

Grey Literature in the Life of GESAMP, an International Marine Scientific Advisory Body

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Abstract: GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), an international marine scientific advisory group sponsored by several UN bodies, has published significant reports on marine pollution and marine environmental protection since it was established in 1969. GESAMP serves as an exceptionally good organization to test for access to and uses of grey literature. Although thoroughly reviewed and refereed, many of GESAMP's publications fit within the internationally-accepted definition of grey literature. Since grey literature can be difficult to identify and locate, are GESAMP's publications ever used? Through an analysis of its publications this paper shows that even when an organization relies on grey literature as its primary means of output, the publications can receive extensive use. Nevertheless, problems of identification and access remain, and these are not fully addressed by digital publication. Recommendations for improving access to GESAMP publications are in the paper.

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Introduction

For over thirty years, GESAMP, a leading international scientific advisory body on marine pollution and marine environmental protection, has been publishing significant reports. Often printed in limited press runs, the reports are, nonetheless, comprehensive assessments of the health of global marine environments by scientific experts. Produced by an organization that is sponsored by intergovernmental United Nations agencies in "formats not controlled by commercial publishing," these reports clearly fit the internationally-accepted definition of grey literature.¹ Furthermore, the idiosyncratic publishing features of GESAMP reports, coupled with their handling by indexing services, highlight the complexity and problems of this genre. For decades researchers and organizations have grappled with handling publications of this sort (Posnett and Baulkwill, 1982; Auger, 1998; Luzi, 2000; Søndergaard, Andersen, & Hjørland, 2003). Yet, as our analysis of the GESAMP reports shows, problems of identification and access continue even when recent major developments and advancements in digital publishing might resolve some of the issues.

In the same period that GESAMP has been publishing, other "governments, intergovernmental groups

¹ Grey literature was defined by the Third International Conference on Grey Literature (1997, p. iii) as "that which is produced by all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers."

(e.g., the United Nations and its agencies, ICES², OECD³) and non-governmental groups around the world have reported...on the overall condition or state of the marine environment” (Wells, 2003, p. 1219), one of the key functions of GESAMP. Therefore, why should any interest be paid to the publication and diffusion of GESAMP reports on similar topics? Beyond the usefulness of the reports to policy and decision makers in the UN agencies, is anyone in the wider marine studies and policy communities, or other researchers, using the reports? If the reports were ignored, would it matter? These questions became important to GESAMP itself as over the past three years the organization undertook an evaluation of its global effectiveness and future.

Grey literature is central to the life of GESAMP. Technical reports, prepared via thorough refereeing and review by a large number of scientific experts, but not published by commercial publishers, are the primary means by which GESAMP provides advice to its parent agencies and other interested parties. GESAMP’s technical reports contain cutting edge reviews and analyses coupled with recommendations about problems threatening the health of marine environments. As a result, these reports significantly augment knowledge on these subjects. For example, GESAMP contributed a research paper (GESAMP, 1991a) to the preparation of Agenda 21, adopted at the United Nations on Environment and Development (UNCED) (Earth Summit ‘92), held in Rio de Janeiro. GESAMP’s hazard evaluation procedures and guidelines contribute to the application of the International Convention for the Prevention of Pollution from Ships, or MARPOL (1973). Modified in 1978, MARPOL 73/78 continues as a major international convention for regulating ocean pollution by oil and chemicals (Wells, Höfer, & Nauke, 1999). GESAMP’s most recent publication is a revision of these guidelines (GESAMP, 2002).

Since there are no firm publishing rules for grey literature, GESAMP was not constrained in its dependence on this genre. Further, although the cost of preparing, producing, and distributing the technical reports is high (estimates of over US\$1m for some reports have been suggested), no effort was taken previously to determine whether this form of report preparation and distribution was efficient or effective. Judging a need of GESAMP, the authors engaged in a thorough study of its publishing history and an extensive analysis of the use of its reports. Our recommendations should help GESAMP improve its publication practices, and have a positive impact on awareness and use of its publications. As an interdisciplinary research team undertaking this study, we have found that our questions and approaches are evolving as we consider findings. Ultimately, the study aims to track the influence of the GESAMP reports; however, determining actual influence is very difficult to confirm systematically. As a significant step in this study, this paper reports on an extensive analysis of the production and use of publications by GESAMP (further details are found in Cordes, 2003), an organization that can act as an exemplar for discussion of publishing implications where research is grey dependent.

² International Council for the Exploration of the Sea

³ Organisation for Economic Co-operation and Development

History and Operation of GESAMP

The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) has fulfilled an important international scientific role since it first met in 1969 at the Intergovernmental Maritime Consultative Organization (IMCO) headquarters in London (Pravdić, 1981; Windom, 1991; Wells, Duce & Huber, 2002). The Group consists of natural and social scientists sponsored by eight UN bodies.⁴ The GESAMP “mechanism encourages collaboration and coordination of activities within the UN system on matters relating to marine environmental protection” (Wells, Duce, & Huber, 2002, p. 79).

GESAMP’s original mandate, which focussed on scientific aspects of marine pollution, has expanded to include periodic assessments of the state of the marine environment, and, since 1993, matters concerning the protection and management of marine living resources and ecosystems, especially where the multidisciplinary advice proves beneficial (Wells, Duce, & Huber, 2002). The GESAMP secretariat, made up of representatives of the sponsors, appoints members to provide advice on marine environmental issues of concern to them and to maintain an appropriate disciplinary and geographical balance. Members (to date, maximum of 32—four per agency) act independently in their personal capacities as marine specialists. In the first twenty years of its history, GESAMP had 103 members from 36 countries (Windom, 1991, p. 7). All members are recognized researchers in their fields, chosen on the basis of their reputation and their ability to hold a broad perspective. The broad multidisciplinary makeup of GESAMP has been one of its significant strengths.

At GESAMP’s annual sessions, members review their work program, receive and, after thorough consideration, approve publication of reports, and discuss emerging issues affecting the oceans. Most of the substantive work on specific issues, however, is carried out inter-sessionally by designated working groups under agency sponsorship. Each group is chaired by a GESAMP member, and includes invited marine specialists from around the world. For example, “during the 1999-2000 inter-sessional period, 39 experts from 22 countries participated in GESAMP working groups” (Wells, Duce, & Huber, 2002, p. 79). Meetings of the working groups are highly technical, with the goal of producing reports on very specific topics. Most groups are ad hoc, with specific tasks that can be accomplished in one to three years, and disband after their reports are reviewed, revised and published in the GESAMP *Reports and Studies* series. Some groups have had lengthy histories, however, and have produced many reports. For example, the Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships (known as the EHS Working Group), began as an *ad hoc* panel in 1972, but since 1974 has had a major role evaluating the hazards of chemicals

⁴ GESAMP is sponsored by the International Maritime Organization (IMO) (formerly IMCO); the Food and Agriculture Organization of the United Nations (FAO); the United Nations Educational, Scientific and Cultural Organization (UNESCO), and its Intergovernmental Oceanographic Commission (IOC); the World Meteorological Organization (WMO); the World Health Organization (WHO); the International Atomic Energy Agency (IAEA); the United Nations (UN); and the United Nations Environment Programme (UNEP). The number of sponsors grew from four in 1969 to eight in 1977, but WHO and UNEP currently limit their involvement.

carried by ships for the International Maritime Organization and the MARPOL Convention (Wells, Höfer, & Nauke, 1999).

GESAMP has issued over 70 reports, including major periodic assessments, such as *The State of the Marine Environment* (# 39) (GESAMP, 1990). One, *A Sea of Troubles* (# 70) (GESAMP, 2001), was designed to reach a decision-making and public audience, and a science journalist was hired to draft and finalize the text, with extensive GESAMP input and external review. Many scientists think of grey literature or technical reports as work that has not been peer reviewed, but that is emphatically not the case for GESAMP's reports. Each report is drafted in one of the working groups; report # 64 (GESAMP, 2002), for example, was the result of six years of work by the thirteen member EHS Working Group. Frequently, the chair of a working group arranges for a late draft of the report to be refereed by external reviewers; a draft of report # 64 was refereed by nine external experts. The working group submits a final draft to an annual session of GESAMP, in print and in an oral presentation, where further detailed, page-by-page consideration is undertaken. Draft reports are often returned for modification, and sometimes for major revision. Most early reports did not explicitly acknowledge the thorough, open reviewing process, but reviewing details have been included recently; report # 70, for example, lists over 90 individuals who had various roles in its preparation.

After three decades of work, GESAMP is in a transition period. It has felt directly the funding cuts in the UN system. In addition, increasing pressures on marine environments (GESAMP, 2001; Rozwadowski, 2002), have prompted many organizations to pursue their own lines of research and policy development. Moreover, it is harder to recruit volunteer experts, since employers (governments, especially) are less willing to let their employees take on expensive membership responsibilities. In 2000, the sponsoring agencies "agreed to carry out an independent and in-depth evaluation of the achievements of GESAMP, its impact, scope, membership, working methods and role" (United Nations, 2001). GESAMP's productivity has been affected as the evaluation of the Group was completed and its positive advice and support considered. Nonetheless, a totally independent global body that can provide unbiased advice about marine environmental issues remains a necessity, and it is likely that GESAMP will continue to evolve rather than be disbanded.

Identifying GESAMP Publications

Beginning with the *Report of the First Session* (GESAMP, 1969), GESAMP has published a variety of reports and documents. The range of publication types is shown in Table 1, and the topics are reflected in the titles of the most highly cited reports (Table 2). The main output of the Group is its *Reports and Studies* series (GESAMP, 2003), begun in 1975, which includes reports of the annual sessions, and 48 thematic reports prepared by the working groups. Each report is published by the agency that hosted the session or was the primary sponsor of the working group. Twelve thematic reports and three reports of sessions are available electronically through GESAMP's website (GESAMP, 2003). In addition, GESAMP has released other publications, identified by document numbers, including the reports of the first six annual sessions, numerous report drafts, and other working documents. A report prepared for Earth Summit '92 was published as an

UNCED Research Paper (GESAMP, 1991a). All reports were published in English, and some, including reports of the sessions from 1970 to 1997 and a few of the thematic reports, were translated into French, Spanish, and/or Russian. Recent session reports contain summaries in these languages. One recent thematic report appeared in Chinese. The number of copies in a print run varies widely. Some reports have been published in low numbers (500-600), insufficient to meet distribution requirements (M. Huber, personal communication, November 6, 2002). Others have been produced in much larger numbers. The *Impact of Oil and Related Chemicals and Wastes on the Marine Environment* (GESAMP, 1993), for example, has been reprinted twice (IMO, personal communication), and *A Sea of Troubles* (report # 70) (GESAMP, 2001) had a completely distributed press run of about 6,000. The latter report is now available only in electronic format.

Many reports have appeared in multiple versions. Starting in 1990, seven thematic reports, and one paper from the *Technical Annexes to the Report on the State of the Marine Environment*, were recast and published as monographs or as papers in the primary research journals. For example, in 1997 report # 59 (with additional supplementary chapters) was published as a book by Cambridge University Press (Liss & Duce, 1997) and report #s 45 and 38 were republished as papers in *Marine Pollution Bulletin* and *Global Biogeochemical Cycles* respectively (Gray et al. 1991; Duce et al., 1991). GESAMP reports have also been republished by the sponsoring agencies in other series; identifying these has been challenging, and some may have been missed. One thematic report reappeared in IAEA's *Technical Reports* series. Thirteen more were republished in the *Regional Seas Reports and Studies* series (UNEP, 2003), with one in both Spanish and English. The *Technical Annexes to the Report on the State of the Marine Environment* were published only in that series. Reports of four early sessions were published in *FAO Fisheries Reports*, one in English and three others in Spanish. Seven of the ten most widely cited GESAMP publications (Table 2) were republished in a related book or paper, and/or *Regional Seas* version.

Confirming the identity of the output of GESAMP is made all the more challenging since the publishers of GESAMP reports have placed a low priority on abiding by consistent bibliographic standards. Two reports, #s 22 and 52, lack publication dates, and ISSNs and ISBNs have been irregularly applied. The fact that there are eight different publishing agencies adds to the degree of complexity of identity, access, and citation. Two reports were published by different agencies as # 11, although subsequent GESAMP lists give one the number 12. The titles of successive reports on the same topic are often similar (e.g., *Review of Potentially Harmful Substances...* as in report #s 22, 28, 29, 34, and 42), or identical (e.g., *Interchange of Pollutants Between the Atmosphere and the Oceans*, as in report #s 13 and 23).

Seemingly modest variations in the name of the series and the organization can cause identification problems. Examples of inconsistencies are given in Table 3. The name of the series, *Reports and Studies*, appears (if at all) in that form on the title pages of all reports, and on the covers of reports up to 1990. On the redesigned cover template, used since 1991 for most reports, the title appears as *GESAMP Reports and Studies*. However, the recommended citation format always is *Rep. Stud. GESAMP*. The GESAMP acronym is inconsistently placed before the full name, except in the recommended citation format. Although the

acronym has remained unchanged, the official name of GESAMP has changed six times, as sponsoring agencies were added and its mandate expanded, from *Joint IMCO/FAO/UNESCO/WMO Group of Experts on the Scientific Aspects of Marine Pollution* in 1969 to *IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection* since 1993. Since all of these variations are reflected in catalogues and indexes, identifying GESAMP's reports comprehensively and exactly can be challenging.

It can be very difficult for a reader or researcher to be sure that all GESAMP publications on a subject have been consulted. Although publication lists are printed in some of GESAMP's reports, and one is given on the organization's website (GESAMP 2003), inaccuracies occur. Working titles of draft reports may be included, but not be updated when the final report is published. This is the case for the title of report # 64 (GESAMP, 2002) listed on the website (GESAMP, 2003). None of the indexing services (currently, *Aquatic Sciences and Fisheries Abstracts (ASFA)*, *Environmental Science & Pollution Management*, *GeoRef*, and *Zoological Record*) contain records for all of GESAMP's publications. Given its broad mandate, ASFA should index all of GESAMP's reports, but seven thematic reports, including two major 2001 reports (#s 70 and 71), and two reports of sessions are missing. In addition, the indexes often introduce their own variations of the corporate author name and series title, complicating searching.

GESAMP reports have been acquired by libraries but distribution problems can affect the completeness of collections. A search of holdings of selected major marine sciences and national libraries, along with e-mail correspondence with librarians at some institutions, confirms that holdings are often incomplete (Table 4). The National Marine Biological Library (NMBL) in Plymouth, England "contains one of the world's major collections of literature on aquatic sciences and fisheries, and acts as a marine biological sciences resource for the UK." This library aims "to give a lead, both nationally and internationally, in the development and provision of information to the wider aquatic community" (National Marine Biological Library, 2003). The library is missing only two GESAMP publications, from the 1980s. Marine sciences libraries, and the British Library Document Supply Centre, have more complete collections than the Bibliothèque nationale de France and the Library of Congress in the United States. The Library of Congress holdings of GESAMP reports since 1990 focusses on aquaculture and other coastal issues. Dalhousie University Libraries, which are a UN depository, did not receive copies of report # 70 (GESAMP, 2001) and its companion # 71, of which insufficient copies were printed (M. Huber, personal communication, November 6, 2002). Spotty holdings of libraries pose both awareness and access difficulties for researchers at those institutions. If these libraries are an indicator, then it is possible that lack of awareness of some GESAMP publications could be widespread. This could be a major problem in the world of grey literature and is worth further investigation.

Tracking the Use of GESAMP Publications

Determining who uses GESAMP publications is not a trivial task. While "use" can be defined in a number of ways, the most systematic, albeit incomplete, method of tracking use is to locate citations to the GESAMP

reports and other publications. Citation indexes are available for much of the journal literature, but no comprehensive tool exists for citations found in either grey literature (print or electronic) or in monographs.

Tracking citations found in journal literature can be achieved via Web of Science, a citation index, compiled by the Institute for Scientific Information (ISI) in Philadelphia, containing citation records from more than 8,000 periodicals in the sciences, social sciences, arts and humanities. This index was searched for citations to the English language publications outlined in Table 1, but locating citations to grey literature is not easy. In Web of Science's compact citation format, 18 characters are allowed for the cited author, and 20 for the cited work. The cited author field may be blank, or may contain a variation of the name of GESAMP or a sponsoring agency, e.g., "GESAMP," "JOINT GROUP EXP S," "GROUP EXP SCI ASP," "IMO FAO UNESCO WM," or "UNEP." The cited work field may begin with a report number, or may contain a report title, a variation of GESAMP's name, or the report series title, e.g., "115 REG SEAS REP STU," "STAT MAR ENV," "IMOFAOUNESCOWMOWHOIA," "REP STUD," or "GESAMP REPORTS STUDI." Citations to document GESAMP XVII/5 were variously coded as "GESAMPXVII5 UNESCO" and "GESAMP175 UNESCO FIN". (Documents are given identification numbers based on the numbers of the session and agenda item where they are discussed; GESAMP XVII/5, the final draft of report # 32, was the fifth agenda item at the seventeenth session in 1987.)

Authors commonly introduce or perpetuate errors in citation data, which are not detectable until citations are compared to original publications. While checking inconsistent citations, papers were found to contain citations with errors in report numbers, titles, and publication years. In ambiguous cases, the report title was assumed to be the most accurate information. Web of Science also introduces occasional coding errors, including misspelling GESAMP (GEASMP, GSAMP), reversing digits (report # 59 became # 95), truncating data (report # 43 became # 4), putting data in the wrong field (report # 38 in 1989 became a report in 1938, and "Duce RA" became a "cited work" entry), and combining similar adjacent citations (two citations to GESAMP reports # 21 (1984) and # 31 (1987) appear as one citation to report # 31, 1984).

Retrieval of relevant citations in Web of Science improves as a searcher discovers more variations in how authors cite the GESAMP publications and how the citations are entered in Web of Science. Errors like those noted above emphasize human fallibility often found in citation data, and underscore the need to check problematic citation data against the original citing paper and GESAMP's publication list. Creativity and sheer persistence are needed to locate grey literature citations in Web of Science!

Uses of GESAMP Publications

Although GESAMP publications may be difficult to find in libraries and indexes, citation data confirms that the GESAMP publications are definitely used. A comprehensive search for citations using Web of Science (for details on the methodology, see Cordes, 2003) located 1518 citations to GESAMP publications in 1251 papers indexed by July 28, 2002. Since Cordes (2003) was written, the citation data has been updated to include one target publication (GESAMP, 1991a), a citation to it, and 81 other citations. Over 88% of the citing papers

contain only one citation to a GESAMP publication, but three papers about GESAMP each have between 15 and 17 citations. Figure 1 shows the number of citations per year. Before 1991, only one year (1982) had more than 20 citations. Between 1989 and 1991, 13 thematic reports, a book and three papers were published, which led to an accelerated citation rate through the 1990s, to 170 citations in 1999. Although a search for citations in 2002 publications, indexed after July 28, has not been thorough, citations to GESAMP publications in that year are even higher. Most of the citations (96%) make reference to versions of the thematic reports, rather than to reports of the sessions. This statistic provides evidence that the thoroughly prepared reports are the most important GESAMP publications in the eyes of readers. The ten most cited reports in their various versions (Table 2) account for 1029 citations, two thirds of the total. The eight books and journal articles related to the thematic reports received 38% of the citations, showing a decided bias toward these items; one paper (Duce et al., 1991) received 324 citations, 21% of the total. Overall, citations were found to 85 of 115 identified English language GESAMP publications, and to numerous working documents and drafts of reports. No citations were found to two of the thematic reports (#s 20 and 36), a point which remains unexplored.

The strength of citations over time for the two most highly cited GESAMP reports (Table 2) is illustrated in Figures 2 and 3. *The Atmospheric Input of Trace Species to the World Ocean* received an increasing number of citations for more than a decade after its publication in 1989, with the highest number of citations in a single year occurring ten years after its release. Citations are even higher in 2002, when citations from publications indexed after the initial data collection date of July 28, 2002 are included. The journal version of this report (Duce et al., 1991) received 79% of the 410 citations. The 22 co-authors (members of the working group) led this trend, with 57 citations to the journal version among their 67 self-citations. Citations to *The State of the Marine Environment* (Figure 3) show a bimodal citation pattern, but it too received more citations a decade after it was published than in the first two years following its release. The UNEP *Regional Seas* version of this report, preferred by its working group members for self-citation, received more citations than the book version. These examples demonstrate that GESAMP publications continue to hold the attention of researchers for at least ten years, in contrast to many scientific papers, which if they receive any citations at all, often do so for only a short period after publication. Citation by authors familiar with the report also may be an important factor in promoting awareness, i.e., citations by these authors may influence others to use and cite the reports.

To test whether direct involvement with GESAMP would skew the citation patterns, 690 individuals connected to the Group (GESAMP members and administrators, working group members, reviewers and observers at sessions) were identified. These individuals account for 28.3% of the citing papers and 33.8% of the citations. Therefore, over 70% of the citing papers were written by authors outside the organization.

The geographic distribution of citing authors further characterizes the use of GESAMP publications. An analysis of the countries named in the Web of Science "availability" field for 91% of the citing papers shows the following distribution: Western Europe (43%); North America & Caribbean (31%); Asia (8%); Australia &

New Zealand (6%); Eastern Europe (5%); Middle East (4%); Africa (2%); and South America (1%). Thus, most of the researchers citing GESAMP publications are located in Western Europe and North America. The majority of the addresses (53%) are for universities, and most of the rest are for government facilities. This distribution may be biased, however, by the selection of journals, published largely in English in North America and Western Europe, that are indexed in Web of Science.

GESAMP's publications were cited in 311 different journals, with *Marine Pollution Bulletin* containing the most citations (12%). From the categories established by ISI's *Journal Citation Reports*, it can be shown that journals in 84 subject areas cite GESAMP publications, with 56 each containing at least two citations. The top five categories are *Environmental Sciences; Marine & Freshwater Biology; Oceanography; Geosciences, Interdisciplinary; and Meteorology & Atmospheric Sciences*. Farther down the list, but still in the top 25, are the social science categories *International Relations; Environmental Studies; and Law*, and diverse science categories including *Engineering, Environmental; Fisheries; Geochemistry & Geophysics; Public, Environmental & Occupational Health; and Food Science & Technology*. The audience for GESAMP publications is indeed wide.

Although GESAMP reports are cited in monographs (Wells, 2001), the only way to locate such citations is to examine the books themselves. A suggested methodology could include: 1) establish a set of descriptors that objectively identify subject categories in the field of marine environmental protection and related topics, ensuring coverage of scientific, managerial, and popular literature. The set of key words found in the *Marine Pollution Bulletin*, a key journal that cites GESAMP reports, and/or the *ASFA Thesaurus*, could be used as a reasonably objective source of subject descriptors; 2) using these descriptors, search the collections of selected libraries (holdings of marine science, oceanography, management, public policy, etc.) for relevant monographs; 3) create a list of the monographs (possibly establishing sample subsets); and 4) examine references and citations noting all those referring to GESAMP publications. This method would be comprehensive, but very time-consuming. A preliminary survey (Wells, 2001) has demonstrated that established authors and major publishing houses do refer to GESAMP reports; 39 citations to 19 of GESAMP's thematic reports, and two citations of its definition of marine pollution, were found in 22 relevant books published from 1987 to 2000.

Publishing Recommendations for GESAMP

As this paper shows, an array of grey literature issues was found while examining the production and use of GESAMP reports and other publications. The following recommendations, which are designed to reduce description inconsistencies, and to improve awareness, retrieval, and ultimately use, of the GESAMP reports, have been forwarded to the GESAMP secretariat:

- Emphasize the acronym GESAMP by placing it at the beginning of the full name of the organization. The acronym by itself could become the official name, like some other UN agency names, e.g., UNESCO, UNICEF.

- Use only the acronym in the recommended citation format, e.g., GESAMP. (2001). *A Sea of Troubles. Rep. Stud. No. 70.* (35 pp.).
- Establish a standardized name for the series with the acronym GESAMP at the beginning, and apply it consistently on cover titles and title pages, and in the recommended citation format.
- Ensure that the title of each report is consistently the same in all locations where it is found: cover of a report, title page, recommended citation format, publication lists within printed reports, and on the GESAMP website.
- Obtain a new ISSN when a name change occurs in GESAMP or in the report series.
- Always include an ISBN in each published report, along with the ISSN.
- Distribute new reports widely, with generous publicity.
- Ensure that a copy of each new report is sent to each indexing agency.
- Alert ASFA to the reports not already indexed.
- Describe the peer review process in each report, and on the GESAMP website.
- Consider publishing the reports in two series, one for thematic reports and one for reports of sessions, since the production and reviewing processes for the two types are markedly different.
- Give much greater effort to ensure that the reports, especially the thematic ones, are translated, since GESAMP is a global advisory body sponsored by the UN.
- Prepare book or journal versions of new thematic reports routinely.
- Keep the website up-to-date, accurate, and relevant to potential users, to encourage use.
- Continue creating electronic versions of older reports, especially thematic ones.
- Centralize the production and distribution of the reports by a single agency or the GESAMP secretariat, if possible, to make it easier to carry out the other recommendations.

Conclusions

Many intergovernmental organizations and non-governmental scientific bodies publish and depend upon grey literature. Whether such literature is detrimental to the dissemination of scientific research and advice, and consequently, the impact of the organization, is often not a major concern of such agencies. However, since grey literature by its nature can remain hidden from its potential users, reliance on grey literature as the major means of publication should concern IGOs and NGOs. Even when publications are now made available digitally, as GESAMP has provided in recent years (GESAMP, 2003), the literature can still remain hidden from potential users.

GESAMP has proven to be an exceptionally good organization to test for access to and uses of grey literature. As an international organization, sponsored by the UN and several of its agencies, it has published most of its output as grey literature for over thirty years. Its publishing practices demonstrate how complex and idiosyncratic a report series, with even a small number of reports, can be. While standardization of publishing practices could be the responsibility of GESAMP's secretariat, this paper has shown that human

fallibility occurs in citation and indexing well outside the control of GESAMP. Both GESAMP's own practices and external factors impact on accessibility of its reports.

Recent studies (Toms, 1994; Rozwadowski, 2002) have pointed to a growing production of grey literature by major government departments and international intergovernmental organizations. Some countries, e.g., the USA, illustrated by NTIS (National Technical Information Service), depend heavily upon grey literature. If these studies indicate a trend, then increasing reliance on grey literature will become more common in such bodies. The advent of new dissemination models, such as the open access movement emerging in the sciences (Malakoff, 2003), may encourage increased production of grey literature since this genre will be seen as fitting within the open access paradigm. Moving documents to an open access digital environment, however, does not reduce the need for attention to the recommendations supplied to GESAMP by the authors for its publications in paper format. Accessibility does not automatically improve because a publication is placed on an open website; once found large files can be difficult to download by users with limited bandwidth. A search for links to the GESAMP website confirms that there are very few links to the digital versions of the reports (E. Toms, personal communication, November 22, 2003). For example, a search in Google (<http://gesamp.imo.org/link>) retrieves only 27 links, and only one link to the publications section of the GESAMP site (<http://gesamp.imo.org/publica.htm/link>), which is to a GESAMP publication itself. A further search in Google for related sites (<http://gesamp.imo.org/related>) retrieves only 52 links, some of which are internal links to GESAMP publications.

As this paper has demonstrated, GESAMP's output has been used quite widely. The distribution of citations highlights the lasting importance of these reports, showing that they, and publications based on them, have been referenced in scientific and policy periodicals and books. Some GESAMP reports received sustained citation for more than a decade, in an extensive range of disciplines, by individuals working around the world, most of whom have no direct connection to GESAMP. Grey literature is an important medium, but versions of reports published in the primary journal papers and books often receive more attention. GESAMP studies have advised influential global environmental conferences from Stockholm in 1972 to Rio de Janeiro in 1992 and Johannesburg in 2002. Although use of GESAMP publications can be shown, the larger issue of influence of the reports is more difficult to ascertain. Determining the impact of the reports requires different methods of investigation, including tracing how the reports were cited, interviews with policy makers world-wide, and surveys of researchers. As an examination of the role of GESAMP as a multifaceted global advisory body moves forward, an analysis of influence, particularly in the policy community, will be the focus of attention. Understanding GESAMP's grey literature output and citations to it is central to this new task.

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Table 1—Types of GESAMP Publications*

Type of Content	Type of Publication	Items in English	Translations Identified
Session Reports	<i>GESAMP Reports and Studies</i>	25	59
	Early sessions - documents	6	15
	Early sessions - other series	1	4
	Related journal articles	7	
Thematic Reports	<i>GESAMP Reports and Studies</i>	48	7
	Supplements to early session reports	2	4
	Identical versions in other series	14	2
	Only published in other series	2	
	Report drafts and other working documents (# not determined)		
	Related books (commercial publishers)	2	
	Related journal articles (primary literature)	6	
About GESAMP	Histories of GESAMP	2	
	Journal articles describing GESAMP (not included as targets in the citation study)	6	

* Adapted from Cordes (2003), Table1, and reprinted with the permission of the University of Toronto Press.

Table 2 — Ten Most Frequently Cited GESAMP Publications, to 28 July 2002*

Report Title Versions¹ and Publication Dates	Total Citations
<i>The Atmospheric Input of Trace Species to the World Ocean</i> A: # 38 (1989), B: # 119 (1990), C: Duce et al. (1991)	410
<i>The State of the Marine Environment</i> A: # 39 (1990), B: # 115 (1990) (also in Spanish), C: GESAMP (1991b) ²	165
<i>Technical Annexes to the Report of the State of the Marine Environment</i> B: # 114 (1990), C: Fowler (1990)	108
<i>The Sea-Surface Microlayer and its Role in Global Change</i> A: #59 (1995), C: Liss & Duce (1997)	76
<i>Land/Sea Boundary Flux of Contaminants: Contributions from Rivers</i> A: # 32 (1987)	60
<i>The Review of the Health of the Oceans</i> A: # 15 (1982), B: # 16 (1982)	47
<i>Impact of Oil on the Marine Environment</i> A: # 6 (1977)	44
<i>Review of Potentially Harmful Substances: Arsenic, Mercury and Selenium</i> ³ A: # 28 (1986), B: # 92 (1988)	43
<i>Impact of Oil and Related Chemicals on the Marine Environment</i> A: # 50 (1993)	42
<i>Global Strategies for Marine Environmental Protection</i> A: # 45 (1991), C: Gray et al. (1991)	42

* Updated and adapted from Cordes (2003), Table 4; reprinted with the permission of the University of Toronto Press.

¹ Versions: A - GESAMP Reports and Studies; B - UNEP Regional Seas Reports and Studies; C - journal article or book. Citations to draft versions were also included.

² Content of the book is identical of that of the report.

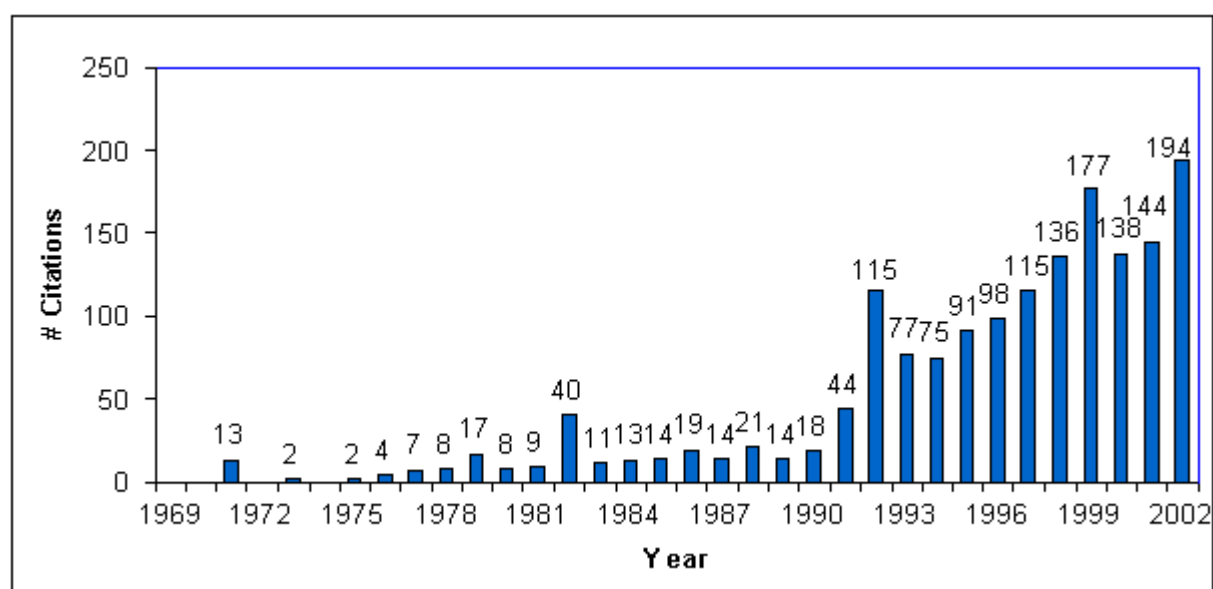
³ Title of Regional Seas #92: *Arsenic, Mercury and Selenium in the Marine Environment*.

Table 3—Variations (in Bold) in Bibliographic Elements Among the Title Page, Cover, and Recommended Citation Format of Selected Reports

Report	Element	Location	Contents
# 61 (1996)	Corporate author	Title page	IMO/FAO/Unesco-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection - GESAMP -
		Cover	IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)
		Citation format	GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection)
	Series	Title page	Reports and Studies No. 61
		Cover	GESAMP Reports and Studies No. 61
		Citation format	<u>Rep.Stud.GESAMP</u> , (61):66 p.
	Title	Title page	The contributions of science to integrated coastal management
		Cover	The contributions of science to integrated coastal management
		Citation format	The contributions of science to coastal zone management
# 67 (1999)	Title	Title page	Report of the twenty-ninth session, London, United Kingdom , 23-26 August 1999
		Cover	Report of the twenty-ninth session of GESAMP London, 23-26 August 1999
		Citation format	Report of the Twenty-Ninth Session, London, United Kingdom , 23-26 August 1999

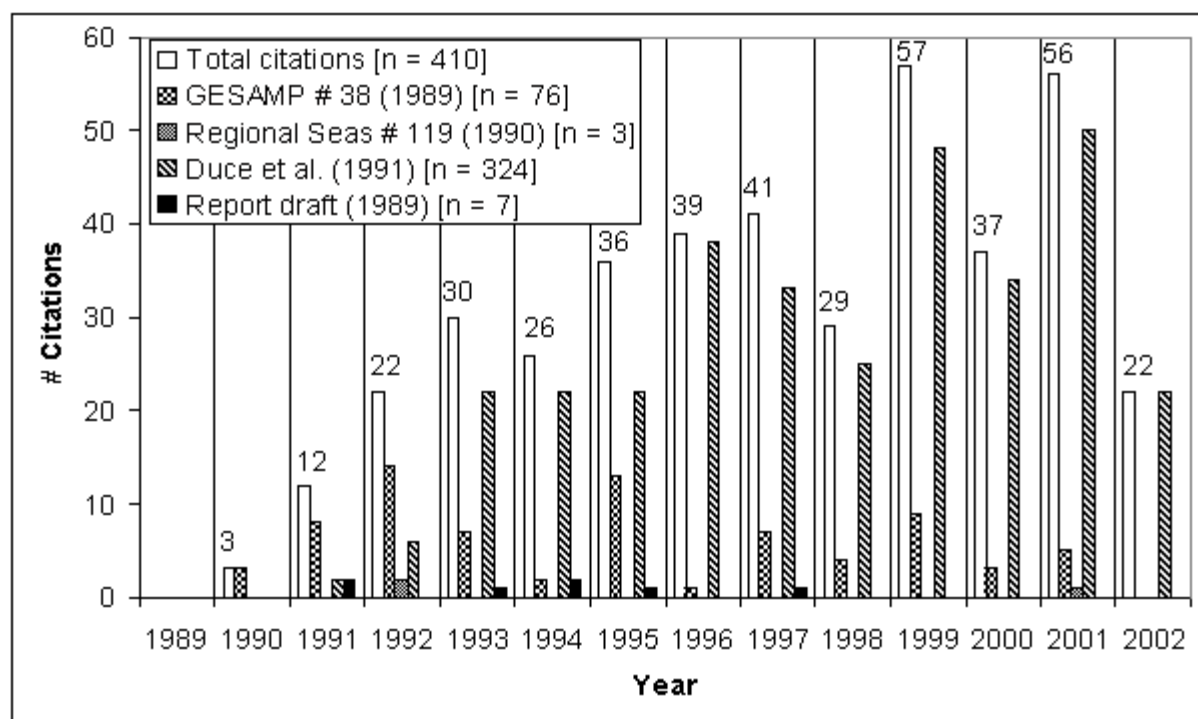
Table 4 — Holdings of GESAMP Publications in Selected Major Marine Science and National Libraries

Library	Holdings of <i>Reports and Studies</i>
National Marine Biological Library, Plymouth, England http://www.mba.ac.uk/nmb/	Almost complete holdings (two missing reports will be acquired at R. Cordes's suggestion)
Woods Hole Oceanographic Institute Library, Woods Hole, Massachusetts, USA http://www.mblwhoilibrary.org/	Missing five reports, published 1986-1991 (missing reports will be acquired at R. Cordes's suggestion)
Scripps Institution of Oceanography Library, San Diego, California, USA http://scilib.ucsd.edu/sio/	Missing several recent thematic reports, and many session reports
Bedford Institute of Oceanography Library, Halifax, Canada http://www.mar.dfo-mpo.gc.ca/e/library/bio-e.htm	Complete holdings
British Library, London, and Document Supply Centre, Boston Spa, West Yorkshire, England http://www.bl.uk	Complete holdings (Document Supply Centre)
Library of Congress, Washington, DC, USA http://www.loc.gov	Many gaps in holdings
Bibliothèque nationale de France, Paris, France http://www.bnf.fr	Many gaps in holdings

Figure 1 — Frequency of Citations to GESAMP Publications, to the End of 2002*

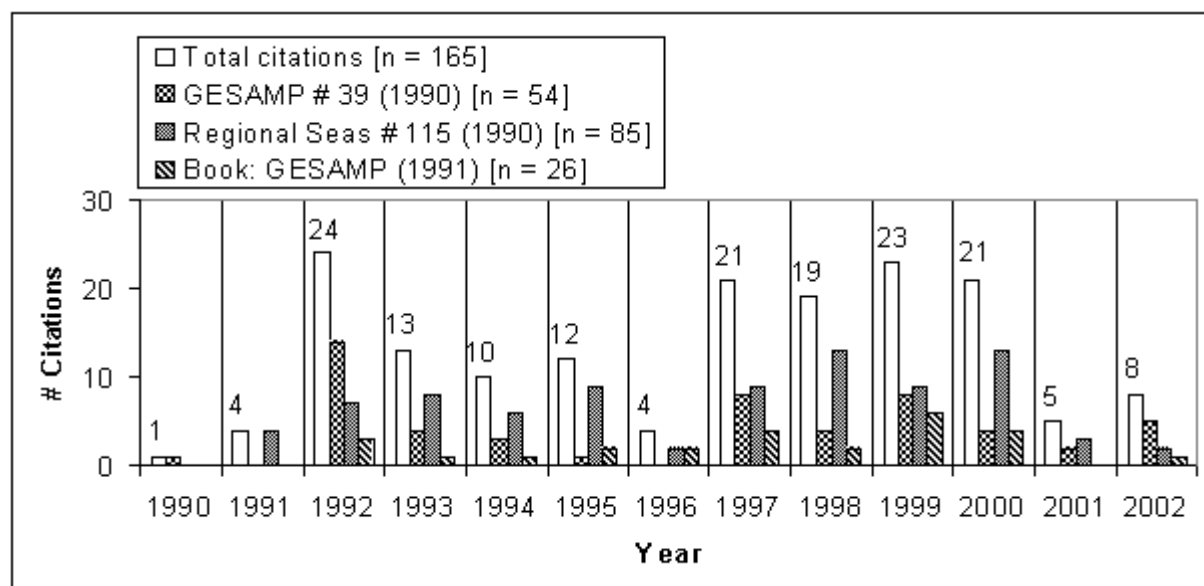
* Updated from Cordes (2003), Figure 2, and reprinted with the permission of the University of Toronto Press. The updating included 82 citations from 1991 to July 28, 2002, and 120 additional citations from later in 2002.

Figure 2—Citations to Versions of *The Atmospheric Input of Trace Species to the World Ocean*, to July 28, 2002*



* Reprinted from Cordes (2003), Figure 3, with the permission of the University of Toronto Press. An additional 53 papers, published in 2002, citing Duce et al. (1991) were not included in this analysis.

Figure 3—Citations to Versions of *The State of the Marine Environment*, to July 28, 2002*



* Reprinted from Cordes (2003), Figure 4, with the permission of the University of Toronto Press.