Main Menu
Science
CSAS
Science Advisory Schedule
Publications
Processes, Policies and Guidelines
Contact Us
Proactive Disclosure

DFO Science Advisory Process Framework

Table of Contents:

Why Does a Formal Science Advisory Process Matter?

Science is an important pillar of sound decision-making in management and policy formation. Sound science provides information on the consequences of policy and management options, and the likelihood of achieving policy objectives under alternative management strategies and tactics. When objectives are stated explicitly, science can evaluate which options are most likely to achieve them, and which options are likely to fail. Such science-based information is only part of policy formation and development of management approaches, but the information is invaluable in ensuring that the subsequent consultative processes with stakeholders and advisory bodies proceeds from a shared and reliable information base.

Department of Fisheries and Oceans (DFO) Science is committed to quality, objectivity, and inclusiveness in its overall scientific advisory process. Faced with a diverse and growing number of issues to address, the scientific advisory process is severely challenged to uphold that commitment while providing other DFO Sectors and other clients with the science information and advice that they need, in a timely and cost-effective manner. To meet this challenge we have developed a flexible but structured set of approaches, that may be considered as different processes in the whole DFO

Science Advisory process, to allow the advisory process to work effectively in a varied set of circumstances.

The whole process is intended to make sure that DFO Science meets its advisory responsibilities fully, in ways that are predictable to all participants, and give all interested parties a clear understanding of their roles and responsibilities. The process is based on the SAGE (Scientific Advice for Government Effectiveness) Principles and Guidelines. Those principles and Guidelines have proven to be a very effective foundation on which to build the DFO advisory process. There have been many challenges in building an advisory process meeting those high standards, but we have succeeded. We face additional challenges as we strive to build the culture of working within the framework of this process. In meeting these challenges, the DFO process has been reviewed relative to the processes used in other science-based Departments of the Canadian government, and of other countries, and our progressive leadership has been acknowledged consistently. This external validation of our efforts is welcome and reassuring, as it supports feedback we received directly from our clients. We are serving the clients of the advice, and the Canadian public, well.

[Back to top]

Detailed Description of the DFO Science Advisory Process

Peer Review as a Fundamental Part of the Advisory Process

Science information usually comes from diverse sources, and the parts are often difficult to integrate into a whole perspective on the issue of concern; some parts of the information available may even be contradictory with other parts. Interpretational perspectives are likely to vary widely within the group, particularly when a diverse array of scientists and holders of experiential knowledge all contribute information and analyses. Moreover, even when information comes from diverse sources, it is likely to be incomplete, with some key types of information not available. Hence, in many cases definitive answers to needs of clients cannot be provided, and the science information and advice must be framed in a manner that reflects the balance of evidence.

It is difficult to ensure that a consistently high standard of technical evaluation is applied to all science data and analyses, and experiential knowledge is evaluated with similar objectivity and rigour through methods appropriate to the type and sources of information. It is also difficult to maintain the objectivity and lack of bias in interpreting results and assessing the weight of evidence with regard consequences and options. All these tasks benefit from an inclusive process, where the diversity of experts and perspective examine all the material with rigour and with open minds. That is the essence of peer review.

The Government of Canada's Framework

The Canadian government has taken the need for sound and effective science advice seriously. It has adopted a set of Principle and Guidelines for the Effective Use of Science and technology Advice in Government Decision Making (http://dsp-psd.pwgsc.gc.ca/Collection/C2-500-2000E.pdf), commonly referred to as the SAGE Principles and Guidelines. The six core principles are:

1. Early Issue Identification
2. Inclusiveness
3. Sound Science and Sound Advice
4. Uncertainty and Risk
5. Transparency and Openness
6. Review

Each of the Principles has several Guidelines to clarify how it should be interpreted and applied in practice. Together the SAGE Principles and Guidelines provide a comprehensive and coordinated framework in which to conduct peer review and provide science information and advice to clients inside, and occasionally outside, of

government.

DFO's Response to the SAGE Principles and Guidelines

DFO has used science advice in decision-making for decades, and by the late 1970s a structured peer review process, leaded by the Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC), was developed for providing fisheries advice on Canada's east coast. CAFSAC evolved substantially through the early 1990's when it was disbanded. Regional Advisory Processes (RAP), which replaced CAFSAC, coordinated peer review and provision of scientific advice through the 1990's drew on some of its strengths but still had some shortcomings. Initially developed to provide science information and advice on fisheries questions, modifications to these review processes were required to provide the science advisory support to the wider range of issues faced by the Department when the *Canadian Environmental Assessment Act* (CEAA), the *Oceans Act* (OA) and the *Species at Risk Act* (SARA) were implemented. When the SAGE Principles and Guidelines were adopted in 2000, review of the DFO Science Advisory process found our advisory approach generally met the Guidelines well. Nonetheless our review found opportunity for improvements in Inclusiveness, Transparency and Openness, and Uncertainty and Risk.

DFO has addressed these issues by developing and implementing a flexible and structured approach for its scientific advisory process. There are nine different paths (or processes) within the whole DFO Science Advisory process, as identified in the table below. These processes are ranging from large and relatively formal meetings with diverse participants to small case-specific working groups.

The general principles, methods, and roles underlying these processes are outlined here, as well as the rules and factors which guide treatment of specific requests using one of the available processes.

Goals & Scope

The goals of the DFO Science Advisory process are to:

- ensure DFO science information and advice to clients meet all the SAGE guidelines;
- be timely, cost-effective, and reliable;
- provide all clients with stable and consistent service, with roles and responsibilities clearly understood by all participants;
- have full accountability to the Department and clients, while maintaining independence from policy influence.

The scope of the advisory process includes provision of all science advice needed by DFO (Fisheries, Aquaculture, Oceans and Habitat Management, and Policy), and science information and advice to other parts of the Canadian government dealing with key marine and aquatic issues such as species-at-risk and environmental impact assessments. For **Fisheries and Aquaculture Management** typical issues addressed include stock (and ecosystem) status and trajectories, harvest levels consistent with policy options, management benchmarks including conservation limit reference points, and harvest rules consistent with the federal policy on application of precaution. Information and advisory support for **Oceans and Habitat Management** is long standing from the perspective of habitat issues as well as newer, as programmes develop under *Canada's Ocean Act.* Issues currently or to be addressed include ecosystem impacts of energy exploration and development, ecosystem objectives for integrated management, biological definition of oceans management zones, biological basis for siting of marine protected areas, invasive species, and review of environmental impact assessments of undertakings in aquatic environments. Demands for information and advice in support of the provisions of the ***Species at Risk Act*** are growing rapidly. They include quality control of data and analyses of population data to be provided to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), review of Species Status Reports, critical habitat identifications, evaluation of allowable harm under Section 73, and science aspects of recovery plans and

recovery targets.

This diversity of issues to be addressed requires a diversity of processes in order for the provision of science information and advice to be done efficiently. Depending on the issue, the needs of the clients, and DFO's history with a topic, a particular request for advice might be dealt with best via large, formal meetings, expert workshops, or even informal brainstorming sessions. Altogether the nine different approaches have been developed to give us the flexibility needed to deal with the diversity of requests. All nine comply with the standards of the SAGE Principles and Guidelines, but do so in different ways. Sound Science and Sound Advice and Risk and Uncertainty are pre-eminent in all nine. Inclusiveness and Transparency are also central to processes which produce direct advice on management and policy. Cost effectiveness and efficient use of time and expertise are always considered, but the cheapest approach is not always the best one.

The Goals of the DFO Science Advisory process and the SAGE Principles and Guidelines require processes that are predictable and consistent, as well as flexible, however. To be applying Best Practices to the advisory tasks, a similar issue in a similar context should be treated in a similar way across the country. To achieve that standard of best practice, a series of nine explicit considerations, five regarding context and four regarding the nature of the question posed, have been used to stream a particular request into one of the nine alternative approaches within the overall suite of advisory processes. By addressing these nine considerations explicitly in determining how to conduct review and provide science information and advice on particular issues, we achieve both the flexibility necessary to deal with the diversity of requests and consistency necessary to meet the standards for best practices.

The Nine Considerations

1. *Will the product of the meeting will be **advice** on policy or management?*

   If yes, then full Inclusiveness and Transparency must be provided by the meeting. If the formal advice is to be provided by another body, and DFO Science is being asked to provide information to that body, then technical considerations are the dominant concern in selecting the process. Full standards of Inclusiveness and Transparency can be met at later stages in the path to the final science advice.

2. *What is the **history** of DFO Science in dealing with the type of issue?*

   If there is a long history of addressing similar questions, then it is likely that technical standards for sound science have already been established. Appropriate data sets and analytical methods have already been identified through past peer review, and methods of interpreting results, including effective communication of Risk and Uncertainty have been proven. The advisory meetings can largely focus on the degree to which the work being tabled complies with the established “industry standards”.

   At the other extreme, some types of problems may not have been addressed previously by any of the components of the DFO Science advisory process. In such cases each action taken in review and development of advice becomes a precedent, and must be done with a broad range of expertise participating. Such requests often are best addressed by a sequence of meetings, with the first ones scoping out the issue and information available, and developing a plan of action. Later meetings begin the review of results and consolidation of science information and advice to be provided to clients.

3. *What is the **breadth of interest** in the issue?*

   This consideration includes both the geographic scope of the question, and the range of disciplines and public groups likely to take an interest in the meeting results. When the geographic scale of the question is large, such as reviewing information on an Atlantic-wide species being considered by COSEWIC, a single

advisory meeting is usually necessary to ensure all relevant expertise is included and the issue is treated consistently across all regions, even though meeting costs will increase. This consideration can interact with the history consideration, as well. Even when a particular request for science advice focuses on a local issue, such as a seismic survey or capacity of an area to support aquaculture, if there is no advisory framework, how the local issue is handled may be taken as precedents for how the same issue should be addressed in other areas. Therefore a meeting drawing in zonal or national participation may be the best approach, even if the request is specific to a small area.

The disciplinary breadth of an issue is important but generally straightforward. If the question has been posed correctly, and the science response scoped well, it should be clear what range of experts should participate in the review and provision of advice. Interaction with managers and policy experts can also clarify the likely range of public interest in the issue on which advice is sought. This information is important in determining the nature and extent of participation from outside DFO Science.

4. *What **expertise** is available within DFO?*

   Many advisory requests, particularly on new issues related to integrated oceans management, may require scientific expertise not available in the particular DFO region where the advisory work will occur, and sometimes not within DFO Science at all. Addressing the consideration explicitly early in the planning stages for a response to a request for advice can clarify when it would be best to address the request at a zonal or national scale, or invest extra effort in ensuring participation in the meeting by experts from other DFO regions, academia, or laboratories in other countries. Reliance on external experts, including those contributing experiential knowledge presents no conceptual problems, but may pose some practical ones. Travel costs for external experts can add greatly to meeting costs. Also, peer review and provision of advice within the context of support for government decision-making is not identical with peer review for scientific journals. External participants who lack experience in the need to focus on weight of evidence, and provide the best advice possible even when the information is incomplete, may slow down progress in meetings on time-sensitive issues. Finally, it is occasionally necessary to deal with confidential or proprietary information in developing scientific advice (for example, fishery logbooks or industry business plans). This may be difficult or impossible when external participants are present at a meeting, and special arrangements may have to be made.

5. *How much **lead time** is available between the request and the need for a response?*

   Ideally all science advisory meetings should have ample time to consolidate data and information, conduct analyses, prepare working documents, and attract the right mix of participants. Sometimes advisory needs arise which are unforeseen, but urgent. The advisory process has to be responsive to such needs, even if it means dealing with an urgent request with an *ad hoc* process. Wherever possible such *ad hoc* treatments of important issues are revisited at a subsequent meeting with more complete planning, where the preliminary advice is either confirmed or modified as necessary. The Canadian Science Advisory Secretariat (CSAS) and DFO regional secretariats work closely with clients and DFO Science line offices to make sure such urgent requests are infrequent, and advisory needs which can be foreseen are included in annual work planning and advisory schedules.

6. *Is the question "**What do we know** about the issue?"*

   Such requests are generally for information, not advice. They require adequately comprehensive disciplinary expertise and planning, and often run best as workshops. External participants are valuable whenever they bring in unique knowledge or interpretational perspectives. However, because advice on policy

and management is not a direct product, the importance of Transparency and Inclusiveness is dealt with on a case by case basis.

7. *Is the question "**What could be done** [by the client] to address the issue?"*

   The focus of such meetings is to develop management or policy options, evaluate their consequences, and/or estimate the risks that each option may fail or succeed in to respect conservation objectives. Products are often, although not always, advice, and Inclusiveness and Transparency are usually important factors. The completeness of policy frameworks and **history** with similar issues both affect how such questions should be addressed. Where policy frameworks are mature, objectives are explicit, and there is extensive experience in dealing with similar issues, meetings often can produce conclusions on which options are preferred. Where objectives and policies are vague or absent and there is little experience, the meeting is likely to at best provide a list of the risks associated with the various options.

8. *Is the question "**How** can something be achieved?"*

   Such questions generally can only be posed when the policy framework is mature and objectives are clear. The meeting products are generally advice as well as information, giving importance to Inclusiveness and Transparency. Otherwise the scale of the meeting reflects the scope of the issue posed by the client of the advice.

9. *Is the question "**How much** of something [e.g. harvest of a fish stock] can be permitted?"*

   Requests of this nature presuppose that objectives have been set to guide setting the boundaries on how much; for example sustainability as a boundary on fish harvests. Sometimes the policy framework is sufficiently mature that management rules are in place, so the client is asking what level of an activity is consistent with the rules. The products are advice, so the meeting must meet the SAGE standards for Inclusiveness and Transparency. However, the meeting might be brief and straightforward, particularly when advising within rule-based approaches to management and policy.

Possible Choices Among the Types of Advisory Processes

The diversity of advisory processes under the umbrella of CSAS and the Regional Secretariats are built on three pair-wise choices.

- Are the meetings **Regional** or **Zonal/National;**
- Do they include **external participants** or **only DFO experts;**
- Are they part of the **annual work plan**, or ***ad hoc***.

Choices among these three sets of alternatives are guided by the nine considerations above. To insure that the SAGE Principles and Guidelines are followed, the guidance is quite firm. The system gets its flexibility by being able to accommodate the specific characteristics of each issue, not through allowing the Department to pick what is most convenient for its own circumstances.

The choice of **Regional** vs **Zonal or National** depends primarily on the considerations of **history** and **breadth of interest**, although the **expertise** available can also play a role in this choice. If there is wide interest in an issue, or the activities at the meeting are likely to be taken as precedents for how the issue should be handled throughout the country, there is a strong imperative for a Zonal or National meeting. If these conditions do not apply, it is often most cost-effective to have a Regional meeting, which also places the meeting closest to affected clients and stakeholders. When issues are addressed in a recurrent manner, such as stock assessments, Regional meetings are usually used. However, there are benefits in bringing the Regional experts together periodically in a Zonal or National assessment meeting on a group of similar stocks, to ensure innovations are being disseminated effectively and consistency of practice is

being maintained.

The choice of **External Participation** versus **only DFO experts** hinges crucially on whether or not **advice** will be provided to managers or policy developers. If the advisory meeting is the last science-based step before the issue is the responsibility of the managers or policy sector for their actions or consultation, the SAGE Principles of Inclusiveness and Transparency *must* have been met. The meetings *must* include external participation. If the products of the advisory meeting are DFO's input to some other agency's activities, the external participation is not mandatory. It is often still desirable, but the particular circumstances of each issue are considered. Sometimes DFO has legal requirements *as a Department* to play a particular role in government-wide activity. In some cases DFO may be inputting science information and perspective into a process run by another Department or agency, which has its own preferred policies and practices for meeting the SAGE Principles. In both such circumstances, it may be preferable for the DFO science review to be internal, while encouraging the agency coordinating the overall initiative to ensure DFO clients and stakeholders receive appropriate Inclusiveness and Transparency in the overall process.

The need for external participation also often reflects the considerations regarding the types of questions to be posed to the meeting. Particularly if the questions are of the nature "**How** can something be achieved" or "**How Much** of something can be permitted", the products are almost certainly advice, and external participation would be essential. If the question is "**What** do we know", it is sometimes helpful for DFO to pool its own knowledge, identify gaps, and develop a strategy for how to move to a position where a more inclusive meeting can tackle the more demanding advisory-type questions.

The choice of **Planned** versus ***ad hoc*** processes hinges exclusively on the consideration of **Lead Time** for preparations. Sometimes emergencies occur which require rapid response. An effective response may mean that some of the standards set above cannot be met fully, particularly with regard to Inclusiveness and Sound Science (through inadequate time to assemble all information that exists). Even with *ad hoc* processes, however, there is no justification to compromise Transparency. The necessity for occasional *ad hoc* meetings does not make them a virtue. However, as long as there is appropriate follow-up to ensure that in due time there is a body of information and advice provided in ways that meet the SAGE Principles and Guidelines, rapid but *ad hoc* responses to client needs can be a vital part of the DFO Science Advisory process.

Taken together, these three pair-wise choices produce nine types of advisory processes as described in the table below:

The Nine Types of Processes that are Parts of the DFO Science Advisory Process

Process (Path) no.	Scale	Description
1	National / Zonal	Inclusive review & advisory meeting
2	Regional	
3	National / Zonal	Information review open workshop
4	Regional	
5	National / Zonal	Information review closed workshop
6	Regional	
7	Regional	Past advice review meeting
8	Regional	*Ad hoc* meeting
9	Regional	*Ad hoc* review

Those nine advisory processes may be regrouped in different categories:

1. National/Zonal, Inclusive, and Planned (processes 1 and 3) – These are the flagship National Advisory Processes (NAPs) and Zonal Advisory Processes (ZAPs), and large national thematic Workshops. They deal with high-profile issues, and usually requiring significant resources.
2. National/Zonal, DFO-only, and Planned (process 5) – These are disciplinary workshops laying the technical groundwork for further Science actions. Their products often include research plans, and proposals for review papers to be prepared for additional meetings. Products may include DFO's input to the advisory processes of other government agencies, such as to CEAA Panels or COSEWIC authors.
3. Regional, Inclusive, and Planned (processes 2 and 4) – These are the standard RAPs and regional Workshops, and can address almost any advisory or information issue of regional importance
4. Regional, DFO-only, and Planned (process 6) – These parallel the National/Zonal disciplinary workshops, but address comparable issues at regional scales. Such a process may not even involve a formal meeting, if a work-team can ensure that *all* relevant DFO science expertise and perspectives are included in how the issue is handled.
5. Review of past advice (process 7) – This advisory meeting is the special case when advice and information on a topic has already been provided by one of the first six types of processes. After some time has elapsed, managers or policy staff may wish to have **confirmation that past advice is still sound** as a basis for the Department's policies and actions. Meetings to review past advice do not fit comfortably into any of the four categories above. The advice and information already exists, and was provided in ways that met the SAGE Principles and Guidelines. The most effective way to conduct such a review of past advice is too case-specific to fit into any single category above, so that type of request has a non-prescriptive category of its own. The important matter is that if the review concludes that the past advice and information is no longer sound, the updated advice has to be provided by one of the processes above, selected according to the explicit considerations relevant to any request for new advice or information.
6. *Ad hoc* processes (Processes 8 and 9) are identical to 1-6, but in each case are arranged on short notice. The key differences are the likelihood and breadth of Inclusiveness that is possible, and the completeness with which information can be consolidated in advance of the meeting. The more compromises which have to be made on Inclusiveness, and Sound Science, the more urgent it is that appropriate follow-up meetings be planned.

[Back to top]

Annex I: Terminology

Science Information and Advice:

The DFO Science Advisory process may provide both “advice” and “information” to clients. “Information” is generally factual information, with relatively little synthesis and interpretation accompanying it. Peer review may still be essential to provision of “information”, to ensure the quality of the information is high and that potential biases and incomplete coverage of a topic are clearly identified. “Advice” requires substantial interpretation of factual results and/or syntheses of diverse types of information, to provide the “big picture” from the pieces. “Advice” often describes the likely consequences of different options available to managers. However “advice” only includes a preferred option from among the alternatives when the policy objectives have been specified clearly, so the option whose consequences best meet the policy goal can be identified objectively.

The boundary between “information” and “advice” is not firm and clear in all cases. This

can cause some debate and confusion in practice, because which process is appropriate for a particular request depends in part on whether the desired outputs are information or advice.

Clients:

The process often refers to “clients” of the advisory processes. One type of client is the sector or agency which actually requests advice or information from DFO Science. This is usually one of the DFO Sectors (Fisheries and Aquaculture Management, Oceans and Habitat Management, Policy, Science), or one of the formally constituted advisory bodies like the Fisheries Resource Conservation Council (FRCC) and the Pacific Fisheries Resource Conservation Council (PFRCC). Often one of these sectors or advisory bodies requests information or advice as input to an initiative of another Federal Department or Provincial Government, for example to environmental impact assessments coordinated by the Department of Environment (DOE) under the Canadian Environmental Assessment Act, or to species-at-risk assessments coordinated by DOE and COSEWIC. Other Departments can request advice directly of the DFO Science Advisory process, but this occurs rarely.

Whether the requesting client seeks information and advice for its own needs or for input to initiative of other parts of governments, the information and advice is needed to support programs which affect Canadians and Canada's environmental quality. Hence, industries such as fishing and energy, community and environmental groups, and the general Canadian public are all clients of the information and advice as well, to the extent that they may be affected directly or indirectly by the advice, or the government programs based on it. The concept of “client” should be interpreted to include both types of clients unless another use is specifically mentioned.

Participants:

In the context of the DFO Science Advisory process, reference is always made to *external participants* at a meeting. This wording is chosen intentionally, rather than referring to such individuals as “representatives” of stakeholder and client groups. The essence of peer review is objectivity and impartiality. To the extent possible all partisan views and desires are suspended for the duration of the advisory meeting. Partisan views have a place in democratic dialogue, but that place is the consultation stage run by managers and policy experts, not in the formation of science information and advice. To refer to external participants as “representatives” is to suggest that their role is to “represent” some group, and that could be doing one's best to advocate the interests of one's group. Such a view is completely inappropriate in an advisory meeting, regardless of one's perspective. Hence we invite *individuals* to our meetings. We do *not* contact partisan organisations and ask them to send a “representative”. We do not normally allow a “substitute” if an invited individual is not available. We do our best to ensure that we invite individuals from the full breadth of viewpoints and experience with the issue under consideration, and that we invite individuals who are widely respected across all interest groups, and not just by those sharing a common viewpoint. We ask each invited participant to contribute fully the knowledge and perspective gained from their particular background, so the differences among participants will be clearly apparent during the dialogue of a meeting. The crucial nuance is that in evaluating information and ideas, every person, regardless of background, views the information and ideas on their soundness and degree of objective supporting evidence, and not on whether or not the idea or information fits with the interests of any particular group.