

The timeliness of scientific information in support of sustainable management of Canada's fisheries and oceans

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November 2018

Introduction

Canada's marine fisheries are highly valuable: they are a major driver of our economy, shape our culture and sustain our coastal communities. Yet many of Canada's marine fish and invertebrate stocks are depleted, and only a third can confidently be considered healthy (Oceana Canada 2018a). Successful modern fisheries management requires evidence-based decision making, supported by strong science (Melnychuk 2016).

Science and evidence-based decision making have become increasingly important in recent decades in Canada (Canada 2000, Council of Science and Technology Advisors 1999), including in support of the management of our fisheries and oceans (DFO 2008). More recently, the current government reaffirmed the importance of science with the Prime Minister's mandate letters to the Minister of Fisheries and Oceans Canada (DFO), calling for the restoration of funding to ocean science and reiterating the importance of using scientific evidence and the precautionary principle when making decisions affecting fish stocks and ecosystem management (Trudeau 2015, 2016, 2018). When science information is produced in a timely fashion to support decision making and made publicly available so that the basis of decisions is transparent, Canadians can have increased confidence that our fisheries and oceans management will ensure the stability of healthy fisheries and the rebuilding of depleted stocks for the benefit of marine ecosystems, coastal communities and the fishing industry.

This report evaluates the timeliness of the availability of scientific information in support of the management of Canada's fisheries and oceans in 2017.

Background

The Canadian Science Advisory Secretariat (CSAS), within DFO, oversees the peer-review process of science related to the management of Canada's fisheries and oceans (DFO 2016). The process is intended to provide the best possible science advice to the Minister, managers, rightsholders, stakeholders and the public through rigorous peer review that is evidence-based, objective, impartial and respectful (CSAS 2011). Requests for advice are reviewed, assessed and prioritized based on risks, and the schedule is finalized prior to the start of the new fiscal year so scientists and managers can develop work plans and make necessary resource allocations (CSAS 2012). Participants are chosen for their knowledge of the topic under review (e.g., species, modeling) (CSAS 2011), and meeting conclusions and final scientific advice are reached by consensus (CSAS 2010a). Documents produced from the science peer-review meetings need to be published in a timely manner (CSAS 2012). Delays in producing these documents can result in delayed management decisions and create the impression that advice is being withheld or unduly influenced by lobbyists, which in turn can undermine the credibility of the process (CSAS 2012).

The CSAS currently produces four types of publications resulting from its meetings (CSAS 2010b):

1. **Science Advisory Reports:** These outline the peer-reviewed scientific advice that was achieved through the consensus of meeting participants. These documents contain a synopsis of the evidence in support of the advice but lack specific details on the scientific analysis. They should be published within approximately 10 weeks from the end of the meeting (CSAS 2012).
2. **Research Documents:** These outline in detail the scientific studies and analyses that were peer reviewed during the meeting and are based on working papers that are produced before the meeting. These documents contain all the detail required for other scientists to review, critique or replicate the research. They should be published less than five months from the end of the meeting (CSAS 2012)

3. Proceedings: These outline the discussions that occur during a peer-review meeting, who participated and their affiliations. These documents contain the relevant details of any concerns expressed by participants about methodology, alternate interpretations of the scientific analysis or resultant advice. They should be published less than five months from the end of the meeting (CSAS 2012).
4. Science Responses: These outline the scientific advice and proceedings from meetings convened to address urgent and unforeseen reviews undertaken under the Science Response Process (SRP). SRPs are less thorough review processes (i.e., internal peer review; no external reviewers) held in response to urgent and unforeseen issues or where a fully inclusive and thorough science peer-review meeting is not required because such a meeting has already developed a framework for the issue (CSAS 2016). These documents contain a synopsis of the evidence in support of the advice but lack specific details on the scientific analysis. They should be published within approximately 10 weeks from the end of the meeting (CSAS 2012).

Multiple publications are often expected from each meeting, but there are no requirements on which types need to be published. However, given their differing, yet complementary, content, peer review meetings should always require the publication of a Science Advisory Report, Research Document and Proceedings. SRPs, which are often urgent and have less thorough review processes, should always have at least a Science Response published.

Methods

To assess the timeliness of recent scientific information in support of fisheries and oceans management in Canada, all CSAS meetings held in 2017 were examined, and ensuing publications produced were evaluated against expected publications and CSAS publication policy deadlines (CSAS 2012). The CSAS schedule website, publication search and spreadsheet export tools (DFO 2016, 2018) were used to determine how many processes had all expected publications published within expected timelines, how many had publications published late and how many still had publications forthcoming as of July 1st, 2018.¹

To determine the focus of 2017 meetings, broad taxon (e.g., invertebrate, groundfish) and subject area category (e.g., population assessment, habitat and biodiversity) were assigned to each meeting.

The CSAS schedule and corresponding exported spreadsheet lists expected publications for each CSAS meeting. These were used to assess if all expected publications were published. The CSAS schedule website is updated with links to publications when they become available. In this analysis, if unexpected publications were published, they were assumed to have been expected, even if they were not listed as expected on the CSAS schedule website or exported spreadsheet. This was most often the case for SRPs, where there were often no expected publications listed. For SRPs, it was assumed a Science Response report was the only expected publication unless otherwise noted by CSAS. For peer-reviewed processes (both Regional and National), when no expected publications were listed, it was assumed that at least one Research Document was expected to be published.

Document publication dates, as they appear in exported spreadsheets from the results of CSAS publication searches, were compared to the CSAS policy on timelines for submission and publication of documents to evaluate the timeliness of publications produced (CSAS 2012). The policy outlines the timelines for submission of documents to CSAS by report authors after processes have been completed (CSAS 2012). It also outlines timelines for CSAS to finalize, format, translate and post documents online once received (CSAS 2012). The policy indicates Research Documents and Proceedings should be submitted to CSAS as soon as possible and at the latest within four months of the end of the meeting. These document types should be posted as soon as possible and within three weeks of reception of the final documents by CSAS. Therefore, these document types

¹ July 1st, 2018 is more than one month past the longest deadline for publication under CSAS policy for meetings held in late December 2017.

were evaluated as being published on time when they were published within 145 days² of the meeting end date. Science Advisory Reports and Science Response reports should be submitted to CSAS as soon as possible and at the latest within eight weeks of the end of the meeting. These document types should be posted as soon as possible and within 10 working days of reception of the final document by CSAS. Therefore, these document types were evaluated as being published on time when they were published within 70³ days from meeting end date.

Results

In 2017, 112 CSAS meetings were held, 58.9 per cent of which were external peer-review processes (66 meetings) with the rest being SRPs (46 meetings). Most meetings pertained to population assessments of invertebrates (20 per cent or 24 meetings), followed by those involving assessments of anadromous fish (14 per cent or 16 meetings) and groundfish (11 per cent or 14 meetings). Several meetings involved multiple taxa and pertained to habitat and biodiversity (11 per cent or 14 meetings) (Figure 1).

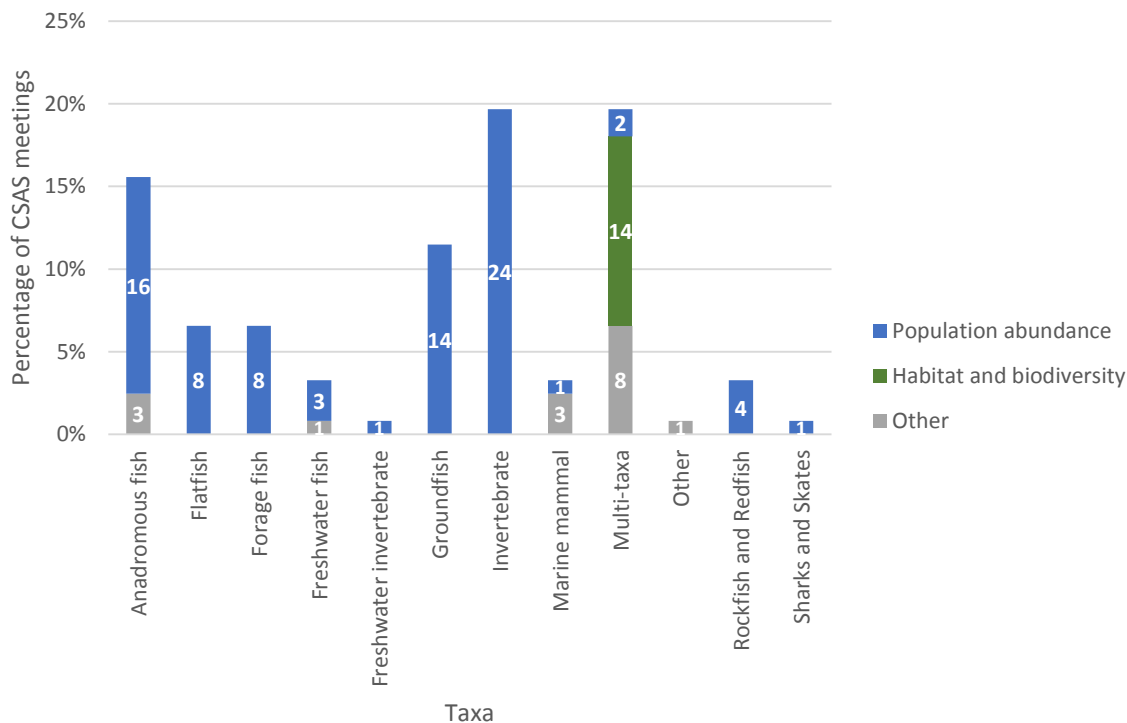


Figure 1. The percentage of Canadian Science Advisory Secretariat (CSAS) meetings (n = 112 meetings) in 2017 that pertained to population abundance, habitat and biodiversity or other subject matters among different taxonomic groups. The number of meetings in each category is indicated in white font within the bars.

Overall, these meetings were slated to produce 239 documents, of which only 9.2 per cent (22 documents) were published within CSAS policy timelines. 47.3 per cent (113 documents) were published late, and 43.5 per cent (104 documents) are not yet available. Documents that were late were published on average 137.3 days (minimum 1 day; maximum 529 days; median 99 days) after CSAS policy timelines indicates they should have become available. Timeliness did vary by document type, with most Science Advisory Reports and Science

² (4 [months] x 31 days) + (3 [weeks] x 7 days) = 145 days
³ (8 [weeks] x 7 days) + (2 [weeks; i.e., 10 business days] x 7 days) = 70 days

Response reports published (but with the majority late), while most Research Documents and Proceedings are not yet available (Figure 2).

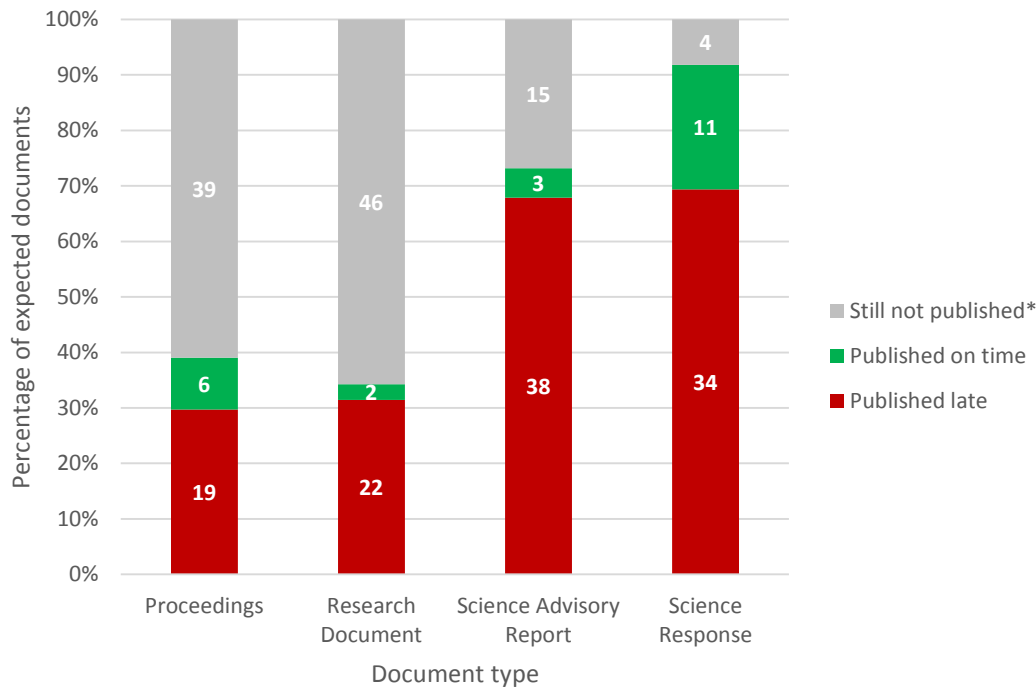


Figure 2. The percentage of documents (n = 239 documents) for each of the four document types expected to be published as a result of Canadian Science Advisory Secretariat (CSAS) meetings in 2017 (n = 112 meetings) that were published within and outside of CSAS policy on timelines. The number of documents in each category is indicated in white font within the bars. *As of July 1st, 2018.

Multiple documents are often expected for each meeting, with 2.1 documents expected on average (minimum 1; maximum 6; median 2). Overall, only 9.8 per cent of meetings (11 meetings) had all their documents published on time and within CSAS policy timelines, 70.5 per cent (79 meetings) had at least one document published late and 18.8 per cent (21 meetings) still do not have any documents available. Within external peer-review meetings, only 1.5 per cent (one meeting) published all expected documents on time and within CSAS policy timelines, 71.2 per cent (47 meetings) had at least one document published late and 80.3 per cent (53 meetings) still have documents yet to be published. Just over two-thirds of external peer-review meetings that were expected to publish Science Advisory Reports (55 meetings) had them available (40 meetings), although the majority were published late. Meanwhile, most meetings expected to publish Research Documents (61 meetings) and Proceedings (64 meetings) have yet to publish them (44 and 39 meetings, respectively) (Figure 3). Nearly a third of external peer-review meetings (30.3 per cent or 20 meetings) still do not have a Science Advisory Report or a Research Document available to the public to summarize the scientific evidence of management advice.

The situation is a little better for SRPs, which involve urgent and unforeseen meetings with less thorough review processes (i.e., internal peer review; no external reviewers), where 21.7 per cent (10 meetings) had all expected documents published on time and within CSAS policy timelines, and only 8.7 per cent (4 meetings) still have documents yet to be published. However, 69.6 per cent (32 meetings) had at least one document published late.

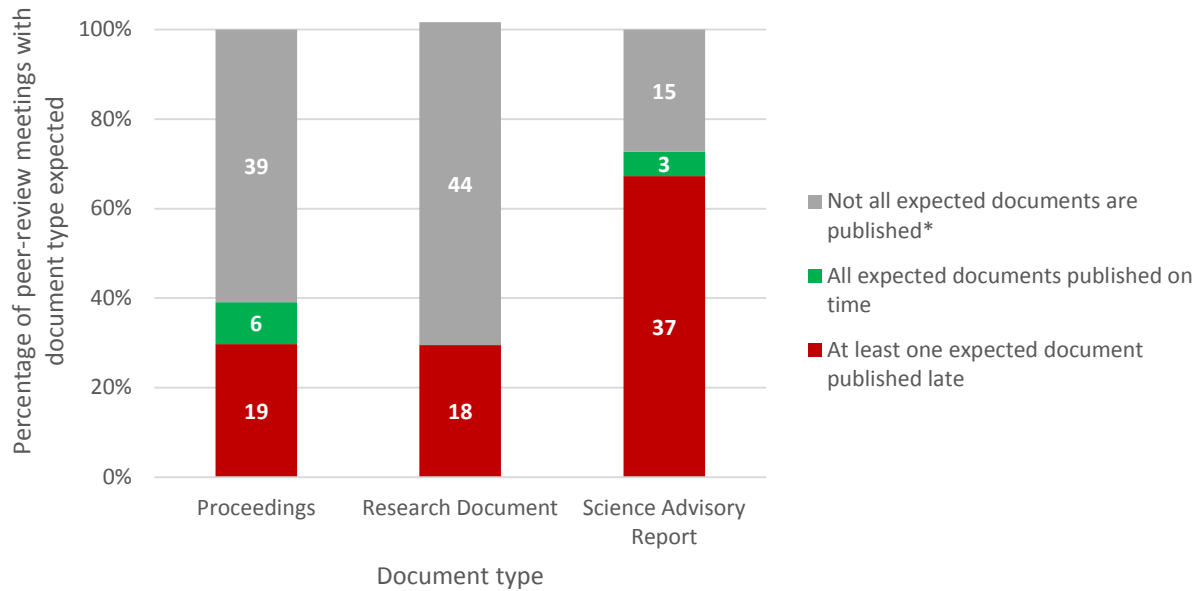


Figure 3. The percentage of Canadian Science Advisory Secretariat (CSAS) peer-review meetings (n = 66 meetings total) in 2017 with expected documents for each document type that were published within and outside of CSAS policy timelines. The number of meetings in each category is indicated in white font within the bars. The sum of percentages does not equal 100 per cent for Research Documents as there was some overlap in categories; one meeting had documents published late and still has some expected documents not yet available. *As of July 1st, 2018.

Discussion

CSAS, within DFO, oversees the peer-review process of science related to the management of Canada’s fisheries and oceans (DFO 2016). The resultant CSAS publications are the main source of scientific information about our oceans and their inhabitants. This formalized science peer-review process and transparent document availability is an exception among science-based federal departments.⁴ Operation of CSAS as intended is important not only for successful fisheries and oceans management but also to maintain the standard it sets for other departments in the provision of science advice.

CSAS policy states that delays in producing documents can result in delayed management decisions and create the impression that advice is either being withheld or influenced, which in turn can undermine the credibility of the process (CSAS 2012). Thus, it is startling that less than 10 per cent of expected publications from CSAS meetings in 2017 were published on time and within CSAS policy timelines. Almost half of the documents that were published came late, and over 40 per cent of expected documents are still not published. Similar results were found when publications were examined by meeting, with less than 10 per cent of meetings having all of their documents published on time and within CSAS policy timelines. Over two-thirds of meetings had at least one document published late, and almost one in five meetings still do not have any documents available, more than six months after the last meeting date. Furthermore, nearly a third of external peer-review meetings still do not have a Science Advisory Report or a Research Document available to the public to summarize the scientific evidence for management advice, even though most meetings pertained to population assessments in support of

⁴ To our knowledge, there is no other science-based federal department (e.g., Health Canada, Environment and Climate Change Canada) with a formalized peer-review process that includes external reviewers and transparent online tracking of meetings from schedule to document publication.

fisheries management decisions. Clearly, there is room for improvement in the timeliness of publication of science in support of fisheries and oceans management in Canada.

Fisheries and Oceans Canada uses a shared stewardship approach to decision making, meaning the decision-making process is inclusive of resource users and others (such as crew members of fishing vessels, plant workers, academics, indigenous groups, environmental groups or community organizations) and ensures everyone has the appropriate opportunities to participate (DFO 2004). Although this approach does not extend to CSAS processes, these peer-review meetings do include non-academic participants chosen for their knowledge of the topic under review (CSAS 2011). As a result, many of the same people involved in decision making, including managers, are often present when scientific evidence is reviewed at CSAS meetings (although during CSAS processes, participants are expected to be objective and not act as advocates or representatives of their interest group (CSAS 2011)). Thus, many involved in decision making are armed with scientific information even if the publication of it is too late for decisions. However, when publication of the final wording of advice is not available on time, it could create an imbalance between those involved in decision making who were present during CSAS processes and those who were not. This is not the intention according to CSAS policy (CSAS 2011) but may be the result when documents are published late. Summary bullets of scientific evidence and advice for Science Advisory Reports (and Science Response reports for SRPs) are often finalized during CSAS meetings, and drafts are often shared with membership of management advisory committees to inform their formulation of guidance on harvest levels. To facilitate fair and transparent decision making, finalized summary bullets with the list of attendees and affiliations should be officially published on the CSAS website within one week of the end date of the meetings.

Final approved evidence and advice is not truly available until all documents are published. Due to the differing content of each publication type (see Background above), it is difficult for those not present at meetings to truly evaluate the scientific evidence until all publication types are available. Although Science Advisory Reports provide a summary of key evidence and advice, the information required to truly evaluate the analysis and replicate results if necessary are not available until Research Documents are published. Moreover, concerns expressed by meeting participants about the analysis or the interpretation of findings, as well as the list of meeting participants (and affiliations) are not available until Proceedings are published. Not all peer-review meetings listed all three of these document types as expected publications, but all should be expected and available within CSAS policy timelines due to their differing, yet complementary, content.

It is unclear why the delays in publishing documents are so frequent and, at times, lengthy, with the average delay more than four months beyond CSAS policy timelines (which does not include those still not published). Science capacity may be a contributing factor. In the early 2000s, increasing demands for scientific information and advice often coincided with fixed or declining capacity in DFO's Science program (DFO 2008). In more recent years, DFO scientists were further limited in their science capacity due to funding cuts, closing of libraries and the destruction of archived materials (Bailey et al. 2016). Likely due to this neglect, in the last few years, DFO undertook the largest science recruitment campaign in its history (DFO 2017). It is hoped that this increase in capacity will improve the production of science information and advice in support of fisheries and oceans decision making. But, there are concerns that this may take some time, as the capacity to train or mentor young scientists may have been hindered by a lack of overlap with those that retired or were forced out in previous years (Barnett and Wiber 2018). Regardless, these concerns should pertain more to the capacity to undertake scientific research (and resultant number of meetings) and less to the timeliness of publishing documents for research reviewed at meetings that have already taken place. However, considering Research Documents likely take more time to produce than less detailed Science Advisory Reports, capacity may be a contributing factor to the large percentage of peer-review meetings expecting Research Documents that are still without them published (72 per cent of meetings). Yet, Research Documents should be based on working papers produced before meetings (CSAS 2010b), meaning that if capacity is a contributing factor, it relates to time required for revisions.

Since 2010, CSAS publications are only available online (CSAS 2010c). Thus, the delays are not related to printing and distribution issues. Publications are required to meet the federal Policy on Communications and Federal Identity (CSAS 2010c, Canada 2016) and be available in both official languages. Translation services are sometimes cited by departmental staff as a delaying factor. It is important that CSAS documents most heavily relied upon by those involved in the decision-making process, particularly Science Advisory Reports and Science Response reports, are available in both French and English within policy timelines to aid decision making. Approvals may also be a source of delay as multiple authorities (e.g., co-authors, directors) must approve document content prior to publication. Each document type has a specific format, and all documents are subject to formatting review and conformation, meaning capacity issues within CSAS may also contribute to delays. And lastly, after documents are finalized and approved, delays could still occur due to issues related to posting the material online, as appears to be the case with some Integrated Fisheries Management Plans (see examples in Oceana Canada 2018b).

DFO needs to determine the cause of delay in the publication of science information and allocate resources where required to ensure publications are available within CSAS policy timelines to support decision making. Furthermore, to facilitate fair, transparent and timely decision making, summary bullets finalized at meetings for Science Advisory Reports and Science Response reports should be published in advance on the CSAS website in both official languages within one week of the end date of the meetings, along with the list of meeting attendees and affiliations. With an increasing emphasis on ecosystem-based management and the development of an associated ecosystem science framework (Soomai 2017), the importance of science advice will only increase. As will the importance of timely availability of scientific information among the different departmental science sectors and fisheries. Canada's fisheries and oceans management are based on science, and the timely delivery of science advice is required to support the stability of healthy fisheries and the rebuilding of depleted stocks for the benefit of marine ecosystems, coastal communities and the fishing industry.

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