion is primarily aimed at establishing working groups, providing funds for proposals, sending letters, etc.

These categories are all, of course, primarily "scientific" in nature and thus, it may also be argued that pure "scientific matters" can have conservation or management implications (or being used as the basis for such efforts) since they provide basic information about the status of cetacean populations.

In addition formal statements of the SC include at least 36 standardized terms such as "**the SC Notes…", "…Agrees…", "…Expresses Concern…", "…Recommends…", "…Requests…", "…Urges…", "…Stresses…", "…Suggests…", "…Welcomes…", "…Strongly recommends…", "…Strongly expresses concerns…"**, etc. (Table 1).

Whenever the report transcribed the authors' views and/or comments of other members during paper discussions, those statements were not included in the analysis. Administrative sections of the report such as welcome and opening remarks, meeting arrangements, adoption of the agenda, review of available data, documents and reports, cooperation with other organizations, funding requirements, working methods, etc. were not included in the analysis, unless important items were highlighted. Work plans of different sections were also excluded because most frequently they reiterated previous recommendations made in the report. Welcome and acknowledgement for

contribution of papers were also excluded from the analysis unless they were followed by an additional comment regarding its importance, continuation, etc.

The SC standing sub-committees and working groups are all established according to its annual agenda (IWC, 2012). Proportions of statements made by SC sub-committees and working groups by category were analyzed. However, during the period considered these groups have varied in their names and with respect to the topics that they covered, which sometimes made comparisons difficult. For example, Sperm Whale sub-committee (Sp) was only established in one of the analyzed year, or Southern Hemisphere minke whales have been covered on different sub-committees over the years such as Southern Hemisphere Minke Whake (SHMi) or In-Depth Assessment (IA).

SC reports were also analyzed from a financial perspective, according to the four categories and to quantify how much funding was allocated to each.

Results

Since 1986, the breadth of the work of the SC has increased steadily, which can be inferred from the increasing number of subcommittees and working groups that have been established, as well as the range of topics addressed by the SC over the years. This is reflected in the number of pages of the reports and the number of statements in each report, which has increased accordingly and is significantly correlated to the number of pages of the reports ($p<0.005$, Figure 1).

A total of 3,259 statements were made in the 13 SC reports reviewed from 1986 to 2012. Of these, 76% were *scientific statements*, 10% were *conservation statements*, while *management* and *administrative* statements represented 7% each. However, the percentage in each category has varied through the years (Figure 2). Particularly, although the number of *conservation statements* has increased, their relative proportion has shown more variation through the years compared to *scientific statements* (Table 2, Figure 3). The number of *management statements* has been relatively stable through time, but their proportion decreased due to the increase in the total number of statements. Also, the higher proportion of *management statements* in 1994, 2001 and 2008 coincides with the development of and technical discussions on the revised management procedure (RMP) and the strike limit algorithm (SLA) (Table 2, Figure 4).

Standing sub-committees and working groups have also varied through the years in respect to the number of sub-committees/working groups, the topics covered and their names. Small Cetaceans (SM), Special Permits (SP) and Aboriginal Subsistence Whaling, either under Aboriginal Whaling Management Procedure (AWMP) or under Protected Species and Aboriginal/Subsistence (PS, ASW) sub-committees, were discussed during all the years analyzed. Discussions on the status of whale populations take place in a wide range of sub-committees that varied from Sp, SHMi, IA, North Atlantic Minke Whales (NAMi), Other Baleen Whales (Ba), North Atlantic Humpback Whales (NAH), Southern Hemisphere Baleen Whales (SHB, SH), North Atlantic Baleen Whales (NAB), North Pacific Minke Whales (NPM), Bowhead, Right and Gray Whales (BRG), etc. Therefore comparisons over time are difficult. Other sub-committees and working groups that have been established in different years include Management Procedures (MP), Sanctuaries (SAN), RMP, Environmental Concerns (E), Whalewatching (WW), Estimation of By-Catch and Other Human-Induced Mortality (BC), Stock Definition (SD), Ecosystem Modeling (EM) and DNA.

The sub-committees and working groups that produced most *conservation statements* were SM (44%), BRG (19%), WW (16%) and E (11%). The sub-committees that contributed most of the *management statements* were AWMP/ASW (50%), RMP (16%) and BRG (16%). *Scientific statements* were more evenly distributed among the sub-committees and working groups (Table 3).

Importantly, the SM sub-committee usually addresses a large variety of species and threats, thereby making considerable contributions to the conservation agenda of the Commission. It is also one of the sub-committees that has contributed the most *scientific statements*. Moreover, the BRG sub-committee includes considers several small

endangered stocks and also stocks that are subject to aboriginal subsistence whaling; therefore, it is expected to make a significant contribution to both *conservation* and *management statements*.

In addition to the quantitative analyses of the SC reports, there are qualitative aspects in the wording of the reports that can be highlighted in relation to the strength, clarity or absence of statements.

Agreement. Some discussions do not reach agreement and the reporting of such situations has changed through time. Only rarely is there explicit mention such as "*the SC was unable to reach agreement*"; sometimes the discussion is reported and statements are made such as "*with only a few members dissenting, the Committee agreed…*" or "*the majority of members…*", or "*with a minority statement…*". Furthermore, sometimes the discussion is not reflected in the report and statements such as "*draws attention (of the Commission) to those discussions (in previous years) which are not repeated here.*" or the statements and discussions are given only in an Annex. The lack of clarity and specificity is difficult for readers that have not followed previous discussions or comments and does not facilitate a better understanding by the Commission of the scope of the discussions.

Absence. Occasionally there is an absence of statements when a threat is known. For example, in 2008 several studies on vessel collisions with cetaceans were analyzed, various critical locations were identified, options to mitigate entanglements reviewed, and threats faced by several species of small cetaceans in the Southeast Pacific discussed. However, the SC did not make explicit statements expressing concern or make specific recommendations. These situations have also been variable through the years, and particularly because most such statements are generally related to conservation, this may partly explain the variability in the relatively low proportion of *conservation statements*.

Strength. A third aspect refers to the variability and strength of statements over time. An example concerns discussions about the baiji (*Lipotes vexilifer*). In 2003, the SC congratulated the government of China for their conservation efforts; in 2005, the SC "*agrees concomitant in situ conservation work should be pursued in areas ostensibly subject to lower levels of risk*". However, the SC did not express serious concern on the baiji population status nor did it make additional statements, and in 2007 the species was already declared functionally extinct. In the case of the vaquita (*Phocoena sinus*), the SC statements have varied from "*welcomes this news and thanked the President of Mexico for this important conservation measure*" to "*reiterates its extreme concern on the status…*" and "*strongly recommends that all gillnets should be removed from the upper Gulf of California immediately*".

In the same way, the SC has also made more general statements, such as "*strongly advise there should be an interim halt in all direct catches…*" or "*strongly request the Commission urges the relevant authorities to develop and implement a comprehensive, long-term conservation and monitoring programme*", or "*recommends that the IWC urges its member governments to join international efforts to reduce greenhouse gas emissions*", or "*repeats its advise on this population that it is a matter of absolute urgency that every effort be made to reduce anthropogenic mortality to zero*".

Funding. As for SC funding requirements, for the 13 years analyzed, a total of £2,849,384 has been allocated. A large proportion (62%) is directed towards scientific research (related to knowledge about whale abundance, stock structure, movements, etc.), followed by work related to management (18%, related to review of special permits, development of RMP and AWMP, etc.) and administrative matters that refer mostly to Invited Participants (IPs, 11%). Only 9% of funding has been allocated to scientific work with a conservation perspective (to assess threats and investigate mitigation measures for vessel collision, entanglement, pollution, etc.) (Figure 5). Moreover, most of these funds supported workshops rather than specific field activities, such as identification/quantification of threats, modeling or the investigation/testing of mitigation measures (Table 4). Note that the larger expenditure on "conservation" in 1999 (Figure 6a) corresponds to funds allocated in the 1999-5 resolution that allocated funds for research on environmental threats to cetaceans from the IWC reserve (£100,000 – IWC, 2000a). However only a small amount was actually spent on "conservation" (the Pollution 2000+ project) the majority was diverted to, and spent on, ship-based surveys that have provided minimal conservation-relevant data, therefore funds that should have helped to address critical conservation issues, as was intended by the IWC Commissioners, were diverted to non-conservation focused surveys.

The SM sub-committee could not be included in these analyses because funding for this sub-committee has come exclusively from the Small Cetacean Voluntary Fund, established in 1994. This fund received voluntary contributions from 1995 to 2012 for a total of approximately £464,000. Furthermore, this voluntary fund also covers funding for IPs to SM sub-committee, which are not covered by the SC budget. As a direct comparison, during the 18-year period from 1995 to 2012, the SC received approximately £4,700,000 from the Commission and therefore the Small Cetacean Voluntary Fund represents about 10% of the Commission-allocated funds to SC. Note also that one large contribution from the Australian Government in 2009 to the Small Cetacean Voluntary Fund represents more than 50% of the contributions received from 1995 to 2012.

Discussion and recommendations

The results of this basic analysis show that the IWC SC has increased the amount of work oriented towards conservation issues between 1986 and 2012. Moreover, while the proportion of *scientific statements* and the number of *management statements* have been relatively stable through time, the number of conservation statements has increased. Even though the SC sometimes produces or receives information that could suggest conservation recommendations to preserve cetacean populations, sometimes this is not highlighted in the report and/or no comments are made. We recommend clearly addressing and highlighting such issues so that the Commission will be better able to fulfill its conservation mandate.

Most of the budget for conservation-oriented purposes has been allocated to workshops rather than to specific studies directed to evaluate risks or investigate mitigation measures. Despite a lack of funding, those conservation activities that have occurred have often had substantive effect on highlighting issues on a global scale (e.g. noise from sonar, seismic surveys, shipping & pile-driving, whalewatching impacts, oil spill concerns, marine debris, emerging diseases, renewable energy impacts) that have led to conservation activity beyond the deliberations of the IWC.

A particular case is the standing sub-committee on small cetaceans, which deals with most of the work related to several species that need urgent conservation attention but does not receive any direct funding from the SC budget; rather, it relies exclusively on the Small Cetacean Voluntary Fund, whose amount significantly varies from year to year and hence cannot be considered a stable resource. Given the status of cetaceans world-wide and the heavy conservation-oriented workload of the SC, it has received comparably little SC funding (9%) in contrast to the funding allocated to management (18%) or (non- conservation oriented) scientific purposes (62%).

In order to facilitate the work of the Commission and its members, as well as of the relevant committees such as Conservation Committee, we propose that the statements made by the SC should more clearly indicate the degree of concern felt. We believe this would increase support for conservation-related research projects. This approach would ultimately help enhance the long-term survival of cetacean species, sub-species and populations, clearly a central purpose of the Commission.

We therefore suggest the following:

- Clearly and consistently highlight conservation concerns whenever data show this is necessary, bearing in mind that the IWC is developing inventories of regional cetacean conservation measures. Hence, when reviewing a paper or agenda item, point out aspects regarding status, potential threats, or mitigation measures that can improve and support the IWC conservation work or as guidance for Range States.
- Always include clear statements, when required, to point out the delicate conservation status or increasing risk for cetacean species/subspecies/populations.
- Always reiterate previous statements where necessary, especially when States or the Commission have not adequately addressed what was previously proposed or when the conservation status of the relevant species/subspecies/population has not improved.

- Always include a summary of the status of the species/subspecies/population and the action needed, even if they were addressed in previous years or can be more extensively found in the Annexes.
- Whenever there is no agreement among SC members over an important discussion, properly highlight it in the report including statements such as "*did not reach an agreement… with a minority/majority stating …*".
- Increase the funding allocated for conservation-oriented research, as part of the Scientific Committee´s mandate and agenda, and support specific research activities aimed at developing conservation or mitigation actions.
- Include the budgetary needs of the standing sub-committee on small cetaceans into the general SC budget.
- Consider making the results of IWC workshops more accessible: some are easier to find than others. Often these workshops contain important advice, such as the workshop on Marine Debris (IWC, 2013a), that can be immediately helpful for the members of the Commission and other nations and intergovernmental bodies.
- Consolidate the mandate of the standing sub-committee on small cetaceans by agreeing on terms of reference reflecting its breadth of work over the last two decades (IWC, 2010)
- Make an annual compilation of concerns and recommendations to be forwarded to the Secretariat to contracting and non-contracting governments, intergovernmental organizations and other entities to be considered in the development of national and regional cetacean action plans as appropriate.

In addition, we note that the Scientific Committee Rules of Procedure refer to specific topics of 'current concern' that date back to 1993 and therefore omit several resolutions with directives to the SC to undertake specific tasks after this (IWC, 2010). For example, the Rules of Procedure do not mention resolution 1998-5 on Environmental Changes and Cetaceans that "*directs the Scientific Committee to give high priority to implementing the research initiatives of the Standing Working Group on Environmental Concerns and to continue to produce costed scientific proposals for non-lethal research to identify and evaluate the impacts of environmental changes on cetaceans in all priority areas*" (IWC, 1999) or resolution 1999-4 on the Health Effects from the Consumption of Cetaceans "*requests the Scientific Committee to receive, review and collate data on contaminant burdens in cetaceans and forward these as appropriate to the World Health Organisation (WHO) and competent national authorities, and to report on this matter to the Commission*" (IWC, 2000b). Although SC has advanced in many of those aspects and the Rules of Procedure and Financial Regulations were recently amended at IWC 64 (IWC, 2012), the Rules of Procedure of the SC continue to be somewhat outdated. The Commission may, therefore, wish to consider amending the Terms of Reference of the Scientific Committee.

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Table 1 – Most commonly used statements in SC reports (normally in the form of "*The SC agrees / recommends / supports*", etc)

Acknowledges	Expresses with serious concerns	Stresses
Adopts	Expresses regret	Strongly advises
Advises	Notes	Strongly encourages
Agrees	Notes with serious concerns	Strongly endorses
Commends	Reaffirms	Strongly recommends
Concurs	Recognizes	Strongly reiterates
Considers	Recommends	Strongly supports
Draws attention	Re-emphasizes	Suggests
Emphasizes	Reiterates	Supports
Encourages	Requests	Thanks
Endorses	Repeats its recommendation	Urges
Expresses concerns	Repeats its advise	Welcomes

Table 2 – Number (#) and proportion (%) of SC statements in the four categories considered from 1986 to 2012.

	Conservation		**Management**		**Scientific**		**Administrative**		**Total SC**
Year	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**Statements**
1986	3	4.5	9	13.4	53	79.1	2	3.0	**67**
1987	5	7.5	7	10.4	53	79.1	2	3.0	**67**
1988	5	3.0	12	7.3	135	82.3	12	7.3	**164**
1992	9	3.9	15	6.6	178	78.1	26	11.4	**228**
1994	23	14.1	14	8.6	124	76.1	2	1.2	**163**
1996	22	8.1	16	5.9	203	75.2	29	10.7	**270**
1999	33	13.8	12	5.0	174	72.5	21	8.8	**240**
2001	33	9.1	32	8.9	255	70.6	41	11.4	**361**
2003	37	16.5	10	4.5	171	76.3	6	2.7	**224**
2005	24	7.4	15	4.6	246	76.2	38	11.8	**323**
2008	52	11.9	32	7.3	344	78.9	8	1.8	**436**
2010	60	15.3	19	4.8	261	66.6	52	13.3	**392**
2012	46	14.2	14	4.3	244	75.3	20	6.2	**324**
TOTAL	**352**	**10**	**207**	**7**	**2441**	**76**	**259**	**7**	**3259**

Table 3 – Accumulated SC Statements and proportions from 1986 to 2012 according to discussion topics, sub-committees and working groups. Shaded cells highlight the topics that contribute more than 10% of the statements made in three categories considered for this analysis.

Topics	Conservation		Management		Scientific	
	#	%	#	%	#	%
Revised Management Procedure	3	0.9	33	15.9	355	14.5
Aboriginal Whaling Management Procedure / Protected species & Aboriginal subsistence whaling	9	2.6	103	49.7	260	10.7
In depth assessment	0	0	0	0	170	7
North Pacific minke whales	1	0.2	1	0.5	103	4.2
Bowhead, right and gray whales	66	18.8	34	16.4	205	8.4
Other Southern Hemisphere Whales	9	2.6	0	0	296	12.1
Other species/regional subcommittees**	2	0.6	7	3.4	155	6.3
Stock definition, Ecosystem modeling and DNA	0	0	0	0	106	4.3
Estimation of bycatch and other human-induced mortality	4	1.1	0	0	87	3.6
Environmental concerns	40	11.4	0	0	113	4.6
Whalewatching	55	15.6	0	0	56	2.3
Small cetaceans	153	43.5	11	5.3	294	12
Sanctuaries	5	1.4	2	1	16	0.8
Special Permits	1	0.2	8	3.9	110	4.5
Others	4	1.1	8	3.9	115	4.7
TOTAL	**352**	**100**	**207**	**100**	**2441**	**100**

** Includes several subcommittees related to whale studies such as Southern Hemisphere minke whales, North Atlantic humpback whales, North Pacific Bryde's whales, sperm whales, other baleen whales, etc.

Table 4 – List of budget requested and allocated to conservation-related projects from SC budget

Year	Project Proposal	Initial Amount (£)	Reduced Amount (£)
1988	Meeting on cetacean mortality in fishing nets	30000	30000
1999*	Pollution 2000+	350000	65000
1999	WW long-term effects workshop	8000	8000
2001	Pollution 2000+	103000	8200
2001	Fishery-cetacean competition workshop	15000	10000
2001	Habitat degradation workshop	31000	0
2003	WW intersessional workshop	5000	0
2003	Pollution 2000+	52000	25000
2003	Habitat degradation workshop	15500	0
2005	Impact on cetaceans from seismic surveys. Workshop	6000	4000
2005	Arctic sea ice – body condition and health	20000	0
2008	Workshop on Climate Change Implications for Cetaceans	45000	22500
2008	Pollution Modelling Workshop: Development of Phase II of Pollution 2000+	1000	1000
2008	Participation in conference on marine mammal protected areas	15270	10000
2010	Risk assessment modelling to determine the impact of pollutants on cetacean populations	52400	52500
2012	Pre-meeting workshop on assessing the impacts of marine debris	20500	20500
2012	Whale watching guidelines and operator training in Oman	3500	3500

* Funding allocated from IWC reserves under resolution 1999-5

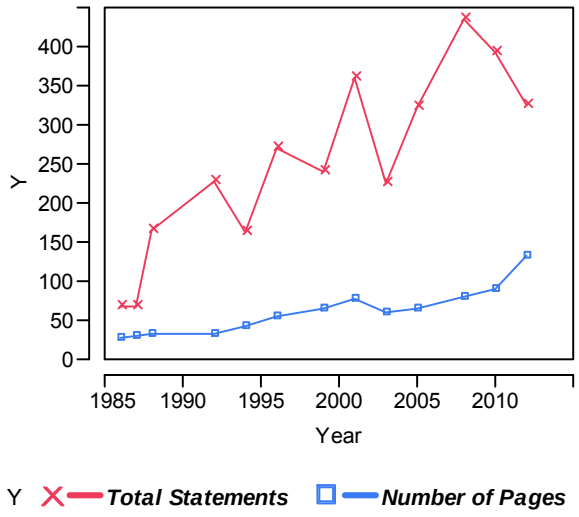

Figure 1 – Number of statements and pages from SC report analysis from 1986 to 2012

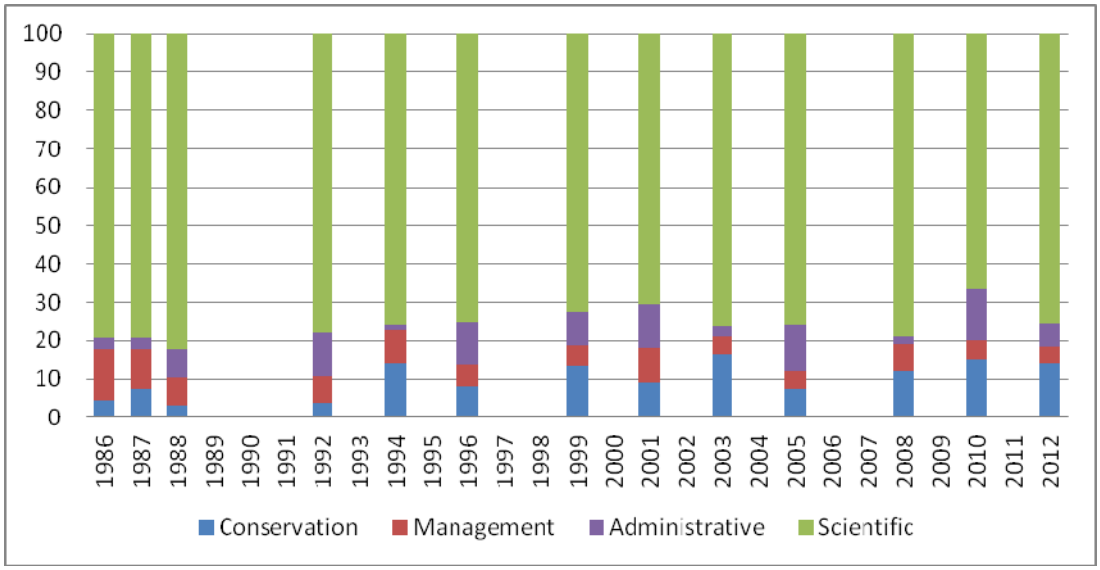

Figure 2 – Percentage of SC statements in the four categories considered

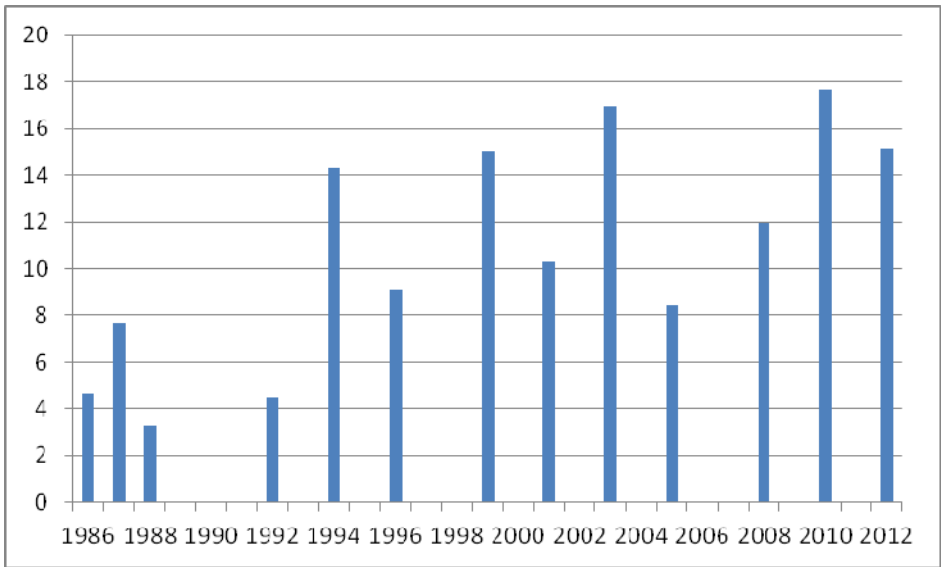

Figure 3 – Percentage of SC *conservation statements* over the total number of statements from 1986 to 2012

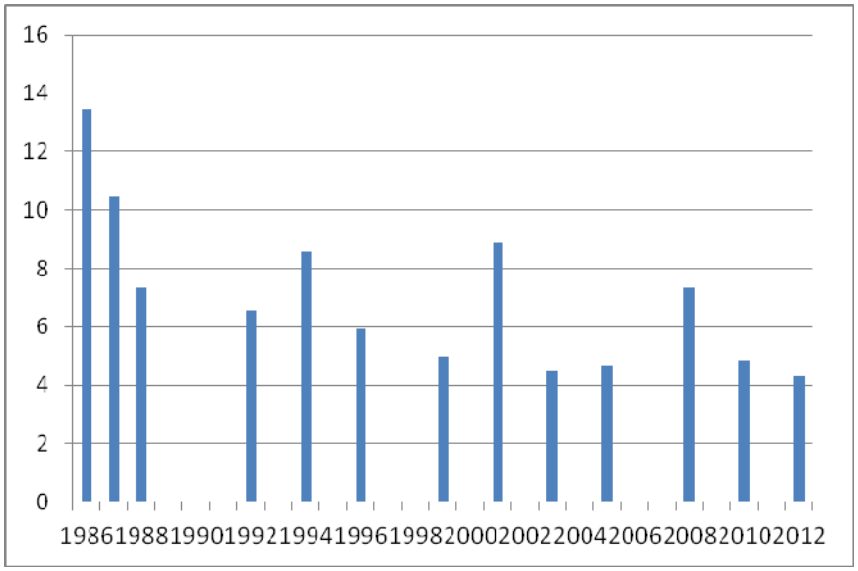

Figure 4 - Percentage of SC *management statements* over the total number of statements from 1986 to 2012

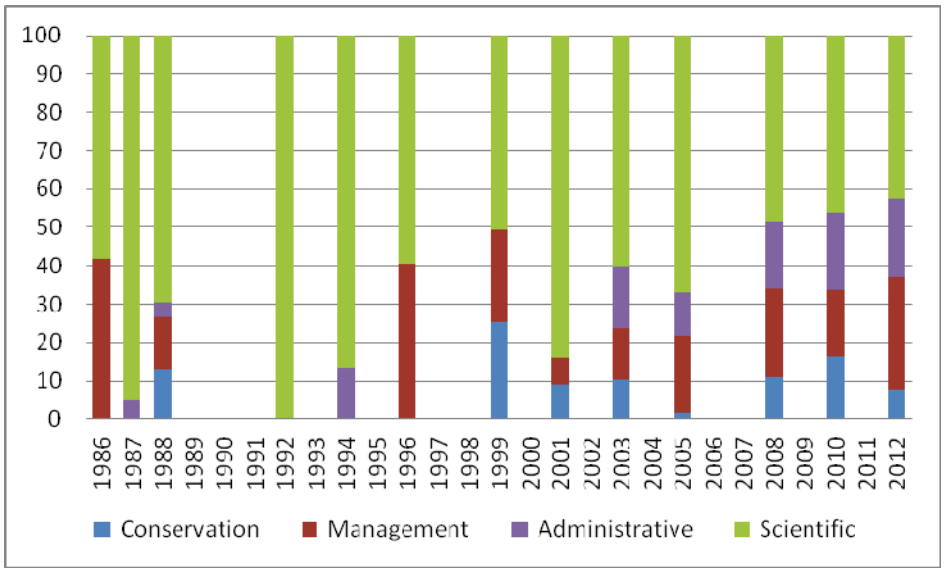

Figure 5 – Percentage of SC funding distributed among the four categories.

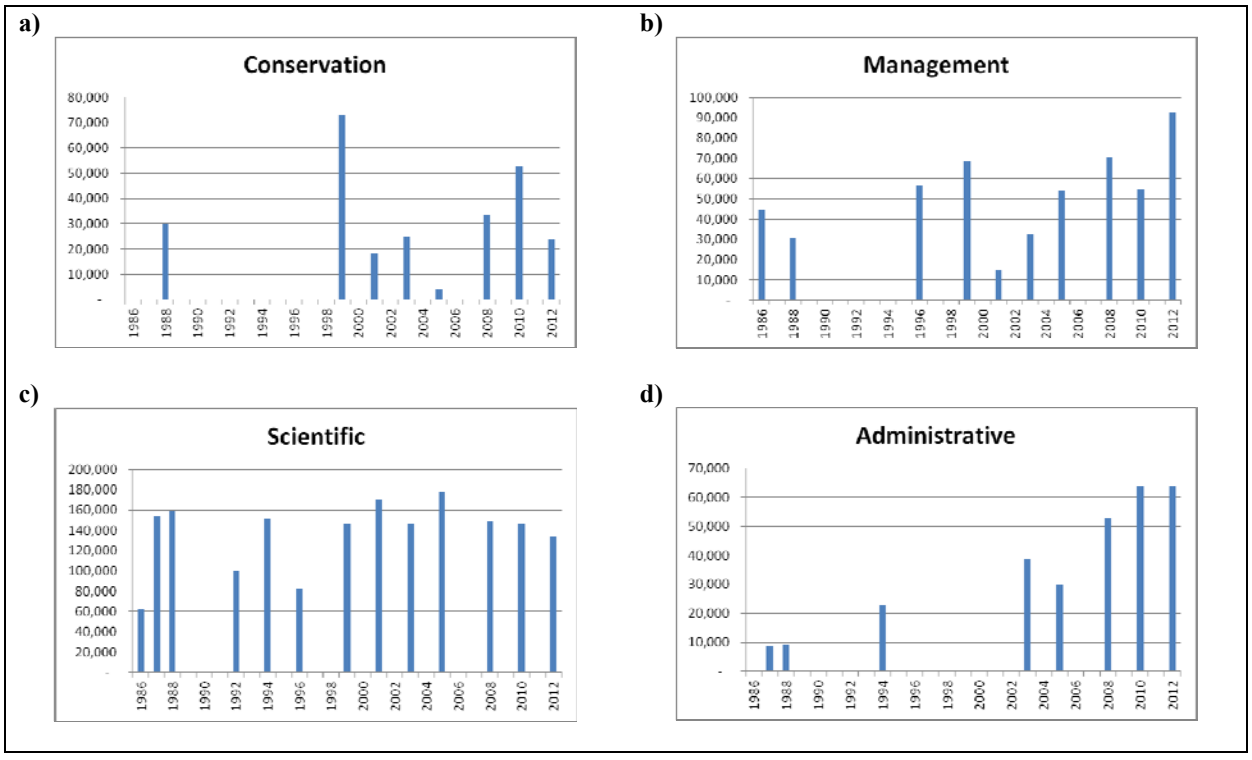

Figure 6 – Details of funding in pounds allocated to: a) conservation b) management c) scientific and d) administrative purposes