

INTERIM GUIDE TO INFORMATION
REQUIREMENTS FOR ENVIRONMENTAL
ASSESSMENT OF MARINE FINFISH
AQUACULTURE PROJECTS

Fisheries and Oceans Canada

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Copies of this publication are available from the following Fisheries and Oceans Canada locations:

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This guide will be reviewed and updated on a regular basis to reflect recent research findings, changes in aquaculture technologies and practices, and new legislative and policy initiatives.

Comments or feedback on the content and format are welcome and will be incorporated into future versions, as appropriate. Please send any comments to:

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PREFACE

This guide has been prepared to identify the information required to assess the environmental effects of marine aquaculture operations of most finfish species under the *Canadian Environmental Assessment Act* (CEAA) by Fisheries and Oceans Canada (DFO) and is intended to assist aquaculture proponents in collecting and presenting such project and environmental information. The information identified is required to allow DFO to conduct an environmental assessment under CEAA when DFO is proposing to exercise one of the powers described in section 5 of CEAA. These powers include the issuance of certain regulatory approvals under the *Navigable Waters Protection Act* (NWPA) and/or the *Fisheries Act* for an aquaculture project.

Prior to using this guide for collecting and assembling the information for a specific aquaculture project, DFO will provide confirmation to the proponent as to whether an environmental assessment pursuant to CEAA is required. **Upon confirmation that an environmental assessment is required, it is strongly recommended that the proponent contact regional DFO officials of the Habitat Management Program to review and discuss the requirements before information collection begins.** A list of the regional Habitat Management offices is included in Appendix 1.

These documents are intended to encourage consistency in the application of DFO's review processes across Regions. However, in some circumstances, Regions may determine that it is appropriate to require less information than is outlined in the guides.

Factors which may affect the level of information and monitoring required include:

- the size, scope and type of the proposed operation, (e.g. cod grow-out, may require less than a salmon farm);
- the extent of other activities in the area;
- site characteristics; and
- the temporal utilization cycle (e.g. continuous occupation, fallow periods, seasonal operation).

For example cod grow-out operations which are relatively isolated, seasonal, and small scale may have fewer requirements than a year-round, large-scale salmon operation located in an area with other salmon farms and activities.

Note: In addition to the CEAA assessment and DFO's consideration of the issuance of NWPA approvals and *Fisheries Act* authorisations, proponents may be required to satisfy other provincial and federal regulatory requirements about which they should obtain information.

This guide is a work in progress and will be continually updated as requirements change or the process changes. Every effort will be made over the following months to harmonize federal requirements with those of the provinces.

It should be noted that this guide is by no way exhaustive; it intends to address only a typical set of circumstances and should not be interpreted as binding DFO to the processes set out therein. Finally, this guide has no force of law. Its sole role is to assist the proponents in the preparation of their submissions required under CEAA.

INFORMATION GATHERING

The Guide to Information Requirements for Environmental Assessment of Marine Finfish Aquaculture Projects was prepared by DFO. The guide reflects the information required by DFO to conduct an environmental assessment of a marine finfish aquaculture project in Canada, regardless of its location and represents a nationally-consistent compilation of these information requirements.

This document is intended to serve as a guide for proponents in the collection and preparation of this required information in the form of a report. This approach has shown to be efficient and effective in ensuring that the required information is provided to DFO such that timely environmental assessments can be conducted and is consistent with the approach DFO applies to other industries for which environmental assessments are required under the *Canadian Environmental Assessment Act* (CEAA). In addition, proponents may also want to indicate which environmental effects may be harmful and propose mitigation measures to reduce and minimize those effects.

In some cases, the requested information will be similar or identical to information already prepared for provincial agencies in conjunction with an application for a lease and/or an operating licence. Proponents may wish to provide these application(s) to DFO referencing the specific relevant information contained within them. Alternatively, some provinces may have developed harmonized applications that contain both federal and provincial requirements.

Further, it should be acknowledged that the availability of this information from existing sources within either the federal or provincial government may vary from region to region and province to province. Provincial agencies may provide background environmental information or DFO may collect some of this information, thus precluding the need for the proponent to collect the same information.

Consequently, in each region, on a provincial basis, DFO may prepare an insert clarifying information that need not be collected. This is not to say that all the information identified in this guide will not be required to assess the environmental effects of marine finfish aquaculture projects, but that the proponent may not be required to collect information already available to DFO assessors from other sources.

It is **strongly recommended** that proponents consult with DFO officials of the Habitat Management Program to review and discuss the information requirements relative to a proposal before information collection begins. An insert may be available that clarifies additional sources of information and/or information that may not be required.

ABBREVIATIONS

| | |
|----------------|---|
| BMP | Best Management Practices |
| CDC | Conservation Data Centres |
| CEA Agency | Canadian Environmental Assessment Agency |
| CEAA | <i>Canadian Environmental Assessment Act</i> |
| CEPA | <i>Canadian Environmental Protection Act</i> |
| CFIA | Canadian Food Inspection Agency |
| cm | centimetre |
| cm/s | centimetres per second |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| CSSP | Canadian Shellfish Sanitation Program |
| CWS | Canadian Wildlife Service |
| DFO | Fisheries and Oceans Canada |
| EA | Environmental Assessment |
| Eh | redox |
| EMP | Environmental Monitoring Plan |
| FCR | Feed Conversion Rate |
| FEAI | Federal Environmental Assessment Index |
| GPS | Global Positioning System |
| HADD | Harmful Alteration, Disruption or Destruction (of fish habitat) |
| m ² | square metres |
| MPA | Marine Protected Area |
| mV NHE | millivolts (Normal Hydrogen Electrode) |
| NAD | North American Datum |
| NWPA | <i>Navigable Waters Protection Act</i> |
| PMRA | Pest Management Regulatory Agency |
| RA | Responsible Authority |
| VEC | Valued Ecosystem Component |

1.0 INTRODUCTION TO ENVIRONMENTAL ASSESSMENT

1.1 Environmental Assessment (EA)

Environmental assessment (EA) is an important planning and decision-making tool. It is an organized information-gathering process used to identify and understand the potential effects of proposed projects on the environment (land, water, air, organic and inorganic matter, living organisms and the interactions among these components). Environmental effects are identified, assessed, and where possible, plans are made to minimize these effects before irrevocable decisions are made. Consideration of potential environmental effects early in the planning stages of a project promotes better planning and can save time and money by proactively addressing potential issues before they become problems.

1.2 The *Canadian Environmental Assessment Act*

The *Canadian Environmental Assessment Act* (CEAA) was promulgated in January of 1995. As the legal basis for the federal EA process, CEAA sets out the responsibilities of the federal government and the procedures for carrying out the EA of projects requiring the federal government's involvement or approval.

CEAA has five stated purposes:

1. to ensure that the environmental effects of projects receive careful consideration before responsible authorities take actions in connection with them;
2. to encourage responsible authorities to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy;
3. to ensure that responsible authorities carry out their responsibilities in a coordinated manner with a view to eliminating unnecessary duplication in the EA process;
4. to ensure that projects that are to be carried out in Canada or on federal lands do not cause significant adverse environmental effects outside of the jurisdictions in which the projects are carried out; and
5. to ensure that there be an opportunity for public participation in the EA process.

In applying CEAA, the following guiding principles are used:

- A healthy environment and healthy economy can be achieved by making sure that the impacts on the environment are known before federal decisions are made.

- The EA process should be applied as early as possible in the planning stages of a project.
- The level of effort required to carry out an EA should match the scale of the likely adverse environmental effects of a project.
- In some cases, public participation could be warranted an open and balanced EA process.

1.3 When is a CEAA Environmental Assessment Required?

ACEAA environmental assessment is required for an aquaculture project when there are both a “**responsible authority**” and a “**project**”.

1.4 Responsible Authority (RA)

A responsible authority (RA) is a federal government department or agency that is required to ensure that an EA of a project is conducted under CEAA. A federal government department or agency becomes an RA for a project when it proposes to provide support for or approval of a project, in the form of:

- being the proponent of a project;
- providing funding;
- providing land; or
- issuing a permit or licence, granting an approval or other action prescribed by the *Law List Regulations* under CEAA.

The RA:

- must ensure that an EA of the project is conducted as early as possible, and before irrevocable decisions are made regarding the proposed project;
- shall not provide federal support to or issue any approvals for the project before the EA is completed; and
- shall not, without Governor in Council approval, provide federal support to or issue any approvals for the project if, following the EA, it concludes that the project is likely to cause significant adverse environmental effects which may not be justified in the circumstances.

1.5 Project

A project is defined by CEAA as either:

- in relation to a physical work, any proposed construction, operation, modification, decommissioning, abandonment or other undertaking in relation to that physical work [A physical work is a physical thing that is constructed and has a fixed location, i.e., is set firmly in place and will not drift away from its intended location and is not designed to be frequently moved in and out of the water or frequently moved from place to place within the water.];

or

- any proposed physical activity not related to a physical work which is described in CEAA's *Inclusion List Regulations*.

Most finfish and many shellfish aquaculture initiatives will fall within the first category of "project" described above. However, it is important to confirm that it is a project before beginning to collect the information identified in this guide.

1.6 EA Required for Specific Regulatory Approvals

DFO is required to ensure that an EA is conducted for a marine aquaculture project when DFO proposes to:

- issue an approval under paragraph 5(1)(a) or subsection 6(4) of the *Navigable Waters Protection Act* (NWPA) for the construction or placement of a work in, on, over, under, through, or across navigable water; and/or
- issue an authorisation under subsection 35(2) of the *Fisheries Act* for the harmful alteration, disruption or destruction (HADD) of fish habitat; and/or
- provide funding to the project.

The Habitat Management Program of DFO usually fulfills this EA responsibility for the Department and it will confirm, on a case by case basis, whether or not a CEAA assessment is required for the project.

1.7 Types of EA

There are four types of environmental assessments under CEAA:

- screening (including class screening);

- comprehensive study;
- mediation; and
- review panel.

The majority of marine aquaculture projects requiring an EA will undergo a screening, which is a systematic approach to documenting the environmental effects of a proposed project and determining the need to minimize or mitigate these effects; to modify the project plan; or to recommend further assessment through mediation or a panel review.

The general CEAA screening process is outlined in Figure 1 on page 9.

1.8 What is Assessed under CEAA?

Subsection 16(1) of CEAA identifies the factors that must be considered in the screening of a project.

“16.(1) Every screening or comprehensive study of a project and every mediation or assessment by a review panel shall include a consideration of the following factors:

- a) the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- b) the significance of the effects referred to in paragraph (a);
- c) comments from the public that are received in accordance with this Act and the regulations;
- d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and
- e) any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to the project, that the responsible authority or, except in the case of a screening, the Minister after consulting with the responsible authority, may require to be considered.”

Environmental effects are specifically defined under CEAA as:

- any change that the project may cause in the environment, including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by

aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and

- any change to the project that may be caused by the environment,

whether any such change occurs within or outside Canada.

Environment is defined under CEAA as the components of the Earth, including:

- land, water and air, including all layers of the atmosphere;
- all organic and inorganic matter and living organisms; and
- the interacting natural systems that include components referred to above.

1.9 Other Federal Departments

The project and environmental information provided to DFO by the proponent will be reviewed to assess potential environmental effects. Other federal departments (such as Environment Canada, Health Canada, Canadian Heritage, Department of Indian Affairs and Northern Development) may be consulted and requested to review and comment on information relative to their area(s) of expertise to assist DFO in the EA.

1.10 Outcome of an EA

After review and assessment of the potential environmental effects of a project, the RA must make a conclusion about **whether the project is likely to cause significant adverse environmental effects, after taking into consideration the implementation of mitigation measures** based upon the following:

| Conclusion | Action |
|---|--|
| The project is not likely to cause significant adverse environmental effects. | DFO can consider whether to issue the NWPA approval or <i>Fisheries Act</i> authorization, as appropriate. The RA is required to ensure the implementation of the mitigation measures which were identified in reaching this conclusion, as well as any followup program, deemed necessary. |
| The project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances. | DFO cannot issue the NWPA approval or <i>Fisheries Act</i> authorisation. |
| It is uncertain whether the project is likely to cause significant adverse environmental effects. | DFO refers the project to the federal Minister of Environment for mediation or assessment by a review panel. |

| Conclusion | Action |
|--|--|
| The project is likely to cause significant adverse environmental effects that may be justified in the circumstances. | DFO refers the project to the federal Minister of Environment for mediation or assessment by a review panel. |
| Public concerns warrant a reference to a mediator or a review panel. | DFO refers the project to the federal Minister of Environment for mediation or assessment by a review panel. |

The summary of the EA conducted, including the conclusion on whether the project is likely to cause significant adverse environmental effects, will be summarized in DFO's EA (screening) report.

The conclusion under CEAA provides direction of whether DFO can provide the NWPA approval and/or the *Fisheries Act* authorisation as noted above.

1.11 Follow-up Program

A follow-up program may be implemented to verify the accuracy of the environmental assessment of a project and to determine the effectiveness of any measures taken to mitigate the adverse environmental effects of the project. The proponent may be required to conduct some monitoring to support the follow-up program.

1.12 The Public Registry

CEAA imposes two main obligations on RAs with respect to the public registry:

- to establish a public registry for the purpose of facilitating public access to the records relating to EAs; and
- to operate such a registry in a manner to ensure convenient public access.

A public registry must be maintained in respect of every project for which an EA is conducted, regardless of whether the project undergoes a screening, comprehensive study, panel review or mediation. The RA is responsible for maintaining the public registry throughout the entire EA (screening or comprehensive study) of a project. During mediation or a review panel, the Public Registry is maintained by the Canadian Environmental Assessment Agency.

Although there are some exceptions, CEAA requires that a public registry must contain all records produced, collected, or submitted with respect to the EA of a project. Regional DFO Habitat Management officials will maintain the public registry for marine aquaculture projects undergoing an EA requiring an NWPA approval or *Fisheries Act* authorisation.

1.13 Public Participation

One of the purposes of CEAA is to ensure that there is an opportunity for public participation in the EA process. The public can participate in an EA in several ways:

- EAs, including tombstone information, are registered on the CEA Agency's Federal Environmental Assessment Index (FEAI) at: http://www.ceaa.gc.ca/0008/index_e.htm.
- A public registry is maintained for every EA to facilitate convenient public access to the records relating to the EA.
- If the RA is of the opinion that public participation in the screening of a project is appropriate, the RA may provide the public an opportunity to review and comment upon the screening report and any record in the public registry.
- Comments from the public received by the RA will be considered in the EA.

1.14 The Canadian Environmental Assessment Agency

CEAA established the Canadian Environmental Assessment Agency (the CEA Agency) to administer and promote the federal EA process policies and practices. The CEA Agency operates independently from any other federal department or agency, with its president reporting directly to the federal Minister of the Environment.

The CEA Agency does not conduct individual environmental assessments (EAs are undertaken by responsible authorities), however the CEA Agency has several important roles, including:

- managing and administering the federal EA process;
- administering the panel review process and the Participant Funding Program, and coordinates and provides technical support for class screening and comprehensive study type assessments; and
- providing procedural advice, training, guidance and co-ordination services to clients across Canada through its regional offices and headquarters.

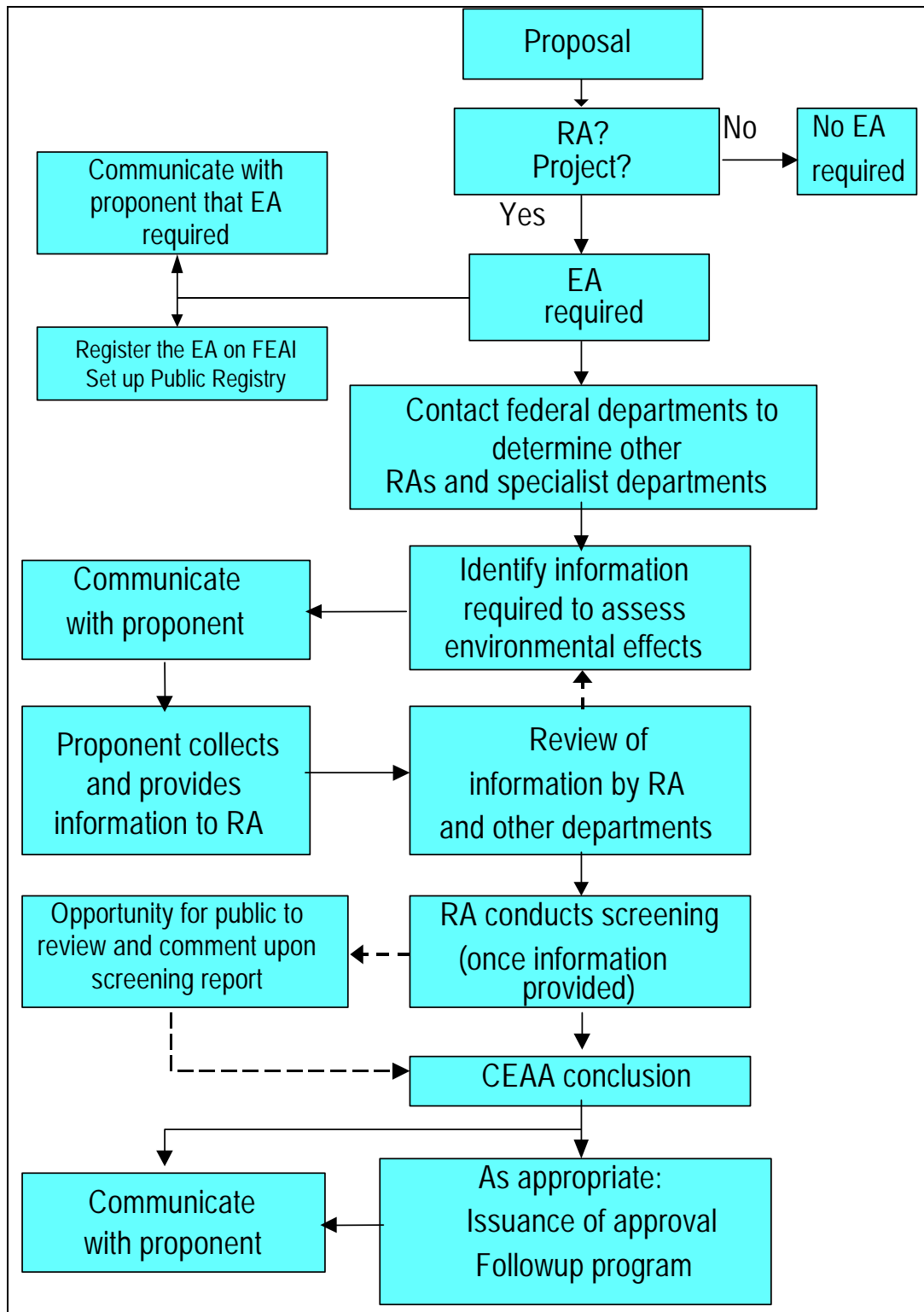
The CEA Agency has prepared various documents related to the application of CEAA for the use of the public, proponents and federal departments. These can be obtained from regional or headquarters CEA Agency offices or through the internet at: http://www.ceaa.gc.ca/index_e.htm.

1.15 Other Federal Government Departments/Agencies

Other federal departments, such as Environment Canada, may be consulted and requested to review and comment on information relative to their area(s) of expertise to assist DFO in the environmental assessment of an aquaculture project.

Environment Canada has prepared guidance material on the environmental assessment of aquaculture projects relative to its areas of expertise. This material may be found at:
<http://www.atl.ec.gc.ca/assessment/facts.html>.

Figure 1: CEAA Screening Process



2.0 INFORMATION REQUIREMENTS

The information identified in this section is to be collected by the proponent and compiled in the form of a report to be provided to the DFO assessor responsible for the environmental assessment of the aquaculture project.

2.1 Project Information

2.1.1 Contact Information

1. Provide the following contact information for the project:
 - name and address of proponent (including company name);
 - name of principal contact person;
 - telephone and fax numbers; and
 - e-mail address.
2. If the EA information submission was prepared by a consultant(s) or another group on behalf of the proponent, provide contact information for the agency or individual(s).

2.1.2 Physical Location and Site Detail

1. Provide a copy of a topographic map, navigational / nautical chart or orthophoto map showing the exact location of the proposed tenure, aquaculture facility and the onshore facilities used to access the site.
2. Provide a detailed sketch or plan (to scale) of the site and specify:
 - latitudinal and longitudinal corner and centre co-ordinates of the site;
 - datum (NAD 27 or NAD 83); and
 - dimensions of the site.
3. Provide the surface area of the proposed site and area of production (m² or hectares). If the application is for an expansion, provide the area of the existing site (m² or hectares) and the proposed expanded area (m² or hectares).
4. Briefly describe the location of the point of access for the proposed site (i.e., wharf, slipway) and locate it on the topographic map or nautical chart (from #1 above). Use nearby area features such as landmarks, islands, highways, wharves, etc. in this description.

5. On the map, draw a 2-kilometre and 5-kilometre circle around the proposed site with the site situated in the centre. Within the 5-kilometre circle, indicate the location of all other users of the area (e.g., other aquaculture operations, shellfish beds, processing plants, campgrounds, cottage communities, municipal or industrial sources of effluent, tourism operators, navigation channels, First Nations territories/reserves, commercial, recreational or aboriginal fisheries, any known future projects and activities, etc.). This may be available from the province or another source. An equivalent mapping plan with the same information, if available, can be substituted for either all or part of this information – all available information relative to other users is expected to be included in the proponent's submission.
6. Within the 5-kilometre circle on the map, identify the location of any environmentally-sensitive areas surrounding the proposed site (e.g., rearing or spawning habitat, migration corridors, protected areas or proposed protected areas, location of streams and connected waterbodies such as lakes, wetlands, sensitive migratory bird habitat, areas used extensively by marine mammals, etc.
7. Describe the site selection process, including the opportunities and constraints that were evaluated in the process.
8. Indicate whether the proposed site adheres to regional or provincial siting guidelines. If yes, indicate how and why. If not, indicate why not.

2.1.3 Design & Operational Plans

Construction and Installation

1. Provide labelled scale drawings of the proposed culture facility in two dimensions (plan view and cross sectional view). Include all equipment such as cages (include length, width and depth) walkways, mooring system, anchors, feed sheds, mortality storage, net washing barges, etc. Include details of any floating residential facilities, and associated land-based components, as applicable.
2. Note: If it is anticipated that the operation will be expanded in the foreseeable future, provide a second set of drawings illustrating the expanded gear layout. Provide a detailed description of any plans for future expansion including approximate dates of completion. Include the addition of cages, diversification of species cultured, any future infrastructure, or any other plan that might affect the site. If it is anticipated that the infrastructure will be moved within the tenure boundaries, provides drawings of likely alternate siting configurations.
3. Describe the anchoring / mooring system (e.g., screwed in, non-attached, etc.) and explain the placement and installation procedures to be employed.

4. Describe the construction materials and provide the name of the cage system manufacturer.
5. Describe other facilities, either existing or proposed associated with the proposed aquaculture operation including during the construction and installation phases. These may include wharves, access roads, staff facilities, portable washrooms, oceanfront property, land facilities, etc. Indicate the location of these facilities on the topographic or orthophoto map or nautical chart provided. Include details and a schedule of what activities will take place and where.

Note: Other structures may require an NWPA exemption or approval (i.e., any work placed below the high water mark). Contact the appropriate regional Navigable Waters Protection office concerning such works.

6. Provide information concerning any construction and installation activities that are intended to take place in water, on wetlands or on beaches. Include a schedule of what activities are intended to take place and where. If heavy machinery, vehicles, or vessels are required for installation and construction phases on wetlands or beaches or within the intertidal or deep water area, list the specific types and explain when and how they are to be used.

Note: A specific permit under provincial or federal legislation may be required for such works/activities. Contact the provincial agency(ies) responsible and DFO Habitat Management Program for additional information.

7. List standard operating procedures and planned measures to mitigate any potential harmful effects of the installation, construction and operation phases of the facility. Measures may include ensuring the construction site remains clean, foreshore areas are not harmed by construction activities and environmental monitoring. Indicate all other necessary permits and conditions of permits. Details regarding these measures will be required to provide assurance to DFO officials that potential environmental effects can be mitigated.

Measures to mitigate (mitigation measures) are actions taken to avoid, reduce or minimize effects on the environment. These may include such actions as timing activities to avoid migration of aquatic species, conducting in-water activities during low tide or isolating in-water activities to reduce sediment introduction.

8. Describe facility inspection and maintenance procedures, including their frequency and the actions to be taken. Discuss daily, weekly, monthly, and yearly maintenance requirements, as well as post-event (storms, predator incursions, etc.) inspection and maintenance procedures.

Production

1. Specify the species of finfish to be raised.
2. Describe the production setting. Will the proposed site be operated as a single-year-class site? Is an area or bay management plan in effect? Will site fallowing be incorporated into the production plan? (if so, specify frequency and duration of fallowing).
3. Provide annual totals for production tonnage, feed consumption and maximum stocking density. Provide data used for modelling.
4. Indicate procedures for transfer/movement of fish, including the introduction of smolts, movement between sites, net changes, etc. Describe all measures that will be employed to prevent escapes.
5. Describe harvesting procedures and schedule, including transportation of product from the production site to the processing plant and the disposal of bloodwater and offal. Identify harvest site, blood-letting site and processing plant. Describe any procedures to mitigate any potentially harmful effects resulting from harvesting and transportation activities.

Note: The *Canadian Environmental Protection Act* (CEPA) prohibits the deliberate disposal of any substance at sea unless the substance is specified on Schedule 5 of CEPA. Deliberate disposal at sea of specified substances requires a Disposal At Sea permit from Environment Canada under section 127 of CEPA. Before being granted such a permit, the proponent will have to show that all other disposal or recycling and reuse options have been evaluated and an extensive review by Environment Canada will be required.

6. Provide details on the use and storage of both medicated and non-medicated feeds. What handling practices will be implemented to minimize cross-contamination between medicated and non-medicated feeds?
7. Describe, in detail, the method of feed administration (i.e., by hand, auto feeders, etc.) and any methods to be employed to minimize excess feed, such as the use of feed tables, calculations to optimize feed use, the use of one form of feed over another, feed cameras or other electronic feedback systems (indicating frequency of monitoring), correct pellet size, etc.
8. Describe any other practices proposed to enhance production (e.g., grow/night lights). Give relevant details of timing, procedures, equipment used, etc.

Fish Health Management

Note: The transfer of fish from one location to another requires a review by DFO or provincial Introduction and Transfers Committees or Transplant Committees, and a licence, pursuant to section 56 of the *Fisheries (General) Regulations*. For salmonid species, being transferred from one province to another or into Canada from another country, a Fish Health Certificate under the *Fish Health Protection Regulations* is also required.. Seed and brood stock transported inter-provincially or internationally must be free of diseases of concern to the importing provinces.

Further information on ecological and genetic parameters may also be required by the Introduction and Transfers or Transplant Committee.

9. Provide details on fish health management plans, outlining actions taken throughout the entire production cycle to reduce the risk of disease and to ensure the fish remain in good health. The plan should include:
 - confirmation that stock meet *Fish Health Protection Regulations* and any provincial fish health regulations;
 - confirmation that transfers will meet National Code for Introductions and Transfers;
 - veterinary practices;
 - fish health training for management and staff;
 - use of vaccinated stocks (if possible, specify for which diseases);
 - potential use (substances, concentrations, frequency of use) of therapeutic agents in accordance with regulatory requirements;
 - mortality management (i.e., removal, storage, transportation, disposal);
 - procedures to deal with mass die-offs/kills;
 - measures to minimize the effects of toxic algal blooms; and
 - other relevant issues.

Note: It may be beneficial to contact your local veterinarian to obtain answers to your questions concerning fish health management.

Ancillary Management

Predator Control

1. Describe measures to be taken to minimize predator (birds, mammals, other fish) attraction and interaction (e.g., minimal perching areas; barrier systems, visual and/or

acoustic deterrent devices, lethal control measures, etc.). Provide details on how these measures may affect the predator. If an acoustic deterrent device (ADD) is used, additional details about the device may be required.

Note: Environment Canada's Canadian Wildlife Service (CWS) has a "Policy for the Issuance of Scare Permits for the Aquaculture Industry". To minimize impacts on migratory birds while protecting aquaculture operations against depredation of their crop, this policy places strong emphasis on siting considerations and early avoidance of problems. Contact CWS for information on this policy or go to: http://www.cws-scf.ec.gc.ca/1_pdf/Aqua.PDF.

Note: Proponents should also contact DFO and provincial wildlife agencies with regard to their predator control policies and regulatory requirements.

Note: Destruction of "fish" by means other than fishing may require an authorization under section 32 of the *Fisheries Act* from DFO.

Anti-fouling

1. Provide details for any anti-fouling materials that may be used and describe how each may be applied, including the location, method and frequency of application. Also include mechanical processes used. Explain where the fouling organisms and other water/material will be disposed.

Hazardous & Human Waste Materials

1. Provide a list of any hazardous materials that may be used on site (e.g., cleaning agents, fuels, etc.). Provide details regarding the transportation, use, storage, and disposal of these materials and their containers (e.g., paint cans, oil containers).
2. Describe the procedure used for collection and disposal of routine garbage and human wastes generated on site.

Decommissioning

1. Should decommissioning be required, describe the process, including measures to restore the area to its pre-development state.

Accidents & Malfunctions

1. Identify potential risks from malfunctions or accidents that may occur during the installation, operation and decommissioning phases of the project (e.g., fuel spills, storm destruction, extraordinary loss of fish livestock, etc.). Discuss operational plans (such as boat and equipment safety protocols, staff presence on the site) to prevent such accidents and malfunctions and contingency plans (including emergency spill response plans, containment and cleaning of spills) to deal with each of these possible situations including details of appropriate equipment and materials to be kept on site. What is the expected response time to deal with an onsite emergency?

2.2 Existing Environment

Note: It is recommended that proponents meet with DFO officials early in the project planning process. Such a meeting will serve to help identify site-specific information requirements, environmental factors to be considered, and the anticipated level of effort and detail that may be required in collecting and compiling information for the EA. It provides an opportunity to direct the information-gathering process and to focus the efforts of both the proponents and the reviewers.

2.2.1 Aquatic Environment

Oceanographic

1. Provide the following information pertaining to the proposed site:
 - range of depths through site (metres) [a profile diagram is useful to convey this information];
 - maximum depth at yearly highest tide (metres);
 - minimum depth at yearly lowest tide (metres);
 - minimum depth between bottom of aquaculture facilities / structures (i.e., cages) and seafloor at lowest tide (metres);
 - direction of maximum fetch; and
 - estimated maximum wave height (metres).

Note: Some government agencies provide oceanographic data on their websites. For example, DFO's Oceans Science website for its Maritimes Region (www.mar.dfo-mpo.gc.ca/science/ocean/home.html) and Pacific Region (<http://www.pac.dfo-mpo.gc.ca/sci/osap/>) includes information on subjects such as: ocean currents, water temperatures, salinity. As well, information is available on the St. Lawrence Observatory site (<http://www.osl.g.ca>). It may be beneficial to check such sites.

Water Quality

1. In addition to the monthly average temperature profile provided with the production data, provide the annual minimum and maximum water temperatures at the site. Is the site normally thermally-stratified? Provide the annual minimum and maximum salinity values for the site. A salinity profile should be provided.
2. Provide an oxygen profile taken at the deepest location during late summer or early fall periods. Secchi disc depth (the depth at which a 30 cm diameter black and white disc disappears from site under calm conditions during the day) should be recorded when oxygen profiles are measured.
3. List any other known organic matter inputs and/or sources of contaminants that may exist within the bay or that may be in close proximity to the site. These may include sources of contaminants resulting from raw sewage, agriculture activities, log boom storage, forestry, effluent from fish processing plants, disposal at sea, land-based industries, etc. Indicate how these activities or inputs/contaminants could affect the site and aquaculture operation.
4. The Canadian Shellfish Sanitation Program (CSSP), jointly administered by DFO, Environment Canada and the Canadian Food Inspection Agency (CFIA), provides for the continuing evaluation of the level of contamination in the water overlying shellfish growing areas and their classification as to sanitary quality. Specify whether the proposed site is located within a shellfish classification area. If so, specify the current classification and the date of the most recent survey. If not, specify the location of and distance to the nearest classified area and the date of its most recent survey.

Note: As a starting point, check the Shellfish Growing Area Classification Index at www.ns.ec.gc.ca/epb/sfish/maps/class.html for the East Coast and http://www.pyr.ec.gc.ca/ep/shellfish/shell_e.htm for the West Coast. Contact DFO or Environment Canada for more information. This information is not available in Quebec.

Note: Sampling guidelines/protocols for parts 3.1.2 (Currents) and 3.1.3 (Benthos) are available from DFO Habitat Management Program.

Currents

1. Provide information on currents at the site and describe the current regime. Describe the current patterns at the site along with their advantages and disadvantages (e.g., circular, vortex, seaward, landward, inflow/outflow). From the current data, provide:
 - the tidal slack period (minutes);
 - average current speed (cm/s);
 - minimum current speed (cm/s);
 - maximum current speed (cm/s); and
 - predominant current direction(s).

Benthos

1. Provide an underwater visual survey of the seafloor beneath the potential site and tenure area where turbidity and depth permit. The visual survey provides critical information on both marine life in the area (e.g., invertebrates, fish, plants and marine mammals), as well as the seafloor characteristics.
2. Conduct a grain-size analysis to provide information on the erosional or depositional nature of the seafloor. Higher energy environments are termed “erosional” and often contain coarser sediment particles than do lower energy “depositional” environments that generally contain finer sediment particles.
3. Provide information on the percent organic matter content in the sediment. This provides an indication of sediment characteristics prior to project operation and, therefore, the potential for assimilation of organic matter at the site.
4. Provide redox (Eh) and sulphide data for the benthic environment as a measure of electron activity in the sediment. Normal sediments consist of an oxygenated layer overlaying an anoxic zone. The redox discontinuity layer is the point at which these two layers meet, or the point where anaerobic microbial processes become dominant. Redox potentials provide a geochemical measure of sediment characteristics prior to project operation and, therefore, the potential for assimilation of organic matter at the site. Considering the above (Eh and sulphide measurements) and the underwater video survey, a determination will be made by DFO about the existing sediment conditions.

2.2.2 Biological Environment

Note: For this section, a number of resources should be consulted when collecting information. These may include the underwater video survey, commercial and recreational fishers, aboriginal groups, Fishery Officers, local fishery organizations, other local residents, etc. A great deal of information concerning fishery resources is available to the public through local regional development authorities. Ensure that all information transfer is documented and attached. It is the responsibility of the proponent to demonstrate a reasonable effort to collect information. Provide details about the source of the information (contact name, agency, phone number, etc.).

1. From the video survey and collected site knowledge, provide a qualitative assessment of fish habitat. A map indicating substrate type (silt, sand, gravel, cobble, boulder), plants (eelgrass, kelp), significant patches of animals (urchins, lobsters, crabs, sea cucumbers, etc.) and any other habitat features (e.g., rocky outcrop) should be provided. Include approximate abundance of each component, i.e., percent cover or number of individuals observed in a given area.

Note: Under section 34 of the *Fisheries Act*, fish habitat is defined as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes”.

2. List other fish species that may use this area as spawning, rearing, or over-wintering habitat. Include the information and its source.

Note: Under section 2 of the *Fisheries Act*, the definition of fish includes “...shellfish, crustaceans, marine animals,...and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals”.

3. Does this site lie within the migratory route of any fish species? If so, identify the species and the predicted time(s) of migration.
4. What is the distance from the site to the nearest stream(s)? Identify the fish species in the stream(s).
5. Identify the type(s) of potential predators (e.g., birds, mammals, other fish) that may interfere with the operation. Give the time of year they are most prevalent, noting particularly the presence of breeding areas, colonies, spring and fall staging areas, wintering areas, food sources and feeding areas.

6. Are any species at risk associated with or in the vicinity of the site? If so, provide details as to the species that may be present permanently or temporarily, as well as food sources, feeding areas and any proposed recovery plans.

Note: In this regard, contact the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) at www.cosewic.gc.ca or Conservation Data Centres (CDC) at <http://www.abi-canada.ca>.

7. Are there any areas in close proximity to the proposed site where birds are likely to congregate, such as ecological reserves, National Wildlife Areas, government parks, Migratory Bird Sanctuaries, Ramsar Sites, Important Bird Areas, or Western Hemisphere Shorebird Reserve Network Sites? If yes, provide details, including species likely to be present, breeding areas, colonies, staging areas, wintering areas, food sources and feeding areas.

Note: Information on these matters is available at <http://www.cws-scf.ec.gc.ca/cwshome.html> or contact the regional offices of Environment Canada's Canadian Wildlife Service.

In addition, also consult Environment Canada's Environmental Assessment of Marine Finfish Aquaculture Projects: *Guidelines for Consideration of Environment Canada Expertise* at: <http://www.atl.ec.gc.ca/assessment/facts.html>.

2.2.3 Socio-Economic Environment

Note: Under CEAA, the RA is required to consider any effect of any change that a project may cause in the environment including any effects of any change in socio-economic conditions.

1. Describe any fishing activities (e.g., commercial, recreational or aboriginal fisheries), tourism operations, recreational activities (e.g., boating, diving, skiing, swimming, etc.) in the vicinity of the site that could potentially be affected by changes in the environment resulting from the establishment and operation of the proposed aquaculture site. Provide information on their time(s) of operation and proximity to the site.
2. Provide contact names and comments received from any other users, such as fishers or their association(s), tourism operators, etc., that have been contacted to discuss the proposed development.

Note: Under CEAA, the RA is required to consider any effect of any change that a project may cause in the environment on the current use of lands and resources for traditional purposes by aboriginal persons.

3. Could the project have an effect on aboriginal people and/or the use of lands and resources for traditional purposes? Indicate why or why not. If there are aboriginal persons that could be affected by your project, summarize any discussions and correspondence you have had with them.

Note: For information on aboriginal groups, contact either the First Nations Tribal Councils or Band Council identified at www.johnco.com/firstnat OR the appropriate regional office of Indian and Northern Affairs Canada at www.inac.gc.ca.

4. Does the proposed site contain any historical, archaeological, paleontological, or architectural significance? If so, explain its significance.

Note: Parks Canada, Canadian Heritage or a local natural history museum, or other cultural agencies in the area may be able to assist.

5. Is the proposed site near potential or existing Marine Protected Areas (MPAs) or other federally or provincially-classified parks? If yes, specify which one(s) and its/their location(s).

Note: Contact DFO, Parks Canada and provincial authorities for information concerning MPAs.

2.2.4 Public Consultation

1. Provide information on, and copies of, any advertisements and public notices regarding the proposed development, including the date(s) and sources (e.g., newspapers, radio; newsletters, etc.).
2. Describe the public notification and consultation process. Provide names of contacts and dates of meetings or interactions. Provide information on comments and recommendations received in support of or in opposition to the proposed venture. Indicate how the issues raised by these parties may be addressed.

2.2.5 Changes to the Project Caused by the Environment

Note: Environmental effect also includes: any change to the project that may be caused by the environment.

Identify any changes to the project that may be caused by the environment. Aspects of the environment, such as weather and climate (including winds and ice build-up), tides, algal blooms, superchill, etc., should be considered. Identify measures to mitigate these

changes. If available, provide a copy of any studies or supporting material, such as engineering reports.

2.2.6 Cumulative Environmental Effects

Note: Under CEAA, DFO is required to consider any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will likely be carried out.

The concept of cumulative effects is the recognition of the complex ways in which the environmental effects of individual projects and activities interact and combine with each other over time and distance. Thus, to address cumulative environmental effects in environmental assessments requires *thinking cumulatively*. This means giving consideration to: (1) the temporal and geographic boundaries of the assessment; and (2) the interactions among the environmental effects of this project, and other existing and planned future aquaculture and non-aquaculture projects and activities.

The mapping exercise specified in Part 2.1.2, Question 5, as well as the other information provided by the proponent, will serve to identify potential environmental effects that exist within the 5-kilometre circle around, and beyond the proposed development site. The actual area for potential cumulative environmental effects around a proposed site may vary depending upon the physical characteristics of the location. Based on information provided and other available information, DFO will assess the scope, likelihood and significance of adverse cumulative environmental effects associated with the proposed finfish aquaculture project. The proponent may be requested to provide additional input to assist with the assessment of cumulative environmental effects.

As with environmental assessment in general, there is no one approach or methodology for all assessments of cumulative environmental effects. Different circumstances, such as location of project and type of potential environmental effects will dictate appropriate methodologies. Where information may be lacking, qualitative approaches and best professional judgement are used.

Follow up Program

As part of this assessment, the RA may conclude that a followup program (monitoring) is required to verify the accuracy of the environmental assessment and to determine the effectiveness of mitigation measures implemented. The proponent will be required to comply with the monitoring program, including carrying out any sampling required and ensuring that monitoring results are provided to DFO.

3.0 NEXT STEPS

The project and environmental information identified Part 2 are to be provided to the regional DFO Habitat Management assessor responsible for the environmental assessment of the project, i.e., the same official who met with the proponent to confirm information requirements for the project prior to information collection.

As outlined in Figure 1, *CEAA Screening Process*, the DFO assessor will review the information to determine what environmental effects may occur, and whether these are adverse and significant. The assessor may request expert advice from within DFO, as well as from other federal departments to conduct the assessment.

In some circumstances, additional discussion with the proponent may be required to clarify information or to discuss further information that may be required to continue the assessment. Such information may include mitigation measures to reduce or minimize harmful environmental effects identified in the assessment since such mitigation can reduce some harmful effects to the point that they are not significant. **To this end and to be proactive, a proponent may identify potentially harmful environmental effects in the information submission and identify mitigation measures that the proponent is prepared to implement to minimize those effects.** This may reduce the extent of discussion required between DFO and the proponent after information is submitted and aid the DFO assessor in determining whether effects are significant.

In some cases, proponents may also indicate their opinions and supporting rationale on the significance of adverse environmental effects of their proposed projects in the form of an Environmental Impact Statement (EIS). Although not a requirement of this guide, such an EIS may assist DFO in reaching conclusions about environmental effects. However, it is important to note that although the proponent is providing an opinion, it is DFO's opinion, as the RA, which will represent the conclusion of the CEAA environmental assessment.

After the consideration of the implementation of mitigation measures, the DFO assessor will determine whether the proposed project is likely to cause significant adverse environmental effects and will summarize the assessment in a CEAA screening report.

Further to the completion of the environmental assessment, a decision will be made on whether DFO will issue the required approval under *NWPA* approval and/or authorisation under the *Fisheries Act*. The proponent will be informed of this decision.

Good communication between DFO and the proponent will help ensure that the assessment is completed efficiently and effectively.

4.0 DETERMINING SIGNIFICANCE OF ADVERSE ENVIRONMENTAL EFFECTS

Additional information is available from the Canadian Environmental Assessment Agency's website:
http://www.ceaa-acee.gc.ca/0011/0001/0008/guide3_e.htm

After review and assessment of the potential environmental effects of a project, DFO, as the RA, must determine **whether the project is likely to cause significant adverse environmental effects, after taking into consideration the implementation of mitigation measures**. This determination is central to the concept and practice of environmental assessment and is a requirement under CEAA. A three-step framework has been suggested to RAs to facilitate this determination:

1. Deciding whether the environmental effects are **adverse**.
2. Deciding whether the adverse environmental effects are **significant**.
3. Deciding whether the significant adverse environmental effects are **likely**.

4.1 Adverse?

The most common way that an RA determines whether a project's environmental effects are adverse is to compare the quality of the existing environment with the predicted quality of the environment once the project is in place. Environmental monitoring information collected over time and/or distance before the project is in place would be a useful tool to identify the conditions of the existing environment. It also implies knowledge of normal baseline environmental conditions. As this guide requires, the proponent is expected to collect and synthesize the available information on baseline environmental quality. In some cases, where there are gaps in information, the proponent may also be requested to collect new information, depending on the size and nature of the project.

4.2 Significant?

There are several criteria that are taken into account in deciding whether the adverse environmental effects are significant. For assessing the significance of potential effects resulting from a proposed project, the Canadian Environmental Assessment Agency recommends consideration of the following criteria:

- the magnitude and severity of the adverse environmental effects;
- the geographic extent of the adverse environmental effects;
- the duration and frequency of the adverse environmental effects;
- the degree to which the adverse environmental effects are reversible or irreversible;
and
- the ecological context with an ecosystem perspective.

The significance of the adverse environmental effects of a project can be determined using environmental standards, guidelines and objectives or, alternatively, by using quantitative risk assessment. The latter approach assumes that there is an “acceptable” level of risk. Where there are no relevant environmental standards, guidelines, or objectives and quantitative risk assessment is not possible, the RA may apply a qualitative approach based on best professional judgement.

4.3 Likely?

After determining whether predicted effects are adverse and significant, the RA must make a determination on the likelihood of the significant adverse environmental effects. This determination is typically based on the probability of occurrence.

4.4 Examples of Potential Environmental Effects

Table 1 identifies various effects relative to components of the environment (sometimes referred to as Valued Ecosystem Components - VECs) which could be affected by marine finfish aquaculture operations, as well as possible mitigation measures and monitoring. This list is provided to illustrate examples of these issues and should not be interpreted to be exhaustive.

Some or all of these effects may be considered in DFO’s environmental assessment of a marine finfish aquaculture project. The information provided by the proponent will assist in determining the adversity, significance and likelihood of these effects.

Table 1: Potential Environmental Effects from Marine Finfish Aquaculture Operations

| A. Marine Habitat (including water quality) | | | | |
|--|--|--|--|--|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Fish feeding, fish defecation | <p>Release of organic matter into the marine environment resulting in:</p> <p>Reduced dissolved oxygen concentrations.</p> <p>Hypernutrification.</p> <p>Increased bacteria levels leading to hydrogen sulphide production.</p> <p>Increased turbidity and settling of suspended solids.</p> <p>Substrate deposition (i.e., smothering).</p> <p>Leading to harmful alteration, disruption or destruction (HADD) of fish habitat.</p> | <p>Feed formulation to be optimized – use dry, floating, extruded, low nitrogen and phosphorus content, increase Feed Conversion Rate (FCR).</p> <p>Feeding frequency and technique to be optimized (hand, automatic feeder) and monitored.</p> <p>Fallowing.</p> <p>Reduce density/number of fish.</p> <p>Ensure proper siting has adequate depth and current to allow sufficient waste assimilation.</p> | <p>Determination of significance of adverse environmental effects made by DFO.</p> | <p>Environmental Monitoring Plan (EMP) – benthic monitoring (video, Eh, sulphide)</p> <p>Increase frequency of monitoring if organic material accumulates.</p> <p>Regularly monitor feed conversion ratios and adjust feeding accordingly.</p> |
| Excess Feeding | <p>Harmful alteration, disruption or destruction (HADD) of fish habitat within the section of the ocean bottom located directly under the cages.</p> <p>Degradation of water quality and sediments.</p> <p>Introduction of organic matter.</p> | <p>Avoid over-stocking. Maintain optimal fish density.</p> <p>Use fallowing strategies.</p> <p>Optimize feeding regime.</p> <p>Implement BMPs. Adapt and improve BMPs.</p> <p>Ensure farm meets all environmental siting guidelines.</p> | | <p>EMP – benthic monitoring</p> |

| A. Marine Habitat (including water quality) | | | | |
|--|--|---|---|---|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Anti-foulant use & removal of biofoulants | Degradation of water quality (toxicity to some species). Introduction of organic matter. Substrate deposition, i.e., smothering. | Comply with manufacturers directions regarding use of anti-foulants. Clean nets dipped with anti-foulants on land. Use only anti-foulants registered for use in Canada. Follow Best Management Practices (BMPs) for removal and disposal of fouling organisms. Products used will be properly disposed of. | Determination of significance of adverse environmental effects made by DFO. | Monitor sediments for accumulation/presence of copper or other anti-foulants. |
| Refuse Disposal | Waste accumulation on seafloor. Degradation of water quality or substrates. | Incorporate source reduction measures. Remove all garbage (e.g., feed bags) from site daily/weekly and dispose in approved landfill. | Determination of significance of adverse environmental effects made by DFO. | Monitor bottom for waste accumulation. |
| Physical footprint of cage system | Sediment disturbance from installation. | Use installation method that minimizes disturbance. Ensure farm has been sited properly (adequate depth and currents). | | |
| Use of therapeutants | Degradation of water quality and/or marine sediments. Accumulation of residue in substrates. | Stock certified disease free fish. Use therapeutants approved by CFIA (Canadian Food Inspection Agency) or PMRA (Pest Management Regulatory Agency). Follow manufacturers' instructions. Apply under direction of a licensed veterinarian. Implement Healthy Salmon plan. Only use therapeutants and pesticides when absolutely necessary. Proper storage or feed containing therapeutants. Undertake regular mortality removal and disposal. | | Maintain and evaluate fish health records. Fish Health Monitoring Program. |

| A. Marine Habitat (including water quality) | | | | |
|--|---|--|--|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Accidental events/ spills (e.g., fuel and lubricants) | Degradation of water quality/sediments. Release of hazardous materials (direct mortality). | Use less-toxic alternatives to hazardous products. Develop an Emergency Spill Response Plan. Designate areas for storage and refueling with proper containment. Train facility workers in the safe and effective use of fuel, lubricants and chemicals. Train facility workers in spill and emergency (e.g., fire) response. Conduct regular inspections. | | |

| B. Fisheries Resources | | | | |
|---|--|--|---|--|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Collection & disposal of mortalities / carcasses | Disease transmission. Predator attraction. Introduction of organic matter. | Maintain a healthy population and minimize stress. Immediate collection, storage in sealed containers, transportation and land-based disposal at an approved landfill. Good husbandry practices. Regular underwater inspections to remove dead fish. Pathological examination of mortalities to check for disease – early detection and response. | Determination of significance of adverse environmental effects made by DFO. | Maintain and evaluate fish health records. |
| Physical footprint of cage system | Alter migration patterns of fish. | Avoid sites with high migration activity. Ensure site meets all siting guidelines. | | EMP to ensure area is not avoided by migrating fish. |
| Release of blood water | Disease transmission. Predator attraction. Introduction of organic matter. | Land-based disposal at approved landfill site. | | |
| Bringing fish onto site | Disease transmission. Escapes. | Follow standard Introduction and Transfer policies. Conduct regular health inspections and monitoring. Use disinfection techniques. Use preventative measures to avoid escapement. Minimize sources of stress. Implement predator deterrence measures. Immediately quarantine and appropriately treat or destroy diseased fish. Disinfect containment and handling equipment. | | |

| B. Fisheries Resources | | | | |
|---|--|---|--|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Use of therapeutants | <p>Direct mortality or degradation of health of non-target species.</p> <p>Indirect effects on wild species (sublethal effects to growth reproduction, bioaccumulation).</p> | <p>Stock certified disease-free fish.</p> <p>Use therapeutants approved by CFIA (Canadian Food Inspection Agency) or PMRA (Pest Management Regulatory Agency).</p> <p>Follow manufacturers' instructions for application. Apply under direction of a licensed veterinarian.</p> <p>Implement Healthy Salmon plan.</p> <p>Only use therapeutants when absolutely necessary.</p> <p>Proper storage of feed containing therapeutants.</p> <p>Undertake regular mortality removal and disposal.</p> | <p>Determination of significance of adverse environmental effects made by DFO.</p> | |
| Cage & site maintenance (including accidents & failures) | <p>Stock loss (escape) and competition with wild fish.</p> <p>Introduction of organic matter.</p> <p>Predation of farmed fish.</p> | <p>Implement and comply with a standard Code of Containment.</p> <p>Install quality equipment.</p> <p>Conduct routine and post-event inspection and maintenance.</p> <p>Implement security and predator-control measures.</p> <p>Implement precautions during all phases of fish handling, grading, and transfer activities.</p> <p>Develop and maintain an inventory control system to track and report escape events.</p> | <p>Determination of significance of adverse environmental effects made by DFO.</p> | |

| C. Wildlife (including birds, mammals and species at risk) | | | | |
|---|---|---|---|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Presence of cage site (e.g., noise, disturbance, etc.) | Predator attraction. Disturbance to species at risk. Degradation of water quality. Direct loss of access to habitat (cumulative effect). | Implement predator control (double netting) and deterrent systems. Avoid sensitive areas during siting. Consult Environment Canada – Canadian Wildlife Service “Policy for the Issuance of Scare Permits”. Meet all siting guidelines. | Determination of significance of adverse environmental effects made by DFO. | Yearly EMP. |
| Release of hazardous substances | Direct mortality of non-target species. Degradation of water quality. | Use pesticides approved by the Pest Management Regulatory Agency (PMRA). Follow manufacturers instructions for application. Train facility workers in the safe and effective use. | | |
| Release of excess feed | Supports seagull populations which may negatively impact other migratory birds. | See Release of excess feed under Marine Habitat (Part A). | | |
| Harvesting | Attracts eagles and other predators which may prey on birds between harvest periods. | Ensure that pollock and other fish species accidentally caught in harvest process are not made available to birds. | | |

| D. Traditional Use of Lands and Resources by Aboriginal Persons | | | | |
|--|---|---|---|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Access to cage site & harvest activities | Interference with use of infrastructure (wharf, roads, etc.). | Consult with local aboriginal groups. Avoid areas of current use of lands and resources for traditional purposes. Meet all siting guidelines. | Determination of significance of adverse environmental effects made by DFO. | |
| Cage site operation | Interference with traditional uses. | Consult with local aboriginal groups Avoid areas of current use of lands and resources for traditional purposes. Meet all siting guidelines. | | |

| E. Fisheries Activities (e.g., commercial, recreational and aboriginal) | | | | |
|--|--|--|---|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Operation of cage site / vessel traffic | Interruption of access to fishing areas. | Abide by NWPA approvals and site requirements. Consult with local fishers and other marine user groups. Avoid sites with significant fisheries. Maintain access to site by fishers, as operational and safety conditions permit. Meet all siting guidelines. | Determination of significance of adverse environmental effects made by DFO. | |

| F. Historical, Archaeological, Paleontological and Architectural | | | | |
|---|--|--|---|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Cage site operations and activities | Information gap identified. | Consult with interested and knowledgeable parties. Avoid areas of significant physical and cultural heritage. Background check into history of area. | Determination of significance of adverse environmental effects made by DFO. | |

| G. Farmed Fish | | | | |
|--------------------------------|--|--|---|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Containing fish on site | Direct mortality (disease or pathogen transmission from wild to farmed fish) | A licensed veterinarian to examine the cultured fish on a regular basis and treat as required. | Determination of significance of adverse environmental effects made by DFO. | |
| | Direct mortality (predation) | Appropriate predator deterrence including predator nets, scaring devices, frequent removal of mortalities, regular inspection of nets. | | |
| | Direct mortality (e.g., superchill) | Select sites of suitable water temperature (to avoid superchill or high temperatures). | | |
| | Direct mortality (e.g., hydrogen sulphide) | Do not allow farm waste to accumulate in the benthic environment. Implement BMPs. Adapt and improve BMPs. | Regular monitoring. Following of site. | |
| | Direct mortality (algal blooms) | Consider the potential for algal blooms prior to site selection. | | |

| H. Physical Structure of Facility | | | | |
|--|---|--|---|----------------------------|
| Project Activity | Potential Environmental Effects | Possible Mitigation | Significance of Adverse Environmental Effects | Followup Monitoring |
| Construction / installation | Weather and sea state could interrupt or delay the construction phase of the facility. | Placement of the facility will proceed when weather conditions permit. Transfer of fish will occur when weather and ambient seawater temperatures permit. | Determination of significance of adverse environmental effects made by DFO. | |
| Integrity of structure | Cage system damage (wind, waves, ice, tides, predators etc.) resulting in loss of fish. | Engineered to account for extreme site and operational conditions. Conduct routine and post-event monitoring and maintenance. Use only proven technologies and equipment. Incorporate redundancy into the system. Use predator deterrent systems at all times. | | |

APPENDIX 1:

DFO REGIONAL HABITAT MANAGEMENT OFFICES

Newfoundland Region

Habitat Management
Fisheries and Oceans Canada
Northwest Atlantic Fisheries Centre
P.O. Box 5667
St. John's, NF
A1C 5X1

Phone: (709) 772-2442
Fax: (709) 772-5562

Maritimes Region

Habitat Management
Fisheries and Oceans Canada
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
B2Y 4A2

Phone: (902) 426-8105
Fax: (902) 426-1489

Gulf Region

Habitat Management
P.O. Box, 5030
Fisheries and Oceans Canada
Gulf Fisheries Centre
343 University Avenue
Moncton, New Brunswick
E1C 9B6

Phone: (506) 851-7768
Fax: (506) 851-6579

Quebec Region

Gestion de l'habitat du poisson
Pêches et Océans Canada
Maurice Lamontagne Institute
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Case postale 1000
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APPENDIX 2:

GLOSSARY

Algal bloom. An algal bloom refers to an increased concentration of toxic or harmful marine microorganisms that may colour the water and from which toxins may be released.

Anti-fouling. It is common for nets, cages, longlines and other gear to become clogged or obstructed with natural foreign matter such as algal and invertebrate species. Unchecked, such fouling may impair productivity in aquaculture operations. It is common, therefore, to deploy anti-fouling techniques to reduce the attraction of fouling organisms and / or to remove them from the affected gear.

Benthos. The aggregate of animals and plants living on or at the bottom of a body of water. Within this context, benthos also includes the characteristics of the physical and chemical environment on the sea or lake bed.

Biofoulants. Biological organisms such as algal and invertebrate species that adhere to gear causing fouling.

Biomass. The weight of all the organisms forming a given population or trophic level, or inhabiting a specific region. Within this context, biomass refers to the total weight of the aquaculture organisms.

Class screening. A planning process that facilitates the environmental assessment of projects that have common or similar characteristics (e.g., project type, geographic location, proponent, environmental effects) and are subject to screening under CEAA. Class Screening Reports are reviewed and approved by the Canadian Environmental Assessment Agency through a process provided for in CEAA.

Cod grow-out operations. In contrast with conventional commercial cage culture operations, cod grow-out operations are generally of a smaller scale and are seasonal rather than year-round ventures. Cages for holding and fattening cod are typically installed over high energy, erosional sites in late spring and removed from the water in late fall.

Comprehensive study. One of four types of environmental assessment provided for in CEAA. Projects subject to comprehensive study are defined by regulation (*Comprehensive Study List Regulations*) and have the potential for significant adverse environmental effects. A comprehensive study requires a review of the same factors as a review panel or mediation, and a broader range than that required by a screening. Comprehensive studies also require public consultation on the completed environmental

assessment report and a decision by the Minister of the Environment on the need for further review of the project by a mediator or review panel.

Contaminants. Substances that, when added to the water column, may render the water harmful or unusable by others.

Cumulative environmental effects. The incremental effects of a project or activity on the environment when the effects are combined with those from other past, existing and future projects or activities.

Currents (circular, vortex, seaward, landward, inflow/outflow). Terms used to describe the pattern of flowing water in the vicinity of the proposed project.

Decommissioning. The process of retiring a site and operation from active service.

Depositional. Characteristic of lower energy sites in which current velocity and turbulence are insufficient to carry away finer organic and/or inorganic particles which, therefore, accumulate on the ocean floor.

Environmentally-sensitive areas. Areas that require an added degree of precaution owing to features and characteristics that support protected species and/or unique habitats (e.g., rearing or spawning habitat, migration corridors, protected areas or proposed protected areas, location of salmon streams, sensitive migratory bird habitat, etc.).

Environmental monitoring plan. A concerted plan between proponents and regulators that outlines specific monitoring requirements (e.g., procedures, protocols, time frames, etc.) and reporting requirements.

Erosional. Characteristic of higher energy sites in which current velocity and turbulence are sufficient to disperse finer organic and/or inorganic particles and consequently, such sites often contain only coarse sediment (e.g., rocks, boulders, etc.).

Extruded feed. As opposed to pelletized feed, the extrusion process generates feeds that are more stable in water, have fewer fines and higher digestibility.

Fallowing or site fallowing. To discontinue production at a culture site for a short period, generally up to one season (year).

Federal authority. For the purposes of CEAA, a federal authority is defined as :

- a federal Minister of the Crown;
- an agency or body of the federal government;
- any department or departmental corporation defined under schedule I or II of the *Financial Administration Act*; or
- any body prescribed in a regulation under CEAA.

Fetch. The distance over which wind-driven waves travel without encountering obstructions such as islands, mainland, etc. Fetch is an important characteristic of open water because longer fetch can result in larger wind-driven waves. The larger waves, in turn, can increase shoreline erosion and sediment re-suspension.

Fish Health Management Plan. A comprehensive plan for maintaining optimum health of the aquatic stocks in culture, usually consisting of procedures and guidelines for procuring healthy stocks, fish handling and transport, vaccination, feeding and veterinary practice.

Harrowing. A re-mediation measure of breaking up sediments by dragging a rake-like or hoe-like implement across the surface. The process serves to turn the sediments enabling increased oxygenation to lower layers.

Hypernutrification. The addition of nutrients to a level that exceeds a normal or healthy state.

Important bird areas. Represent a network of sites that conserve the natural diversity of Canadian bird species, are critical for the long-term viability of naturally-occurring bird populations in Canada. The Important Bird Areas Program is part of the Natural Legacy 2000 program (sponsored by the Canadian Nature Federation, Ducks Unlimited, Nature Conservancy of Canada and the World Wildlife Fund), a nation wide initiative to conserve wildlife and habitats on private and public lands.

Inclusion List Regulations. A list set out in regulations to CEAA, which specify those activities for which an environmental assessment is required if a federal authority proposes, funds or otherwise authorizes a project by issuing a permit or licence.

Intertidal. The region lying along the shore located between the low-water mark and the high-water mark.

Law List Regulations. A list set out in regulations to CEAA, which describes all those federal statutory and regulatory approvals which will trigger an environmental assessment. This includes federal permits, approvals, certificates, licences and authorisations.

Marine Protected Area. Marine Protected Areas (MPAs) under the *Oceans Act* may be designated for the conservation and protection of: commercial and non-commercial fishery resources and their habitats; endangered or threatened marine species and their habitats; unique habitats; marine areas of high biodiversity or biological productivity; and any other marine resource or habitat for which the Minister is responsible.

Mediation. An environmental assessment that is conducted with the assistance of a mediator appointed pursuant to section 30 of CEAA and that includes consideration of the factors required to be considered under subsections 16(1) and (2) of CEAA.

Migratory Bird Sanctuary. Migratory bird sanctuaries (MBSs) are established under the *Migratory Bird Convention Act* (1917) and managed under the *Migratory Bird Sanctuary Regulations*. The regulations prohibit all disturbances, hunting and collection of migratory birds and their eggs within a migratory bird sanctuary. Migratory bird sanctuaries offer protection to 94 significant sites found in all provinces except Manitoba. About one-third of MBSs are located on federal lands, however, they may be located on private or provincial land or any combination of land ownership.

Mitigation measures. Measures taken in respect of a project for the elimination, reduction or control of the adverse environmental effects of the project, including restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

National Wildlife Area (NWA). Environment Canada, through the Canadian Wildlife Service, has authority to establish national wildlife areas, under the *Canada Wildlife Act* and *Wildlife Area Regulations*, for the purpose of wildlife conservation, research and interpretation. National wildlife areas can be established on Canada's federally-managed lands, internal waters and territorial sea. They can include any habitat type - terrestrial, wetland, aquatic, intertidal and marine. They may also be wholly established offshore within the territorial sea or inland waters. In a number of cases, national wildlife areas have been linked with migratory bird sanctuaries for the conservation of migratory birds and their habitats. In addition, with the co-operation of provincial jurisdictions, NWAs have been established for the benefit of some trans-boundary species, as well as, other rare, threatened and endangered species.

North American Datum (NAD). A plane (or more precisely, a surface) to which horizontal positions in the United States, Canada, Mexico and Central America are accurately surveyed and referenced.

Nutrient. Organic and inorganic elements and compounds that constitute food within the aquatic ecosystem, particularly those that stimulate primary productivity (i.e., the production of organic matter via photosynthesis, utilizing energy from sunlight, carbon dioxide and nutrients).

Organic matter. Products or by-products of the feeding of fish and/or shellfish and the subsequent process of metabolism (e.g., dissolved and particulate metabolic by-products such as ammonia, carbon dioxide, fish faeces, un-consumed feed, etc.). Organic matter may also originate from other sources, such as sewage, farms, etc.

Orthophoto map. A map that combines the high visual information content of a photograph with the geometric accuracy of a map.

Oxygen profile. A chart or graph indicating the concentration of dissolved oxygen at regular intervals through the water column from the surface to the ocean floor.

Pesticides. Products designed to manage, destroy, attract or repel pests that are used, sold or imported into Canada, including chemicals, devices and organisms.

Plan view. An engineered drawing that shows the top view of a structure; i.e., looking down on the structure from directly above.

Ramsar site. The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. Ramsar has developed numerous co-operative mechanisms with all the major environmental conventions and many international conservation organizations. Joint work plans with several Conventions such as the Convention on Biological Diversity (CBD) are being implemented. There are currently 124 Contracting Parties to the Convention, with 1073 wetland sites, totalling 81.76 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.

Redox potential. Redox potential is a measure of oxidation and reduction reactions in water, measured as the loss or gain of electrons. Elements that donate electrons are oxidants while those that accept electrons are reductants (or de-oxidizers). In neutral, fully oxygenated water in equilibrium with air, redox potentials slightly greater than 500 mv are obtained. Redox measurements in natural waters should not be quantitatively interpreted or compared. Qualitative or relative comparisons, however, can be helpful in defining the degree of change within a system. Within an oxygenated water column, oxidative reactions predominate. As oxygen concentrations approach zero and anoxic conditions appear, as happens near the sediment-water interface, the redox potential drops significantly. Within the sediments, it is common for reducing conditions to prevail and the redox potential to approach zero or even a negative value.

Responsible Authority (RA). The federal authority whose actions or authority require that an environmental assessment of a particular project is conducted before the action or authority is exercised.

Review panel. Under section 33 of CEAA, the Minister of the Environment is empowered to appoint a review panel comprised of objective and knowledgeable persons to conduct the environmental assessment for a specific project, pursuant to the terms and conditions for review panels as presented in CEAA. The review panel makes its recommendations to the Minister of the Environment and the RA.

Secchi Disc Depth. The depth (measured during the day under calm water conditions) at which a 30 cm diameter white disc disappears can be used as a semi-quantitative index of suspended matter in the water column. It is used to calculate the light extinction coefficient which decreases as turbidity increases due to higher concentrations of suspended particulate matter.

Single-year-class site. An aquaculture production site at which all fish in the facility were hatched in the same spawning season.

Species at risk. Any indigenous species, subspecies, variety, or geographically-defined population of wild fauna and flora of special concern because of characteristics that make it particularly sensitive to human activities or natural events and at potential risk of becoming threatened or endangered.

Screening. A type of environmental assessment under CEAA requiring consideration of the factors outlined in subsection 16(1) of CEAA (see Part I).

Steady-state capacity. The normal month-in–month-out production capacity of a venture reflecting a relatively stable level of biomass, in contrast to the inaugural start-up period that is characterized by a rapid escalation in biomass.

Superchill. Most salmonid fishes freeze at a temperature of approximately -0.7 degrees C while seawater does not freeze until it reaches a temperature of approximately -1.4 degrees C. Between -0.7 degrees C and -1.4 degrees C superchill conditions exist where salmonid fishes can freeze to death in flowing water.

Therapeutic agents. Drugs, and/or pesticides used to reduce stress or to treat infection or disease in aquaculture organisms.

Thermally stratified. During summer months, it is common for deep bodies of water to become thermally stratified into three distinct layers. The upper layer (epilimnion) is characterized by more or less uniform, warm, circulating and fairly turbulent water. The lower layer (hypolimnion) is deep, cold and relatively undisturbed water. Between these two layers, the metalimnion is a narrow layer having a steep thermal gradient marking the transition from the warmer, upper stratum to the lower, colder stratum.

Tidal slack period. The period of transition between low and high tide and, conversely, between high and low tide during which there is very little current.

Trigger. An action by a federal authority that initiates the need for an environmental assessment under CEAA; that is one or more of the following duties, powers, or functions in relation to a project:

- proposes the project;
- grants money or other financial assistance to a project;
- sells, leases or otherwise transfers control or administration of land to enable a project to be carried out; and
- exercises a regulatory duty in relation to a project, such as issuing a permit or a licence, that is included in the *Law List Regulations*.

Turbidity. The transparency of water to light as influenced by unclear or murky conditions related to the presence of stirred-up sediment and/or the presence of algal and planktonic populations.

Valued ecosystem component. Any part of the environment that is considered important by the proponent, public, scientists or government involved in the environmental assessment process. Importance may be determined on the basis of cultural values or scientific concern.

Western Hemisphere Shorebird Reserve Network Site. The Western Hemisphere Shorebird Reserve Network (WHSRN) is a voluntary, non-regulatory coalition of over 160 private and public organizations in seven countries working together to study and conserve shorebirds throughout their habitats. The mission of the WHSRN is the conservation, restoration, and management of critical shorebird habitats throughout the Americas. Membership in WHSRN provides a site with international recognition as a major host for shorebirds.

Yearly highest tide. The highest spring tide level recorded for an annual cycle.

Yearly lowest tide. The lowest spring tide level recorded for an annual cycle.