
**NATIONAL CODE ON INTRODUCTIONS AND TRANSFERS
OF AQUATIC ORGANISMS**

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FOREWORD

The National Code on Introductions and Transfers of Aquatic Organisms sets in place a mechanism (Introductions and Transfers Committees) for assessing proposals to move aquatic organisms from one water body to another. It also provides all jurisdictions with a consistent process (the Risk Assessment procedure) for assessing the potential impacts of intentional introductions and transfers of aquatic organisms.

The Code applies to all aquatic organisms (called fish hereafter) in fresh water and marine habitats. These include finfish, molluscs, crustaceans, echinoderms, and other invertebrates, aquatic plants, both attached to the bottom and floating, and other aquatic animals as defined in the *Fisheries Act*. It applies to all activities in which live aquatic organisms are introduced or transferred into fish bearing waters, or fish rearing facilities such as aquaculture, and for commercial and recreational fishing including biological control programs e.g. control of aquatic vegetation.

The federal and provincial/territorial governments want to maximize the benefits associated with introductions or transfers and at the same time, they wish to avoid

- risks of harmful alterations to natural aquatic ecosystems;
- risks of deleterious genetic changes in indigenous fish populations; and,
- risks to aquatic animal health from the potential introduction and spread of pathogens and parasites that might accompany aquatic organisms being moved.

In sum, the Code is intended to protect aquatic ecosystems while encouraging responsible use of aquatic resources for the benefit of Canadians. Federal, provincial and territorial governments agree to work co-operatively in applying this Code to national and regional regulations and policies that govern intentional introductions and transfers. Provinces and territories and the federal government will work to ensure that affected jurisdictions are given a voice when aquatic organisms are introduced or transferred to shared watersheds.

Humans have been the principal movers of plants and land animals to new areas. The same is true for aquatic species, whether it is the intentional introduction or transfer of an aquatic organism, or the accidental movement of accompanying organisms from one area to another. Some of the major reasons why aquatic organisms have been intentionally introduced or transferred include:

- to fill perceived "vacant niches" in specific aquatic communities;
- to create economic benefits through new recreational and commercial fisheries and/or to increase production from aquatic ecosystems (e.g. through aquaculture and enhancement);
- to enhance diminished populations of a selected species and/or to re-establish extirpated species;
- to create refuges for species or strains that are threatened with extinction in their native habitats; and,
- for human food or to use as forage for other aquatic organisms;

The Code has two parts. Part 1 is general background – the purpose of the Code, why Canada needs such a code, what are introductions and transfers (including brief histories of some that have taken place in Canada), what has been the experience with introductions and transfers in Canada and why are there concerns about introductions and transfers. Part 1 also describes, in written and graphic form, who is part of the decision making process and in general terms, how such a mechanism would operate (that is, what happens when someone proposes to move an aquatic organism from one water body to another **within** a province or territory or **into** a province or territory).

Part 2 is the main body of the Code. It briefly describes the legal framework and the Guiding Principles of the Code. Part 2 also commits provinces and territories and the federal government to establishing Introductions and Transfers Committees in each province or territory if they do not already exist there. As well, the Department of Fisheries and Oceans agrees to establish a registry of introductions and transfers so that national reports can be issued on a regular basis for public information.

There is a list of definitions, a list of scientific references on the topic of introductions and transfers, and 5 appendices.

Appendix I contains information on the regional, provincial, national and international regulations, policies, and guidelines that apply to introductions and transfers of aquatic organisms in Canada.

Appendix II outlines the roles and responsibilities of:

- The Minister of Fisheries and Oceans and/or the Provincial Fisheries Minister – in regard to the Code and Introductions and Transfers;
- The Assistant Deputy Minister of Science for the Department of Fisheries and Oceans (DFO);
- The Regional Director General of DFO and/or the Provincial/Territorial Director of Fisheries;
- The Proponent for the introduction or transfer;
- The Introductions and Transfers Committees;
- The Aquaculture Science Branch of DFO.

Appendix III outlines the nature and scope of information that the proponent of an introduction or transfer should provide in support of the proposal. The major kinds of information required include:

- Who is making the proposal;
- What is being proposed for introduction and why;
- Where will the aquatic organism come from and where is it to go;
- Information on the life history of the organism;
- How is it expected to interact with native species already in the water body;
- Information about the water body into which the aquatic organism is to be placed;
- What precautions are being taken to avoid problems; and,
- Scientific references to back up the proposal.

Appendix IV, the Risk Assessment, is perhaps the most important part of the document. In some jurisdictions, the proponent will prepare the risk assessment and the Introductions and Transfers Committee will review it. In other jurisdictions, the Introductions and Transfers Committee will do the risk assessment or contract out the work to a competent third party. The object of the Risk Assessment is to identify whether the proposed Introduction or Transfer presents a low, medium or high risk for the receiving environment. The Risk Assessment is an adaptation of internationally acknowledged models and processes. The procedure asks questions and the answers are entered into a box in a table. The person or committee answering the questions is asked, on the basis of the scientific literature and/or the person's own personal knowledge, to answer whether the organism is likely to become established in the receiving environment and if the answer is yes, to state what the consequences of that establishment would be in terms of ecological, genetic or disease impacts. Each answer should be supported with references.

In all cases, the person must indicate, on a 5-point scale, whether he or she is certain or not certain whether his or her determination of low, medium or high impact is correct. The risk assessment procedure also asks for a description of how mitigation could reduce the risk of negative impacts even lower. (For instance, if there was concern that a species new to the area might become established in a water body, the authorities could require that only males or only females or only infertile individuals of both sexes be introduced so that there could be no mating.)

The final steps in the risk assessment are to place all the answers given in a summary table and, using a pre-established format, come up with a judgement of whether the introduction or transfer will have a low, medium or high risk of negative environmental impacts.

Appendix V is a summary of the whole risk assessment and it is used as the permanent record of the proposal and the review process. It finishes with the Introductions and Transfers Committee's advice to the Decision-Making Authority.

NATIONAL CODE ON INTRODUCTIONS AND TRANSFERS OF AQUATIC ORGANISMS

PART 1 - BACKGROUND

1.1 Statement of Purpose

1.1.1 The purpose of this National Code on Introductions and Transfers of Aquatic Organisms is to establish an objective decision-making framework regarding **intentional introductions¹** and **transfers** of live **aquatic organisms** that is designed to protect aquatic ecosystems while encouraging responsible use of aquatic resources for the benefit of Canadians. This can only be accomplished by developing sound and consistent scientific criteria to evaluate and facilitate the safe movement of live aquatic organisms into and within Canada in an environmentally sustainable and responsible manner. Federal, provincial and territorial governments agree to work cooperatively in applying this Code to national and regional regulations and policies that govern intentional introductions and transfers.

1.1.2 Part 1 is not an exhaustive study on the issue of introductions and transfers. It provides information that helps to explain the Code. Appendix I contains information on the regional, provincial, national and international regulations, policies, and guidelines that apply to introductions and transfers of aquatic organisms in Canada.

1.1.3 Within the context of this Code, “introduction and transfer” refers to the deliberate movement of live aquatic organisms into Canada, between **provinces** and territories, or within provinces or territories. The Code applies to all aquatic organisms in fresh water and marine habitats. These include finfish, molluscs, crustaceans, echinoderms, and other invertebrates, aquatic plants, both attached and planktonic, and other aquatic animals as defined in the *Fisheries Act*. It applies to all activities in which live aquatic organisms are introduced or transferred into **fish** bearing waters, or fish rearing **facilities** such as aquaculture, commercial and recreational fishing including biological control programs, e.g. control of aquatic vegetation.

1.1.4 The Code reflects, as far as possible, existing federal and provincial acts, regulations and policies, and regional and international standards that relate to introductions and transfers of aquatic organisms. Issues related to **aquarium fish**, live **baitfish**, **live fish for the food trade** and **transgenic aquatic organisms** are not covered by this Code.

1.1.5 This Code establishes a mechanism for assessing proposals to intentionally introduce or transfer aquatic organisms, so that all jurisdictions have a consistent process to evaluate and minimize the potential for:

- **Risks** of harmful alterations of natural aquatic ecosystems;
- Risks of deleterious genetic changes in indigenous fish populations; and,

¹Bold/underlined words are defined in the “Definitions” section.

- Risks to fish health from the potential introduction and spread of pathogens and parasites.

1.1.6 This mechanism provides a consistent, scientifically sound basis for application in all provinces and territories to enable the continuation of safe and responsible movements of aquatic organisms for purposes that:

- Maintain environmental sustainability and renewal;
- Maintain public and private sector **benefits** accrued from aquatic ecosystem use; and,
- Increase future public and private sector opportunities that can be derived from prudent use of the aquatic resource.

1.1.7 The Code does not cover **accidental introductions** and transfers, where the transfer of an aquatic organism (and its eventual **release** into natural waters) is not intentional. However, accidental introductions and transfers such as those resulting from the discharge of ballast water can have serious negative impacts on aquatic ecosystems. Controls involve a wide range of industries and agencies and are being dealt with by regulations and other mechanisms dealing with ballast water.

1.1.8 While socio-economic analysis of introductions and transfers are not addressed in this Code, all jurisdictions recognize that such analysis is important to and may even be required in the overall assessment of introductions and transfers. Therefore all jurisdictions are encouraged to develop their own processes for socio-economic assessments as appropriate and to consult with all interested parties such as individuals and local organisations, Aboriginal Groups, commercial and recreational fishing groups, etc.

1.2 Need for a National Code

1.2.1 The demand is increasing in Canada to introduce and transfer aquatic organisms into the country, between provinces or territories and, in certain instances, within provinces or territories. Fisheries managers may need to introduce or transfer fish to restore **stocks**, improve fishing opportunities and to expand **enhancement** programs, while the growing aquaculture industry may require flexibility to acquire fish for seedstock, to obtain new **strains** to improve the performance of production fish, and to obtain new culture **species** for diversification.

1.2.2 With the increased demand for introductions and transfers, there is a potential risk of negative impacts on **indigenous species**, habitats, and cultured species. Although the ecological, social and economic importance of these resources may vary across Canada, they are all considered to be significant.

1.2.3 As a signatory to the *1992 Convention on Biological Diversity* under the United Nations Environment Program, Canada is committed to "develop[ing] national strategies, plans or

programs for the conservation and sustainable use of biological diversity". The Code sets out procedures for assessing proposals for introductions and transfers so that impacts on fisheries resources (including cultured species/aquaculture products), habitat and ecosystems are minimized.

1.2.4 As well, in 1990, the Wildlife Ministers' Council of Canada adopted *A Wildlife Policy for Canada*. This Policy, agreed to by all federal government departments and all the provinces and territories, provides a national framework for federal, provincial/territorial and non-governmental policies and programs that affect wildlife, including fish. Section 8 provides guidance in regard to species introductions.

1.2.5 The purpose in developing this national Code is to minimize the negative impacts of introductions and transfers in recognition of Canada's responsibility to protect aquatic resources and, at the same time, permit environmentally sound fisheries resource enhancement and development of aquaculture. Administrators in provinces or regions have often worked independently in preparing local regulations and policies and have addressed only selected species or species groups. Therefore, it is important that we develop this national Code to:

- provide a comprehensive and consistent national framework for the introduction and transfer of aquatic organisms that will ensure there is a single, standard set of **risk assessment** and approval procedures covering introductions and transfers of aquatic organisms in Canada, that may be applied across the country. Provinces or regions may add additional requirements to address local needs;
- provide effective procedures that will help to minimize the negative impacts of introductions and transfers on fisheries resources, on habitat, and on aquaculture operations, without unduly impeding government and private sector activities that depend on the ability to move aquatic organisms from one location to another;
- ensure that Canadian **risk analysis** procedures are consistent with international standards and commitments;
- increase public and private sector awareness of the risks and benefits involved with introductions and transfers;
- stimulate research that will improve our ability to assess, and make decisions on, proposals to introduce and transfer aquatic organisms; and
- ensure that affected jurisdictions are given a voice when aquatic organisms are introduced or transferred to shared **watersheds**.

1.3 What are "Introductions" and "Transfers"?

1.3.1 An introduction of an aquatic organism is the intentional or accidental transportation and release of the organism into an **environment** outside its present range (ICES 1988).

1.3.2 When an organism is introduced outside its original range, it is called an **exotic species** in the new environment.

1.3.3 A transfer is the shipment of individuals of a species or population of an aquatic organism from one location and its release to another within its present (geographic) range (ICES 1988).

1.4 Experience in Canada

1.4.1 Humans have been the principal movers of plants and land animals to new areas. The same is true for fish species, whether it is the intentional introduction or transfer of an aquatic organism, or the accidental movement of accompanying organisms from one area to another. Aquatic organisms have been intentionally introduced or transferred for several reasons:

- for human food or to use as forage for other aquatic organisms;
- to fill perceived "vacant **niches**" in specific aquatic communities;
- to enhance diminished populations of a selected species;
- to create new recreational and commercial fisheries;
- to re-establish extirpated species;
- to create refuges for species or strains that are threatened with extinction in their native habitats;
- to increase production from aquatic ecosystems (e.g. through aquaculture and enhancement); and,
- to introduce species for biological control purposes (e.g. to control aquatic vegetation).

1.5 Concerns and Impacts

1.5.1 Aquatic ecosystems are continuously changing as a result of human activities and natural processes. Selective pressures on fish populations are created by recreational, commercial, and First Nations harvesting. Fish habitats are being degraded and altered through human activities. Introducing and transferring aquatic organisms can also affect the stability of aquatic ecosystems.

1.5.2 Three major biological concerns with the introduction or transfer of aquatic organisms are:

- Ecological effects such as competition for food, space, spawning areas, alteration of habitat, and predation on indigenous organisms.
- Genetic changes that will lessen the ability of local populations to survive; and,
- Movement of fish disease agents, parasites and other accompanying organisms that will affect organisms, both wild and cultured, in receiving waters and their habitats.

1.6 Examples of Introductions and Transfers

1.6.1 Examples of Introductions

1.6.1.1 The introduction of finfishes into Canada began with the introduction of common carp (*Cyprinus carpio*) to Ontario in 1880 (Crossman 1991). Since then, the list of species that have been brought to Canada from other countries, that have naturally invaded Canadian waters, or that have been moved from one ecosystem to another within Canada includes 92 species and 13 additional "forms" (subspecies, varieties, **hybrids**) of finfish (1989 statistics; Crossman 1991). Of these, 71 were authorized introductions.

1.6.1.2 The species most often introduced and transferred are salmonids (salmon and trout (*Salmo*, *Oncorhynchus* and *Salvelinus* spp.)), centrarchids (bass (*Micropterus* spp.) and bluegill (*Lepomis macrochirus*)) and percids (yellow perch (*Perca flavescens*) and walleye (*Stizostedion vitreum*)). The most common reasons for these introductions and transfers were to improve recreational fisheries, or for aquaculture.

1.6.1.3 The movement of the Belon or European (flat) oyster (*Ostrea edulis*) to Atlantic Canada, Atlantic salmon (*Salmo salar*) to British Columbia, and coho salmon (*Oncorhynchus kisutch*) and chinook salmon (*O. tshawytscha*) to the Great Lakes are examples of intentional introductions.

1.6.1.4 The introduction of coho and chinook salmon from the Pacific coast to the Great Lakes basin has created economically important sport fisheries. This Pacific salmon fishery in the Great Lakes has been largely supported on a put-grow-and-take basis using hatchery production. However, high stocking rates, coupled with decreases in nutrient input, have created large instabilities in forage fish populations in Lakes Ontario and Michigan in recent years. The continued reliance on the hatchery-based Pacific salmon fishery in the Great Lakes may have compromised managers' abilities to rehabilitate native top predators such as lake trout (*Salvelinus namaycush*) and Atlantic salmon (Lange and Smith 1995; Crawford 1997, 2001).

1.6.1.5 Rainbow trout (*Oncorhynchus mykiss*), most of which originated west of the North American continental divide, have been introduced to every province of Canada, the Yukon and the Northwest Territories. This salmonid provides the basis for significant recreational fisheries and is an important species in the aquaculture industry. However, rainbow trout have displaced native brook trout through competition in many areas where they have been introduced into the latter species' range (Ryder and Kerr 1984; Krueger and May 1991).

1.6.1.6 Populations of brown trout (*Salmo trutta*) introduced to Canada from Europe, are now established in most provinces, although they are not as important economically as rainbow trout. Brown trout have also displaced native brook trout through competition and predation (Ryder and Kerr 1984; Krueger and May 1991).

1.6.1.7 Lobsters (*Homarus americanus*) from the Atlantic coast have been introduced to British Columbia. However, self-sustaining populations have not become established there.

1.6.1.8 A malacostracan invertebrate, (*Mysis relicta*) was introduced into Kootenay Lake in British Columbia in hopes of enhancing food for kokanee salmon (*Oncorhynchus nerka*). This introduction has since proven detrimental because their vertical migration behavior made them unavailable to the kokanee. Instead of serving their intended purpose, they became a competitor with kokanee for other zooplankton prey (Lazenby *et al.* 1986; Martinez and Bergersen 1989).

1.6.1.9 Demands for new species in Atlantic Canada led to trials with the Pacific oyster (*Crassostrea gigas* (unsuccessful)), several introductions of European oyster from different sources and, most recently, two introductions of bay scallops (*Argopecten irradians*) from the United States (Couturier *et al.* 1989). Newkirk (1989) described the history of the introductions of the European oyster to Atlantic Canada. Only one self-sustaining population of European oyster is believed to have been established.

1.6.1.10 Japanese scallops (*Patinopecten yessoensis*), Pacific, American (*Crassostrea virginica*) and European oysters, have all been introduced to British Columbia for commercial aquaculture. Most of these oyster introductions are sustained by regular transfers of seed from the USA. The Manila clam (*Tapes philippinarum*) was accidentally introduced and has now become established. The commercial harvest of both wild caught and cultured Manila clams and Pacific oysters is now well established.

1.6.1.11 **Range extensions** are also considered introductions. This occurs when organisms are intentionally released in areas outside their normal range. The negative impact of range extensions can be significant, even though the organisms may be only just outside their original range (e.g. the impact of northern pike (*Esox lucius*) on the muskellunge (*E. masquinongy*) when the range of northern pike was extended to the Kawartha Lakes, Ontario, through the Trent Canal system). In instances of range extension, fisheries administrators in neighboring jurisdictions should be consulted before the range of an organism is extended into waters that are shared between two or more jurisdictions.

1.6.1.12 The use of hybrid organisms has previously occurred. Hybrids are obtained by crossing different species and, rarely, different genera. For example, brook trout (*Salvelinus fontinalis*) and lake trout were crossed to create "splake" (*S. fontinalis* x *namaycush*) in Ontario. The hybrid had desirable characteristics of both the brook and lake trout. Another common hybrid tested by fisheries management agencies for the recreational fishery is the tiger trout, an inter-generic cross between brown trout and brook trout. The concern with hybrids is that if they backcross with either of the original species, there could be a transfer of foreign genetic material into the indigenous population. This has raised concerns about the changes to **genetic diversity**

in the indigenous populations and the potential to reduce the ability of individuals to survive in the wild.

1.6.2 Examples of Transfers

1.6.2.1 Transfers of aquatic organisms are common throughout Canada. Many valuable recreational fisheries for salmonids are dependent on the transfer and release of hatchery-reared fish in lakes and rivers. Oysters and other shellfish species are transferred from polluted waters or inferior rearing areas to cleaner and more productive waters for aquaculture and commercial harvesting. Other examples include the shipment of live Atlantic salmon between New Brunswick and Nova Scotia, and brook trout from Ontario to Nova Scotia. In each case, the species is native to both source and receiving provinces.

1.6.2.2 Shipments of live Atlantic salmon from Norway or Scotland to the east coast of Canada would also be considered as transfers, because Atlantic salmon occur naturally in all three areas (see Section 1.5 where concerns are described about such transfers between locations which may have different genetic strains and different disease profiles).

1.6.2.3 Transfers within provinces, between provinces or countries could have significant implications for stocks in receiving waters. Different stocks of aquatic organisms have clearly defined behavioral characteristics, many of which are genetically controlled. Interbreeding between divergent stocks of the same species, which could be separated spatially or temporally, may result in the reduction of, or changes to, particular traits that could alter the ability of an indigenous population to adapt to changing environmental conditions.

1.6.2.4 Transferring different genetic strains into water bodies containing locally-adapted strains can be contentious (Phillip 1991; Evans and Willox 1991; Waples 1991; Campton 1995). Some resource managers have developed policies which recognize this concern by recommending that donor stocks for transfers closely match the stocks in the receiving waters. A trend exists also towards adopting a conservative approach in approving transfers between distant locations.

1.6.2.5 Early transfers (1910-15) of American oysters to waters off Prince Edward Island are believed (but cannot be proven) to have caused the outbreak of Malpeque disease. Interest in "alternate species" for aquaculture has resulted in increasing requests for new species and genetic infusions from new stocks, including transfers of a new "selected variety" of hard-shell clam (*Mercenaria mercenaria* var. *notata*).

1.7 The Decision Making Process

1.7.1 The process of providing a fair and informed decision in response to an Introduction and Transfer request requires a variety of inputs. These inputs can include legal factors, ecological, social, economic and cultural information, local community knowledge and the views of Aboriginal Groups, including the use of traditional aboriginal knowledge (Figure 1).

1.7.2 This section provides detail on one aspect of these inputs – ecological issues and how they are addressed through Introductions and Transfers (I&T) Committees using the risk assessment model. The Code is intended to present a clear and common process for assessing ecological risks and for the operation of the I&T Committee. It should not be construed as indicating that other inputs to the decision making process are less important. Rather, it provides input on what are generally accepted as the biological inputs such as ecological, genetic and fish health implications.

1.7.3 Other inputs to the decision making process are summarized as follows:

- *Cultural* – Includes issues such as historical and traditional access, and trends in demographics such as increased leisure time. Such input may be important in the assessment to reach decisions affecting the movement of fish.
- *Economic* – Includes economic issues that may reflect society’s value on development and the protection of fish stocks in both a public context (i.e. salmon enhancement) or a private context (i.e. improved performance of aquaculture stocks). Economic considerations may also describe and promote industries (e.g. aquaculture) and resource uses (e.g. recreational fisheries).
- *Social* – Includes aspects of social policy that often establish the framework of societal values in the context of natural resource management. Social policy can identify the uses of natural resources that society deems appropriate and supportable.
- *Aboriginal Groups* – Includes aspects of Treaty rights and other agreements that can define, or give direction to, the use of natural resources giving proper respect to the cultural and social rights of Canada’s Aboriginal Groups.
- *Legislative* – Includes aspects of a number of Federal and Provincial Acts as well as inter-provincial and international agreements affecting the movement of aquatic animals and plants.

1.7.4 The responsibility to ensure that applicable factors are reviewed prior to final approval for introductions and transfers rests with the Decision-Making Authority in each province or territory.

1.8 The Introductions and Transfers Committee Process

1.8.1 The regional or provincial I&T Committee provides scientific advice to the Decision-Making Authority on risks associated with ecological, genetic and fish health issues for each proposed introduction or transfer of aquatic organisms. The general process is illustrated in Figure 2. A more complete description of the process follows.

1.8.2 The process is initiated by a submission to the appropriate regional/provincial I&T Committee of an application for a permit to introduce or transfer an aquatic species. All applications are reviewed by the I&T Committee to determine if there is any prohibition of use of the organism in the region (if so the application is forwarded to the Decision-Making Authority to respond to the applicant), and to determine if the application contains all required information (if not the I&T Committee may request the applicant to supply missing information).

1.8.3 All applications are screened by the I&T Committee as either being a routine or non-routine movement. Routine movements may be handled by the Chair of the Committee. If the Committee determines that the movement is non-routine, then it will decide if the application would require further review in the form of an Aquatic Organism Risk Assessment as described in Appendix IV of the Code. If the assessment is that the risks associated with the proposed movement of the organisms are low, the application is passed, with the advice, to the Decision-Making Authority for further processing.

1.8.4 All applications representing a high or medium risk are examined by the I & T Committee to determine if there are mitigation procedures or technologies available to reduce the level of risk. The Committee consults with the proponent(s) to determine if they have suggestions on such procedures and technologies and to determine if any proposed procedures and technologies are feasible.

1.8.5 Applications assessed as constituting a medium or high risk and for which there are no mitigation measures to reduce that risk to low are then sent to the Decision-Making Authority. The committee provides information to the Decision-Making Authority concerning the level of risk and how and why it was determined.

1.8.6 The decision-making process ensures that all appropriate consultations are undertaken including those with other agencies, jurisdictions and Aboriginal Groups. The applicant is then informed in writing, of the results. When a permit is refused the Code identifies an appeal process that involves both the Decision-Making Authority and the applicant.

Figure 1. Inputs to the decision making process for introductions or transfers of aquatic organisms.

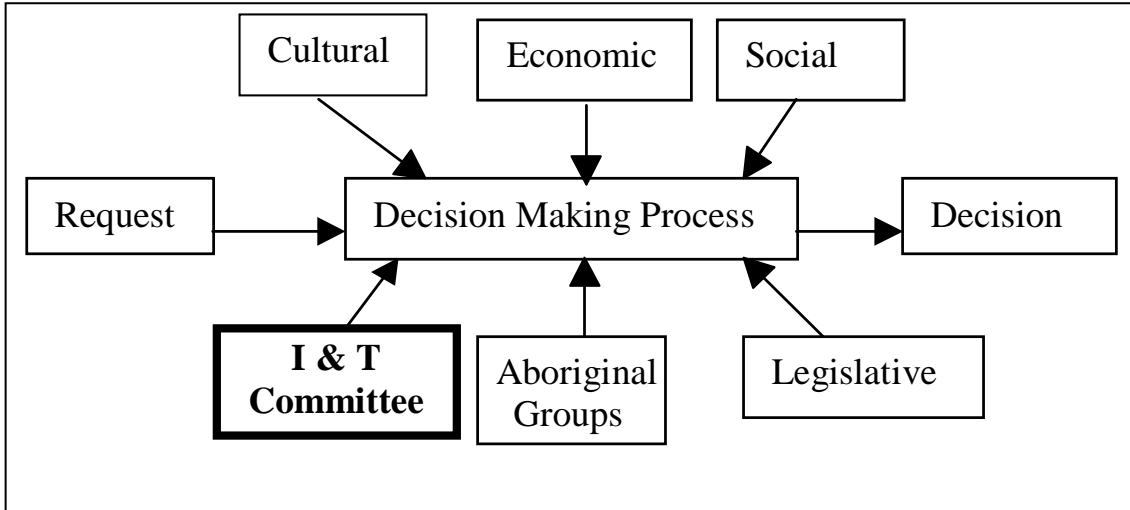
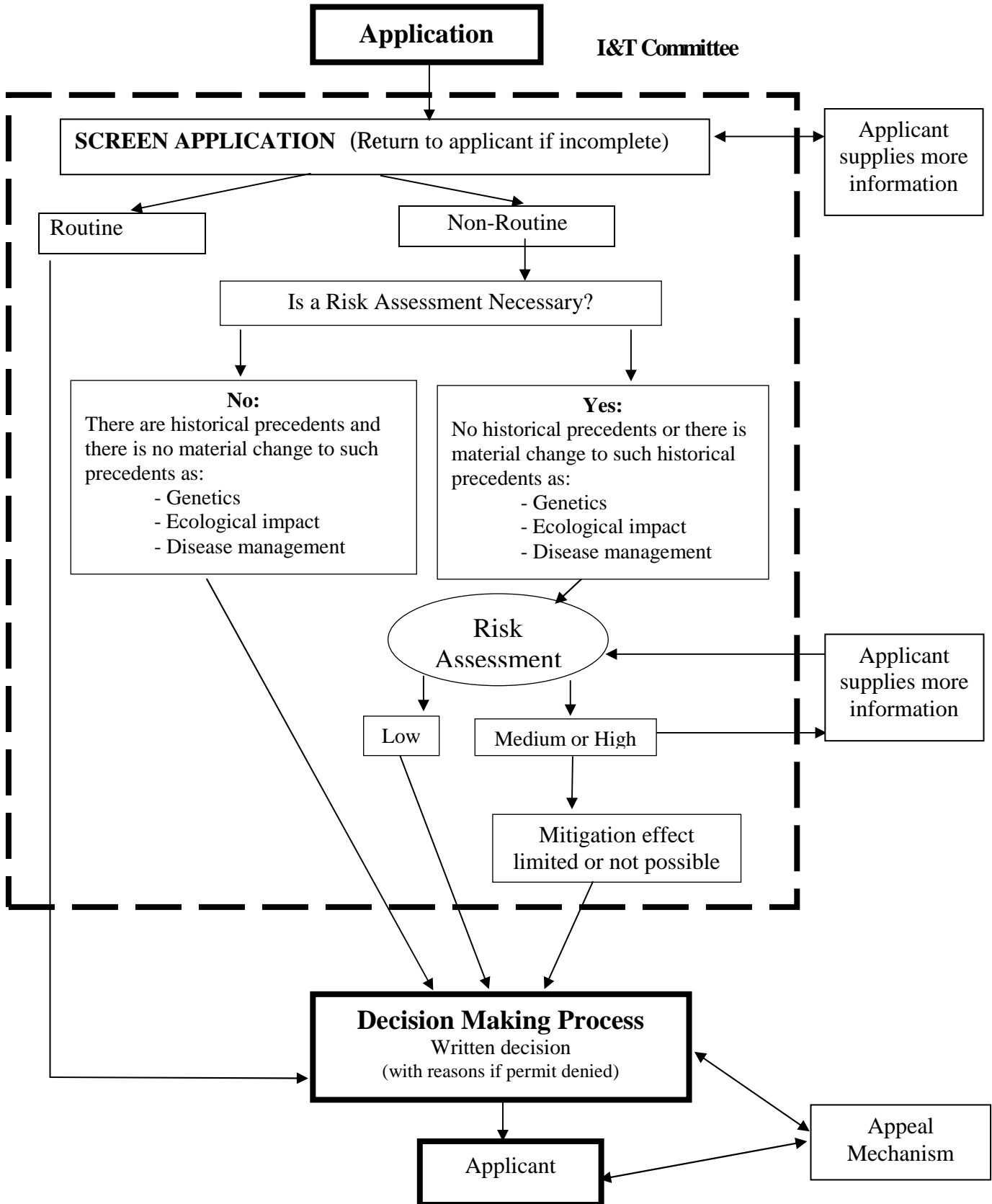


Figure 2. The Introductions and Transfers Committee Application Process.



PART 2 – THE CODE

NATIONAL CODE ON INTRODUCTIONS AND TRANSFERS OF AQUATIC ORGANISMS

2.1 Authority

2.1.1 Section 43 of the *Fisheries Act* provides enabling authority for the Governor in Council to make Regulations for the conservation and protection of fisheries resources, including the taking or carrying of fish or any part thereof from one province to any other province. The authority to issue licences permitting the release of live fish has been delegated to provincial Ministers in only some provinces; the federal Minister of Fisheries and Oceans retains this power in the other provinces and the territories. This Code establishes the principles and standards for the intentional introduction and/or transfer of aquatic organisms in order to protect these resources.

2.2 Guiding Principles

2.2.1 The federal, provincial, and territorial governments intend to work cooperatively to apply this Code to federal and provincial regulations and policies dealing with intentional introductions and transfers. The Code will be national in scope and will be applied fairly, equitably, and consistently.

2.2.2 Needs and benefits must be evident and well defined for human or natural resource communities for the introduction or transfer of aquatic organisms.

2.2.3 Use of suitable indigenous species for intentional release to unconfined waters from within the aquatic zone or watershed is preferable to the introduction of an exotic species or transfer of indigenous species from other distinct stocks (within and outside Canada). However, there may be instances where it is preferable to use a non-indigenous species that is reproductively isolated from indigenous stocks or that would be unable to survive in the wild.

2.2.4 Ecological risks and benefits of introductions and transfers will be assessed prior to movement, except for those cases which have been reviewed and deemed exempt (see Appendix II A 2).

2.2.5 Assessment of proposals from an ecological perspective will include a review of potential genetic and disease impacts on indigenous fisheries resources, aquaculture operations and habitat.

2.2.6 In the spirit of the 1999 *Agreement on Interjurisdictional Cooperation with Respect to Fisheries and Aquaculture*, consultations should take place between and among neighboring jurisdictions, (including those in the USA and France) on proposals to introduce exotic species, or to extend the range of organisms, in shared watersheds. Neighboring jurisdictions should also

be consulted if an introduction, transfer or range extension proposal might impact stocks within a watershed but outside the receiving province (see Appendix II for more details). The advice of the I&T Committee of the affected jurisdiction should be included with the advice provided to the Decision-Making Authority by the I&T Committee in the originating province or territory. Interested parties (e.g. local groups, Aboriginal Groups, commercial fishermen and aquaculturists) should also be consulted prior to the introduction of an exotic species. Because Canada is a signatory to ICES², proposals to introduce exotic species, which may impact on jurisdictions outside of Canada should also be reviewed through the ICES process. Where arrangements do not already exist, Canada should seek to be included in discussions about proposed introductions into watersheds shared with the United States and France.

2.2.7 The initial introduction of an exotic aquatic organism into Canada that may affect neighbouring jurisdictions should be consistent with the ICES (1995, 2003) Codes of Practice on the Introductions and Transfers of Marine Organisms. The ICES Code describes a step-by-step process, from holding of the imported organisms in **quarantine** in a **containment facility**, to small-scale testing in a containment facility in the local environment, to final release in the natural habitat. Throughout the course of a project, and based on the results of monitoring, procedural adjustments may be required or a decision to terminate may be necessary. Subsequent introductions could be modified based on the advice of the Introductions and Transfers Committee if there is a low risk of negative impacts.

2.2.8 ‘Uncertainty’ is unavoidable in the development of a risk assessment. In such cases, the **Precautionary Approach** will be adopted. “States should apply the precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures” (FAO 1996, 2001). If the outcome (impact) is uncertain, priority should be given to conserving the productive capacity of the native resource.

2.3 Intent

2.3.1 A risk assessment based on the classifications of high, medium and low risk will form the basis of advice on all requests for introductions and transfers of aquatic organisms. In most cases, unless additional mitigation measures are taken, or included, the advice should be that the introduction or transfer not proceed if the level of risk is determined to be medium or high.

2.4 The Code

2.4.1 Where Introductions and Transfers Committees or their equivalents do not exist, they will be established in each province or region by the agency or agencies responsible for administering fisheries and/or aquaculture. Each Committee will provide advice to the Decision-Making Authority, on proposals to introduce or transfer aquatic organisms (see Figure 1). Each Committee will develop procedures that are consistent with this Code and keep records of all

² International Council for the Exploration of the Sea

applications for introductions and transfers received throughout the year and the decisions reached on such applications. These will be reported to the Aquaculture Science Branch, DFO, Ottawa. Each jurisdiction should be responsible for consulting and seeking advice from those principal stakeholders and Aboriginal Groups that could be affected by introductions and transfers.

2.4.2 Proponents must obtain authorization to undertake the following procedures for the release of certain specified aquatic organisms into fish-bearing waters or fish-rearing facilities: to **import** the organisms from sources outside Canada; to ship species, not native to the receiving province, from another province or territory of Canada; to extend the range of an organism within a province; or, to transfer aquatic organisms within or between provinces.

2.4.3 The Code recognizes that ongoing historic as well as routine transfers and introductions have occurred within Canada. It is the intent of the Code to enable such transfers and introductions to continue at the discretion of the local authority. The process for handling new introductions or transfers of aquatic organisms requests is outlined in Figures 1 and 2. In the absence of alternative federal-provincial agreements, the Regional Director-General/Assistant Deputy Minister Science (DFO) will adjudicate applications.

2.4.4 Proponents whose applications for permits are rejected may appeal to the appropriate authority (Figure 2).

2.4.5 Proposals to introduce aquatic organisms that are exotic or that may result in a range extension require biological assessments of the impacts on indigenous fisheries resources, habitat and aquaculture, as well as a plan for monitoring any negative impacts arising from the introduction. Additional non-ecological analyses, while important, should be conducted as an adjunct to or after the conduct of the ecological risk assessment and at the discretion of the body with authority over the approval process. Information requested of the proponent is listed in Appendix III and the Aquatic Organism Risk Assessment procedure and Organism Risk Assessment Summary Report Form are given in Appendices IV and V. Proponents may be required to bear the cost of all such risk assessments.

2.4.6 Approvals to import organisms may have conditions attached, such as the requirement for holding in quarantine facilities in Canada, additional disease testing, or reproductive sterilization.

2.4.7 Species exotic to a province should be introduced in a systematic manner, first in quarantine facilities to test for pathogens of concern, then in facilities where there is low risk of escape so as to test adaptability of the organisms to survive in the natural environment. Organisms will only be released from containment after all quarantine conditions have been met.

2.4.8 Introductions and transfers of aquatic organisms must be in compliance with all other national and provincial legislation, regulations, and policies.

2.4.9 A national Registry on Introductions and Transfers will be established and maintained by the Aquaculture Science Branch, DFO, Ottawa. Annual summary reports of introductions and transfers of aquatic organisms in Canada will be issued from the National Registry for public

information. All jurisdictions will work together towards the establishment of a shared electronic risk assessment library and a national registry system.

2.5 Application of the Code

2.5.1 The Code will apply to:

- Introduction of a species exotic to the waters of a province or territory;
- Transfer of indigenous or **naturalised exotic** species from other countries and between provinces or territories;
- Deliberate range extension of a species within a province or territory; and,
- Transfers of indigenous or naturalised exotic species within a province or territory if there is no other review process.

DEFINITIONS

Accidental introduction – Introduction of an aquatic organism, including “fellow travellers”, by chance, not by design. For example, the release of an organism transported in ship's ballast water (= unintentional introduction). <introduction accidentelle>

Aquarium fish – This includes all species of fish and aquatic plants for ornamental use imported or transferred into strict confinement (ICES 2003). <poissons d'aquarium>

Aquatic organisms – This includes all organisms (finfish, molluscs, crustaceans, echinoderms, and other invertebrates and their lifestages defined as “*Fish*” in the *Fisheries Act*, as well as marine and fresh water plants. <organisme aquatique>

Baitfish – Live (or dead) fish (or other aquatic organisms) placed on a hook or in a trap in order to lure fish. <poisson-appât>

Benefits – Advantages or profits derived as a result of an action (e.g. social or economic benefits from a proposed introduction). <avantages>

Containment facility – A facility that has been specially modified to prevent the release of aquatic organisms to waters outside the facility (includes quarantine facility with treated effluent). Some jurisdictions assign level of containment status to facilities based on defined standards. <installation de confinement>

Enhancement – The release of fish to augment the public resource. This can be accomplished through fish culture techniques or the introduction or transfer of wild fish. <mise en valeur>

Environment – Key components of aquatic ecosystem necessary for fish survival and reproduction. <milieu>

Exotic species – (= introduced species) (Porter 1992). <espèce exotique>

Facility – In the context of fish, all locations holding fish or from which come cultured or wild fish or eggs from wild or cultured fish. <installation>

Fellow traveller – Organism which inadvertently accompanies the shipment of the species intended for introduction/transfer. <organisme associé>

Fish – As defined in the *Fisheries Act* includes a) parts of fish, b) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals; and c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals. <poisson>

Genetic diversity – All of the genetic variation in an individual population or species (ICES 1995, 2003). <diversité génétique>

Hazard – A thing or action that can cause adverse effects (APHRAN 1998). <danger>

Hybrid – Offspring of two animals or plants that are of different species. <hybride>

Import – Movement of aquatic organisms across national or interprovincial boundaries. <importation>

Indigenous (native) species – Existing and having originated naturally in a particular region or environment (ICES 1988). <espèce indigène>

Intentional introduction – The deliberate release, or holding, of live aquatic organisms in open-water or within a facility with flow-through circulation or effluent access to the open-water environment outside its present range. <introduction délibérée>

Introduced species – Any species intentionally or accidentally transported and released by humans into an environment or facility with effluent access to open-water or flow-through system outside its present range(= exotic species, non-indigenous) (adapted from ICES 2003). <espèce introduite>

Live fish for the food trade – Fish destined strictly for consumption. Imported live fish are held in containment facilities or containment units such as those in restaurants or fish stores. <poisson vivant destiné à la consommation>

Naturalised exotic – Introduced species that have become established and have formed self-sustaining populations (Anon. 1991). <espèce naturalisée>

Niche – The attribute of an organism which defines the boundaries within which it can carry out its life processes. The potential niche of an organism is constrained by the physical environment and interactions with other species producing a realized niche in a particular ecosystem (based on Hutchinson 1957). <niche>

Precautionary Approach – Measures to implement the Precautionary Principle. A set of agreed cost-effective measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resources, the environment, and the people, to the extent possible, taking explicitly into account existing uncertainties and the consequences of being wrong (FAO 1995, 1996). Adapted from Garcia 1996. <approche de précaution>

Province – Includes Territories in Canada. <province>

Quarantine – The facility and/or process by which live organisms and any of their associated organisms can be held/or reared in complete isolation from the surrounding environment. <quarantine>

Range extension – The enlargement of a geographic area that is occupied by a species, usually through intentional human action; the extension is usually incremental (Anon. 1991), over short distances and contiguous. <extension de l'aire de répartition>

Release – The liberation of aquatic organisms to the natural environment. Release can be unintentional, as in the escape of organisms from aquaculture facilities or during use as live bait. <libération>

Risk – The probability of a negative or undesirable event occurring; the likelihood of the occurrence and the magnitude of the consequences of an adverse event; a measure of the probability of harm and the severity of impact of a hazard. <risque>

Risk analysis – The process that includes risk identification, risk assessment, risk management and risk communication. <analyse des risques>.

Risk assessment – The process of identifying and describing the risks of introductions or transfers of aquatic organisms having an impact on fisheries resources, habitat or aquaculture in the receiving waters before such introductions or transfers take place; the process of identifying a hazard and estimating the risk presented by the hazard, in either qualitative or quantitative terms. <évaluation des risques>.

Species – A group of interbreeding natural populations that are reproductively isolated from other such groups (ICES 1988). <espèce>

Stock – A population of organisms which, sharing a common gene pool, is sufficiently discrete to warrant consideration as a self-perpetuating system which can be managed (ICES 1988). <stock>

Strain – A group of individuals with common ancestry that exhibits genetic, physiological or morphological differences from other groups of the same species as a result of husbandry practices (Porter 1992). <souche>

Transfer – The movement of individuals of a species or population of an aquatic organism from one location to another within its present range (ICES 1988). <transfert>

Transgenic organisms – Organisms bearing within their DNA, copies of novel genetic constructs introduced through recombinant DNA technology. This includes novel genetic constructs within species as well as interspecies transfers. Such organisms are usually (but not always) produced by micro-injection of DNA into newly fertilized eggs. <organismes transgéniques>

Watershed – All land and water within the confines of a drainage divide; the whole gathering ground of a river system (Shorter Oxford English Dictionary 1965). <bassin versant>

RELATED DEFINITIONS

Contain – To prevent the escape of an organism (from a facility). <confiner>

Ecology – A branch of science concerned with the inter-relationships of organisms and their environment (ICES 1988). <écologie>

Genetically modified organism – Organism in which genetic material has been altered in a way that does not occur naturally by mating and or natural recombination (excludes hybrids and polyploids; includes transgenics) (See also Transgenic organisms). <organisme génétiquement modifié>

Genetic containment – Prevent escape to the wild of organisms that can propagate, or allow only the release of organisms that are reproductively sterile. <confinement génétique>

Minimal impact or risk – A change in an environmental attribute that will have, or is predicted to have, little or no consequence to the environment. <répercussions ou risque minime>

Re-introduction – Release of a species to waters from which the species had been previously extirpated (= introduction). <réintroduction>

Risk communication – The open exchange of information and opinion, leading to a better understanding of risk and related decisions; the processes by which the results of the risk assessment and proposed risk management measures are communicated to the Decision-Making Authority and interested parties. <communications connexes à un risque>.

Risk management – The process of selection and implementation of options to reduce, to an acceptably low level, the risk of negative impact of introductions or transfers of aquatic organisms; the process of identifying, evaluating, selecting and implementing alternative measures for reducing risk. <gestion des risques>.

Significant impact – A predicted or measured change in an environmental attribute that should be considered in project decisions, depending on the reliability and accuracy of the prediction and the magnitude of the change within specific time and space boundaries (Beanlands and Duinker 1983). <répercussion importante>

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AUTHORITY

National Code on Introductions and Transfers of Aquatic Organisms

There are many national, provincial/territorial, regional, and international regulations, policies, and guidelines as well as Aboriginal land claims agreements and legislation in effect that apply to introductions and transfers of aquatic organisms in Canada. These include:

1. Federal Legislation

A. *Fisheries Act* (Section 43)

This legislation, which deals with the conservation and protection of fisheries resources, provides the mandate to prepare this Code on Introductions and Transfers of Aquatic Organisms.

- 43.** *The Governor in Council may make regulations for carrying out the purposes and provisions of this Act and in particular, but without restricting the generality of the foregoing, may make regulations*
- a) *for the proper management and control of the sea-coast and inland fisheries;*
 - b) *respecting the protection and conservation of fish;*
(...)
 - k) *respecting the taking or carrying of fish or any part thereof from one province to any other province;*
(...)

Regulations

i) *Fish Health Protection Regulations*

The Fish Health Protection Regulations (FHPR) promulgated under Section 43 of the *Fisheries Act*, require that fish imported to Canada or transferred between provinces be accompanied by an Import Licence. The FHPR apply only to salmonid species at present, but they are being amended to cover all other finfish (and molluscs, echinoderms, and crustaceans via the proposed Shellfish Health Protection Regulations). The FHPR are administered by the Aquaculture Science Branch, DFO, Ottawa, and by Local Fish Health Officers in each province.

ii) *Fishery (General) Regulations*

The Fishery (General) Regulations (FGR) are a consolidation of common aspects of fisheries regulations that come under the *Fisheries Act*. Part VIII of the Fishery (General) Regulations applies to the release of live fish into fish habitat and to the transfer of live fish to a fish rearing **facility**.

55(1) Subject to subsection (2), no person shall, unless authorized to do so under a licence,

(a) release live fish into any fish habitat; or

(b) transfer any live fish to any fish rearing facility.

(2) Subsection (1) does not apply in respect of fish that is immediately returned to the waters in which it was caught.

56. The Minister may issue a licence if

(a) the release or transfer of the fish would be in keeping with the proper management and control of fisheries;

(b) the fish do not have any disease or disease agent that may be harmful to the protection and conservation of fish; and

(c) the release or transfer of the fish will not have an adverse effect on the stock size of fish or the genetic characteristics of fish or fish stocks.

The FGR do not apply to Alberta, Saskatchewan, Manitoba, and Ontario and they do not apply in respect of fishing and related activities where the Quebec Fisheries Regulations apply.

iii) *Provincial Fisheries Regulations*

Provincial Fisheries Regulations promulgated under the federal *Fisheries Act* in each province (Leach and Lewis 1991) are administered by the agency responsible for fisheries resource management in that province. The Regulations require that organisms released into the waters of a province have no disease or disease agent that may be harmful to fish and that the organism will have no adverse effect on the genetic characteristics or size of fish populations. Specific diseases or disease agents are not identified.

The Maritime Provinces Fishery Regulations apply to fishing in the provinces of Nova Scotia, New Brunswick, and Prince Edward Island and adjacent tidal waters. Sections 18 and 19 of the Regulations prohibit the use of live fish for bait that were imported from another province.

The Ontario Fishery Regulations restrict the release of live fish into open waters and prohibit the importation of baitfish (including crayfish and salamanders).

The Pacific Fishery Regulation, 1993, prohibits the importation of a number of fish species to British Columbia.

B. The *Fish Inspection Act*

Regulations under this Act prohibit the importation of live freshwater mitten crabs of the genus *Eriocheir* or any members of the puffer fish family Tetraodontidae.

C. The *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act*

Under the *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* (WAPPRIITA) any importation of plant and animal species that are listed in schedules to the Wild Animal and Plant Trade Regulations requires a permit. The schedules include all species regulated by the Convention on International Trade in Endangered Species (CITES) of Wild Flora and Fauna and alien species considered invasive in and potentially harmful to Canadian ecosystems. Provincial governments may also request that a species be listed if they are of the opinion that transport into their jurisdiction would be harmful to its environment. The federal Department of Environment's Canadian Wildlife Service administers the Act and is currently considering different approaches to augment the list of species regulated.

The Act protects certain species of animals and plants by implementing CITES and regulates international and interprovincial trade in these animals and plants. In addition, it permits provinces to make regulations that prohibit the import of animals and plants that may be harmful to the environment.

2. Land Claims Agreements

Canada's land claims agreements establish the roles and responsibilities of federal, provincial, territorial and First Nation and aboriginal governments with respect to fisheries and wildlife management. Most land claims agreements also establish management boards and councils with fisheries and wildlife management responsibilities. Other agreements are under negotiation.

In the initial development and subsequent review of the Code it was recognized that the roles and responsibilities of various levels of government and public management structures varied from claim to claim. The Code was intended primarily to establish a uniform and objective risk assessment process for introductions and transfers of aquatic organisms across Canada based on scientific and technical information. As a technical policy framework the purpose of the Code is to assist and support consultation and approval processes in each jurisdiction as provided for in land claims agreements. This will include the incorporation of local and traditional aboriginal knowledge in the decision processes as required and the consideration of other socio-economic factors as appropriate and as described in Figure 1

3. Provincial and Territorial Legislation and Regulations

Regulations promulgated by provincial or territorial governments, by means other than the *Fisheries Act* and WAPPRIITA, that can affect introductions and transfers of aquatic organisms include:

- Aquaculture Acts and Regulations;
- Game and Fish Acts and Regulations;
- Environmental Acts and Regulations; and,
- Fish Transportation Regulations.

4. Federal Policies

A. Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity

The Government of Canada, with support from provincial and territorial governments, ratified the United Nations Convention on Biological Diversity in 1992, believing it to be a very important global and national instrument for promoting and guiding efforts to conserve biodiversity and use biological resources sustainably. The Department of Fisheries and Oceans has committed to the support and implementation of this strategy.

Under Section 1.55 of the strategy Canada is committed to:

“Enhance efforts to conserve aquatic biodiversity by protecting species and ecosystems at risk, endemic species, vulnerable spawning areas and unique and representative ecosystems.”

Furthermore, under section 1.58 of the strategy Canada is committed to:

“Reduce to acceptable levels, or eliminate, adverse impacts of species introductions on aquatic biodiversity resulting from aquaculture projects, fisheries enhancement programs and interbasin transfers of water and organisms.”

B. Wildlife Policy for Canada

The Wildlife Ministers Council of Canada has endorsed a Wildlife Policy for Canada (Anon. 1990b). This policy recommends that introductions of a non-indigenous or genetically engineered species, including fish, be considered only if:

- No indigenous species is suitable for the purpose of the introduction;
- Clear and well-defined benefits to human or natural communities are foreseen;

- No known adverse environmental impact is foreseen, and some means of controlling the introduced population exists (such as predators or climate).

C. DFO Fish Habitat Management Policy

This policy is designed to achieve a net gain of productive capacity for fisheries resources. It provides a comprehensive framework for the conservation, restoration, and development of fish habitats, and strategies for the implementation of its various components. Regulations for this policy are under the *Fisheries Act*.

D. DFO Policy on Importation of Aquatic Organisms from Outside Canada

DFO's Assistant Deputy Minister, Science, reviews proposals to import aquatic organisms to Canada. The purpose of this Code is to ensure that decisions to import aquatic organisms are consistent across Canada, and that decisions are in compliance with international standards. Where there is a history of importation of certain species from sources in the USA, and there has been minimal negative impact on local fisheries resources, habitat or aquaculture, ADM authorization prior to importation is not required. Also, annual summaries of imported aquatic organisms are provided by regional DFO offices and provincial agencies for inclusion in Canada's annual report to the ICES Working Group on Introductions and Transfers of Marine Organisms.

5. Provincial or Territorial Policies

DFO and/or provincial governments have established Transplant/Introductions Committees in most provinces. These committees assess proposals to introduce or transfer organisms to a province, and provide advice to the Decision-Making Authority on the acceptability of individual proposals. These committees do not have legislated or regulatory authority at present.

A range of policies on introductions and transfers of aquatic organisms have been prepared in individual provinces. Examples include:

- Newfoundland-Labrador – for salmonids and shellfish
- Prince Edward Island – for finfish, molluscs and crustaceans
- New Brunswick and Prince Edward Island – specific to rainbow trout
- Nova Scotia – for rainbow trout, Arctic charr (*Salvelinus alpinus*) and smallmouth bass (*Micropterus dolomieu*)
- New Brunswick – for salmonids

- Quebec – for live finfish
- Ontario – for all finfish
- Manitoba – for live baitfish
- Saskatchewan – for all species
- Alberta – for all species
- British Columbia – various species are included under:
 - Federal Policy on Atlantic Salmon Introductions
 - Federal/Provincial Policy on Pacific Salmon Introductions

Leach and Lewis (1991) provide detailed information on provincial policies related to introductions and transfers. These policies provide for health protection, and preservation of genetic diversity and ecological integrity of indigenous fish populations. The policies served as valuable building blocks with which to develop this national Code on introductions and transfers. Alberta has a formalised decision-making process described in Berry and Stenton (1993).

6. Regional Organizations

Regional organizations have been established in different parts of Canada and the USA, to improve co-ordination of efforts to minimize the negative impacts of human activities on fisheries resources. Examples follow of the organizations, and the standards or procedures that they have developed:

- Great Lakes Fishery Commission (GLFC – Comprising representatives from Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario, and the federal governments of Canada and the USA) - policies on fish disease control and health requirements for importation of salmonids, and a draft policy on introduction of exotic species.
- Great Lakes Panel on Aquatic Nuisance Species – The Panel is directed to identify priority exotic species issues in the Great Lakes; assist/make recommendations to the US Task Force on Aquatic Nuisance Species; coordinate exotic species program activities in the region; advise public and private interests on control efforts; and, submit an annual report to the Task Force describing prevention, research and control activities in the Great Lakes. The Panel membership is drawn from US and Canadian federal agencies, the eight Great Lakes states and the province of Ontario, regional agencies, user groups, local communities, tribal authorities, commercial interests and the university/research community.
- Pacific Northwest Fish Health Protection Committee (Alaska, California, Idaho, Montana, Oregon, Washington states, and USA federal government; observers from

DFO Pacific and British Columbia attend) – standards for protecting the health of salmonid resources.

- BC Working Group on Non-Indigenous Species – together with its counterpart in Washington State, under the Joint Environmental Council, developing a strategy to prevent the unintentional introduction of non-indigenous species into the shared waters of Puget Sound and Georgia Basin (e.g. in ballast water).
- Proposed compact between North Dakota, South Dakota, Minnesota and USA federal government with Manitoba, Saskatchewan, Alberta and the Canadian federal government – co-operative procedures for control of the introduction of exotic species.

7. International Organizations/Agreements

Standards that affect introductions and transfers of aquatic organisms have been developed by international organizations and under bilateral/multilateral trade agreements. Examples include:

- United Nations
 - Convention on Biological Diversity
 - Convention on International Trade in Endangered Species (CITES).
- International Council for the Exploration of the Sea (ICES) – Code of Practice for Introduction and Transfer of Marine Organisms; to carry out an international review, ICES requests early notification of planned introductions which may affect joint water bodies.
- l'Office International des Epizooties (OIE) – International Aquatic Animal Health Code; to facilitate international trade, the Code (which is updated every two years) defines minimum health requirements for finfish, molluscs and crustacea to avoid the risk of spreading aquatic animal diseases.
- General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO); Sanitary / Phytosanitary (SPS) Agreement – agreed-upon rules for the use of SPS measures in international trade.
- Canada-USA Free Trade Agreement (FTA) and North American Free Trade Agreement (NAFTA) – sanitary/phytosanitary measures considered acceptable for trade between Canada, USA, and Mexico.
- North American Commission (NAC) (Canada and USA of the North Atlantic Conservation Organization (NASCO) – protocols for the introduction and transfer of salmonids on the Atlantic seaboard.

- International Joint Commission under the *Boundary Waters Treaty Act*.

IMPLEMENTATION GUIDELINES

National Code on Introductions and Transfers of Aquatic Organisms

This Appendix provides a general outline of the Roles and Responsibilities of the various entities involved in the Introductions and Transfers process. However, due to some legislative delegation of powers and inter-jurisdictional agreements, as well as the unique arrangements under land claims agreements, the roles and responsibilities may vary somewhat in some jurisdictions.

Roles and Responsibilities

A) Roles and Responsibilities of the Minister of Fisheries and Oceans and/or the Provincial Minister include:

- 1) Propose future amendments to the Code to Canadian Council of Fisheries and Aquaculture Ministers.
- 2) Exempt certain transfers of organisms or classes of organisms from the requirements of this Code if their importation presents minimal risk of negative impact on fisheries resources, habitat, or aquaculture. Exemptions must be subject to regular review by the regional Introduction and Transfers Committee.
- 3) Consider appeals by proponents whose applications for licences for introductions or transfers originating outside of Canada are rejected. Communicate appeal decisions to Decision-Making Authority for action as necessary.
- 4) Ensure compliance with the *Fisheries Act* and its attendant Regulations respecting unauthorized releases of live fish into fish habitat, transfers of live fish into fish rearing facilities and the importation of cultured fish or eggs of indigenous fish.

B) Roles and Responsibilities of the Assistant Deputy Minister (ADM), Science, include:

- 1) Review proposals to ensure national consistency, and approve or reject new/initial proposals to import exotic aquatic organisms from sources outside Canada.
- 2) Indicate approval to the Regional Director-General so that he or she may issue an import licence.
- 3) Consider appeals by proponents whose applications for licences for introductions or transfers originating from another province are rejected. Communicate appeal decision to Decision-Making Authority for action as necessary.

C) Roles and Responsibilities of the Regional Director-General and/or Provincial Director include:

- 1) Determine composition of Introductions and Transfers Committees, taking into account the need for balance between wild stock conservation, enhancement, sport and commercial fishing, and aquaculture mandates.
- 2) Review and approve or reject proposals to introduce or transfer organisms from another province based in part on advice from the regional Introductions and Transfers Committee.
- 3) Ensure that proposals have been discussed to incorporate provincial concerns.
- 4) As appropriate, consult and seek advice from the principal groups that could be affected by introductions and transfers (e.g. local groups, Aboriginal Groups, commercial and recreational fishermen). Responses to such consultation should be documented, in case of an appeal.
- 5) Issue import permits or licences.
- 6) Consider appeals by proponents whose applications for permits or licences for intraprovincial transfers are rejected. Communicate appeal decisions to Introductions and Transfer Committee for action as necessary.

D) Roles and Responsibilities of the Proponent include:

- 1) Obtain authorization to: import aquatic organisms within or from sources outside Canada; ship exotic species from one province or territory of Canada to another; extend the range of an organism within a province or territory; or, transfer aquatic organisms within or between provinces.
- 2) Prepare a detailed description of the life history features of the proposed species, the characteristics of the receiving waters, and the potential for interactions with native species so that the Introductions and Transfers Committee can conduct biological risk assessments of the impacts on indigenous fisheries resources, habitat, aquaculture, and the aquatic community.
- 3) If required by the authorising jurisdiction, prepare a risk assessment (Appendix IV) for review by the Introductions and Transfers Committee.

E) Roles and Responsibilities of the Introductions and Transfers Committees include:

- 1) Provide advice to the Decision-Making Authority (Regional Director-General DFO, ADM Science-DFO, and/or a provincial Minister/Director of Fisheries) on proposals to introduce or transfer aquatic organisms.
- 2) Develop procedures that are consistent with this Code.
- 3) Report records of all approved introductions and transfers to the National Registry on Introductions and Transfers, Aquaculture Science Branch, DFO, Ottawa .
- 4) Conduct, or have conducted and evaluate, the biological risk assessment of the impacts of the proposed introduction on indigenous fisheries resources, habitat and aquaculture.
- 5) Assess the plan of action for controlling any negative impacts from the introduction (which are possible even though only applications with low potential for negative impact are approved).
- 6) Develop mitigation conditions for proposals to import organisms as required, such as, but not exclusive to, the requirement for holding in quarantine facilities in Canada, additional disease testing, or reproductive sterilization.
- 7) Inform (via DFO as appropriate) neighboring jurisdictions, including those in the USA and France, that could be affected by the proposed introduction or range extension.
- 8) Ensure that there are measures in place so that the exotic species will only be introduced in a systematic manner, first in quarantine facilities to test for pathogens of concern, then in facilities where there is low risk of escape so as to test adaptability of the organisms to survive in the natural environment. Release organisms from containment only when the potential negative impacts of the release on the ecological and genetic health of fisheries resources, habitat and aquaculture have received full consideration and have been assessed to be of minimal risk.
- 9) Issue licences for introductions and transfers for applications where the Introductions and Transfers Committee is the Decision-Making Authority.
- 10) Communicate the Code, its application and implications to stakeholders.

F) Roles and Responsibilities of the Aquaculture Science Branch include:

- 1) Maintain a National Registry on Introductions and Transfers. Issue annual summaries of introductions and transfers of aquatic organisms in Canada from the National Registry for public information.
- 2) Convene an annual meeting of Introductions and Transfers Committee chairs to review and discuss procedures and problems in implementing the Code.
- 3) Coordinate the preparation of an annual report for the Canadian Council of Fisheries and Aquaculture Ministers on introductions and transfers requests and their outcomes.
- 4) Communicate the Code, its application and implication and any future changes to stakeholders.

G) Establishing a Dispute Avoidance Procedure

- 1) As the introduction or transfer of a species is subject to a rigorous risk assessment procedure, officials in neighbouring jurisdictions can be reasonably certain that a province or territory will take into account the probability of a species crossing provincial/territorial borders through adjoining waters, as they make their decision. If a jurisdiction receives a proposal for the introduction or transfer of a species in a shared watershed and the species is likely to cross borders, it will consult with its affected neighbours, prior to making a decision, and inform them of its decision as soon as possible, ensuring that there is enough time for a response prior to any further action being taken.
- 2) In keeping with the spirit of the 1999 *Agreement on Interjurisdictional Cooperation with Respect to Fisheries and Aquaculture* – which all jurisdictions have signed – every effort will be made to come to a mutually satisfactory resolution of the issue through any avenue to which they might agree. If after such notification has taken place, and after discussing the issue amongst themselves they have not resolved it to their mutual satisfaction, the jurisdiction wishing to proceed with the introduction or transfer will publicly announce their decision to do so. This would be done to ensure that the public interest is protected, as such contentious introductions or transfers decisions would be made openly, giving interested parties the opportunity to voice their opinions.
- 3) If, after the decision to proceed is made, a neighbouring provincial jurisdiction still believes that the introduction or transfer presents unacceptable risk to the aquatic ecosystems in their jurisdiction, it should have the opportunity to appeal the decision.

INFORMATION REQUIREMENTS

National Code on Introductions and Transfers of Aquatic Organisms

To be completed by proponent

Wherever possible, information is to be supported with references from the scientific literature, and notations to personal communications with scientific authorities and fisheries experts. Applications lacking detail may be returned to the proponent for additional material, resulting in a delay in assessing the proposal.

For some proposals, e.g., intraprovincial transfers or other routine introductions/transfers, the information requirement may be reduced significantly. The local Introductions and Transfers Committee should be consulted in such cases.

A) Executive Summary:

Provide a brief summary of the document including a description of the proposal, the potential impacts on native species and their habitats and mitigation steps to minimize the potential impacts on native species.

B) Introduction

- 1) Name (common and scientific [genus and species]) of the organism proposed for introduction or transfer.
- 2) Describe the characteristics, including distinguishing characteristics, of the organism. Include a scientific drawing or photograph.
- 3) Describe the history in aquaculture, enhancement or other introductions (if appropriate).
- 4) Describe the objectives and rationale for the proposed introduction, including an explanation as to why such an objective cannot be met through the utilization of an indigenous species.
- 5) What alternate strategies have been considered in order to meet the objectives of the proposal? What are the implications of a “do nothing” option?
- 6) What is the geographic area of the proposed introduction? Include a map.

- 7) Describe the numbers of organisms proposed for introduction (initially, ultimately). Can the project be broken down into different sub-components; if so, how many organisms are involved in each sub-component?
- 8) Describe the source(s) of the stock (facility) and genetic stock (if known).

C) Life History Information of the Species to be Introduced or Transferred - For Each Life History Stage

- 1) Describe the native range and range changes due to introductions.
- 2) Record where the species was introduced previously and describe the ecological effects on the environment of the receiving area (predator, prey, competitor, and/or structural/functional elements of the habitat).
- 3) What factors limit the species in its native range.
- 4) Describe the physiological tolerances (water quality, temperature, oxygen, and salinity) at each life history stage (early life history stages, adults, reproductive stages).
- 5) Describe the habitat preferences and tolerances for each life history stage.
- 6) Describe the reproductive biology.
- 7) Describe the migratory behavior.
- 8) Describe the food preferences for each life history stage.
- 9) Describe the growth rate and lifespan (also in the area of the proposed introduction, if known).
- 10) Describe the known pathogens and parasites of the species or stock.
- 11) Describe the behavioural traits (social, territorial, aggressive).

D) Interaction With Native Species

- 1) What is the potential for survival and establishment of the non-native species if it escapes? (This question applies to species intended for aquaculture or for live rearing in a contained facility.)
- 2) What habitat(s) will the **introduced species** likely occupy in the proposed area of introduction and will this overlap with any vulnerable, threatened or endangered species? Indicate if the proposed area of introduction also includes contiguous waters).

- 3) With which native species will there be a niche overlap? Are there any unused ecological resources of which the species would take advantage?
- 4) What will the introduced species eat in the receiving environment?
- 5) Will this predation cause any adverse impacts on the receiving ecosystem?
- 6) Will the introduced species survive and successfully reproduce in the proposed area of introduction or will annual stocking be required? (This question applies to species not intended for aquaculture or life in a contained facility)
- 7) Will the introduced species hybridize with native species? Is local extinction of any native species or stocks possible as a result of the proposed introduction? Are there any possible effects of the introduced species on the spawning behaviour and spawning grounds of local species?
- 8) Are there any potential impacts on habitat or water quality as a result of the proposed introduction?

E) Receiving Environment and Contiguous Watershed

- 1) Provide physical information on the receiving environment and contiguous waterbodies such as seasonal water temperatures, salinity, and turbidity, dissolved oxygen, pH, nutrients and metals. Do those parameters match the tolerances/preferences of the species to be introduced, including conditions needed for reproduction.
- 2) List species composition (major aquatic vertebrates, invertebrates and plants) of the receiving waters. Are any of these species known to be susceptible to the diseases and parasites found to affect the introduced species in its native range?
- 3) Provide information on habitat in the area of introduction, including contiguous waters, and identify critical habitat. Which of those parameters match the tolerances/preferences of the species to be introduced? Can the introduced species disturb any of the habitats described?
- 4) Describe the natural or man-made barriers that should prevent the movement of the introduced organisms to adjacent waters.

F) Monitoring

- 1) Describe the plans for follow-up assessments of the proposed introduced species' success and how the negative impacts on native species and their habitats will be assessed.

G) Precautions and Management Plan

- 1) Describe the management plan for the proposed introduction or transfer. This should include but not be restricted to the following information:
 - a) details of the disease certification status of stock to be imported;
 - b) disease monitoring plan proposed for the introduced stocks following introduction or transfer;
 - c) precautions taken to ensure that no other species (**fellow travellers**) accompany the shipment;
 - d) who will be permitted to use the proposed species and under what terms and conditions;
 - e) will there be a pre-commercial phase for the proposed introduction or transfer;
 - f) description of the quality assurance plan for the proposal; and,
 - g) other legislative requirements that need to be met.
- 2) Describe the chemical, biophysical and management precautions being taken to prevent accidental escape of any fish, parasites and/or pathogens to and their establishment in non-target recipient ecosystems. Give details of the water source, effluent destination, any effluent treatment, proximity to storm sewers, predator control, site security, precautions to prevent escapes.
- 3) Describe contingency plans to be followed in the event of an unintentional, accidental or unauthorized liberation of the species from rearing and hatchery facilities or an accidental or unexpected expansion of the range.
- 4) If this proposal is intended to create a fishery, give details of fishery objective. Who would benefit from such a fishery? Give details of a management plan, and, if appropriate, include changes in the management plans for species which will be impacted.

H) Business Data

- 1) Provide the legal name of the owner and company, the aquaculture licence number and the business licence (if applicable) or the name of the government agency or department with a contact name, telephone, fax and email information.
- 2) Provide an indication as to the economic viability of the proposed project.

I) References

- 1) Provide a detailed bibliography of all references cited in the course of the preparation of the risk assessment.
- 2) Provide a list of names, including addresses, of scientific authorities and fisheries experts consulted.

AQUATIC ORGANISM RISK ASSESSMENT

National Code on Introductions and Transfers of Aquatic Organisms

To be Completed by Introductions and Transfers Committees³

INTRODUCTION

To evaluate risks associated with the introduction or transfer of aquatic organisms, it is necessary to assess the probability that a species will become established and the consequences of that establishment. The process addresses the major environmental components. It provides a standardised approach for evaluating the risk of genetic, ecological and disease impacts as well as the potential for introducing a “fellow traveller” or parasite that might impact the native species of the proposed receiving waters. It also provides a mechanism for assessment in cases where establishment of a population in the wild is the intended outcome. This approach has been adapted from "Final Draft - Report to the Aquatic Nuisance Task Force - Generic Non-indigenous Aquatic Organisms Risk Analysis Review Process, Washington, DC, February 9, 1996 by the Risk Assessment and Management Committee of the U.S. Aquatic Nuisance Species Task Force” (Anon. 1996).

At each of Steps 1, 2 and 3, the element rating and rationale for the rating should be recorded, based on the following criteria:

A **HIGH** rating means that the risk is likely or very likely to occur.

A **MEDIUM** rating means that there is a probability of negative impact.

A **LOW** rating means that the risk is considered to be insignificant.

Note: For the High and Medium category of risks, application of appropriate mitigation measures are required to lessen the risk to a Low rating. However, it is recognized that this may not be possible for all proposals.

The strength of the review process is not in the ratings but in the detailed biological and other relevant information statements that motivate them.

³ Unless the authorising jurisdiction requires the Risk Assessment to be prepared by the proponent

Part I – Ecological and Genetic Risk Assessment Process

Step 1 Determining the Probability of Establishment (beyond the intended area of introduction)

Complete the following table and provide a brief rationale with appropriate references to support the rating given.

Element	Probability of Establishment (H, M, L)¹	Level of Certainty (VC to VU)²
Estimate of probability that the introduced species successfully colonizes and maintains a population in the intended area of introduction ³		
Estimate the probability of its spreading beyond the intended area of introduction ⁴ or , Estimate the probability of its spreading beyond the intended are of introduction if it escapes (apply to cases in which the intended area of introduction is a confined environment) ⁵		
Final Rating^{5,6}		

Explanatory Notes

- | | |
|---|--------|
| H | High |
| M | Medium |
| L | Low |

Element ratings should be supported with data and references, including a rationale for the rating given.

- | | |
|----|----------------------|
| VC | Very certain |
| RC | Reasonably certain |
| RU | Reasonably uncertain |
| VU | Very uncertain |

The level of certainty is intended to give an estimate of whether the element that is being rated is based on scientific knowledge, experience, or whether it is extremely subjective and based on “best guess”. Such uncertainties need to be taken into account when making a decision.

- Characteristics within this element include: the organism coming in contact with an adequate food resource; suitability of habitat, encountering appreciable biotic and abiotic environmental resistance; and the ability to reproduce in the new environment. . If the organism is introduced into a confined facility (land based, sea cages etc.), the facility itself is identified as the intended area of introduction.
- In cases in which the intended area of introduction is a natural habitat (i.e., the wild) the probability of spreading includes consideration of, but is not limited to, factors such as the ability to use human intervention/activity as a means of dispersal
- In cases in which the intended area of introduction is a confined environment such as a land facility or cages, the probability of spreading beyond the area of introduction is dependent on whether the organism escapes from the area of introduction. For example, a **Low** probability of escape from a confined facility will necessarily

result in a **Low** probability of spreading in the surrounding natural habitat. If the probability of escape is deemed **Medium**, the probability of spreading beyond the area of introduction, if estimated as **High**, could still not be rated higher than Medium. Whereas, if the probability of escape is deemed **High**, the probability of spreading beyond the area of introduction will not be limited by its probability of escape and could be rated as estimated (i.e., High, Medium or Low).

6. The final rating for the **Probability of Establishment** is assigned the value of the element with the lowest rating (for example, **High** and **Low** ratings for the above elements would result in a final **Low** rating). Again, both events – probability of the organism successfully colonizing and maintaining a population in the intended area of introduction (be it a confined environment such as a facility, or a natural habitat) and the probability of spreading beyond the intended area of introduction (estimated as explained above) – need to occur in order to have establishment beyond the intended area of introduction.

The final rating for the **Level of Certainty** is assigned the value of the element with the **Lowest** level of certainty (e.g., **Very Certain** and **Reasonably Certain** ratings would result in a final **Reasonably Certain** rating).

Part 1 – Step 2 Determining the Consequence of Establishment of an Aquatic Organism

The “**Consequence of Establishment**” is assigned a single rating based on environmental impacts.

Element Estimate of magnitude of environmental impacts, if established.	Consequences of Establishment (H, M, L)⁷	Level of Certainty (VC to VU)⁸
Ecological impact on native ecosystems both locally and within the drainage basin. ⁹		
Genetic impacts on local self-sustaining stocks or populations. ¹⁰		
Final Rating^{11,12}		

Explanatory Notes

7. See Note 1.
8. See Note 2.
9. Ecological impacts that can affect the distribution or abundance of native species resulting from alterations in relationships such as predation, prey availability, and habitat availability. In assessing the ecological impacts of establishment, the assessors should take into consideration whether the non-indigenous stock i) enters or alters the habitat of indigenous species; ii) displaces indigenous species from optimal habitat; iii) affects the quantity, quality, and availability of food supply of indigenous species; or, iv) preys on other species of concern.
10. Genetic impacts which can affect the capacity of native species to maintain and transfer to successive generations its current identity and diversity. In assessing the genetic impacts, the assessors should take into consideration whether the non-indigenous stock i) encounters or interacts with species of concern; ii) affects the survival of local species; iii) affects the reproductive success of local species; or, iv) affects the genetic characteristics of native stocks or species.
11. The final rating for the **Consequences of Establishment** is assigned the value of the element (individual probability) with the **highest** rating (for example: a **High** probability of ecological impact and a **Medium** rating for the probability of genetic impact would result in an overall **High** probability of environmental impact), as both events are independent (i.e., additive probabilities).
12. See Note 6.

Part 1 – Step 3 Estimating Aquatic Organism Risk Potential

The overall Risk is assigned a single value based on the **Probability of Establishment** and the **Consequences of Establishment**.

Component	Rating (H,M,L)	Level of Certainty (VC to VU)
Probability of Establishment estimate ¹³		
Consequences of Establishment estimate ¹⁴		
FINAL RISK ESTIMATE ^{15,16}		

Explanatory Notes

13. As estimated in Step 1 - Use the “final rating level” and “final level of certainty”, respectively.
14. As estimated in Step 2 - Use the “final rating level” and “final level of certainty”, respectively.
15. Under “element rating ” – Table 1 provides a guide for categorizing the final risk estimate. See also the explanatory note number 29 below Table 1.
16. Under “level of certainty” – the final level of certainty for the **Final risk estimate** is assigned the value of the element with the **lowest** certainty level (e.g. a **Very Certain** and **Reasonably Uncertain** estimate for the probability of establishment and consequences of establishment, respectively, would result in an overall **Reasonably Uncertain** level of certainty).

Definition of **Overall Aquatic Organism Risk Potential**

- HIGH** = Organism(s) of major concern (major mitigation measures are required). It is advised that the proposal be rejected unless mitigation procedures can be developed to reduce the risk to Low.
- MEDIUM** = Organism(s) of moderate concern. It is advised that the proposal be rejected unless mitigation procedures can be developed to reduce the risk to Low.
- LOW** = Organism(s) of little concern. It is advised that the proposal be approved. Mitigation is not needed.

*Note: It is advised that the proposal be approved as presented (no mitigating measures required) only if the overall estimated risk potential is **LOW***

*Note: It is advised that the proposal be approved only if the overall confidence level for which the overall risk was estimated is **VERY CERTAIN** or **REASONABLY CERTAIN**.*

*Note: For an overall **HIGH** or **MEDIUM** risk, a second risk assessment needs to be conducted to determine whether the proposed mitigation procedures are adequate to reduce the overall risk to **LOW**.*

Part 1 – Step 4 Completion of Risk Assessment Documentation

Specific Management Questions (Mitigation Factors or Measures)

Additional Factors and Notes

1. Mitigation measures could reduce risks to a **Low** rating. Mitigation measures include but are not limited to the following:

Reducing risk of genetic impact on local stock:

- hold in containment facilities to prevent escape
- use stocks genetically similar to stocks in receiving waters
- sterilize organisms to prevent interbreeding with local populations

Reducing risk of ecological impact on local ecosystems:

- use local stock only
- sterilize organisms to prevent natural reproduction and increase in population size
- use species that cannot reproduce naturally in receiving waters
- hold in containment facilities to prevent escapes

- 2 Are there any neighbouring jurisdictions to consult?

If Yes – Has this been done?

Is the neighbouring jurisdiction concerned?

If Yes – Has the dispute avoidance mechanism outlined in Appendix II been applied?

Part 2 – Pathogen, Parasite or Fellow Traveller Risk Assessment Process

Step 1 Determining the Probability of Establishment

Complete the following table and provide a brief rationale with appropriate references to support the rating given.

Steps 1 to 3 must be carried out for each **hazard** identified in the hazard identification step (Appendix V).

Element	Probability of Establishment (H,M,L) ¹⁷	Level of Certainty (VC to VU) ¹⁸
Estimate the probability that a pathogen, parasite or fellow traveller may be introduced along with the species proposed for introduction. Note that several pathways may exist through which pathogens or accompanying species can enter fish habitat. Each must be evaluated.		
Estimate the probability that the pathogen, parasite or fellow traveller will encounter susceptible organisms or suitable habitat.		
Final Rating ^{19, 20}		

Explanatory notes

17. See Note 1.

18. See Note 2.

19. The final rating for the **Probability of Establishment** is assigned the value of the element with the **lowest** risk rating (e.g., a **Medium** and **Low** estimate for the above elements would result in an overall **Low** rating). Note that the calculation of the final rating follows the multiplication rule of probabilities (i.e., the probability that a given event will occur corresponds to the product of the individual probabilities). Thus the final risk of establishment is assigned the value of the lowest individual probability estimate. Again, both events – probability of the pathogen, parasite or fellow traveller successfully colonizing and maintaining a population in the intended area of introduction (be it in a confined environment such as a facility, or a natural habitat) and the probability of spreading beyond the intended area of introduction (estimated as explained above) – need to occur in order to have establishment beyond the intended area of introduction.

20. The final rating for the **level of certainty** for the Probability of Establishment is assigned the value of the element with the **lowest** level of certainty (e.g. a **Very Certain** and **Reasonably Uncertain** ratings for the above elements would result in a final **Reasonably Uncertain** rating).

Part 2 – Step 2 Determining the Consequence of Establishment of a Pathogen, Parasite or Fellow Traveller

Complete the following table and provide a brief rationale with appropriate references to support the rating given. The final rating of the Consequences of Establishment is assigned a single rating based on environmental impacts.

Element	Consequences of Establishment (H, M, L)²¹	Level of Certainty (VC to VU)²²
Impacts of establishment of a parasite, pathogen or fellow traveller on native species and/or aquaculture in the watershed.		
Ecological impacts on native ecosystems both locally and within the drainage basin including disease outbreak, reduction in reproductive capacity, habitat changes, etc.		
Genetic impacts on local self-sustaining stocks or populations (i.e. whether the pathogen, parasite or fellow traveler affects the genetic characteristics of native stocks or species).		
Final Rating^{23, 24}		

Explanatory notes

21. See Note 1.

22. See Note 2.

23. The final rating for the **Consequences of Establishment** is assigned the value of the element (individual probability) with highest risk rating (e.g. **High** and **Medium** ratings for the above elements would result in a final **High** rating) as both events are independent (i.e., additive probabilities).

24. See Note 20.

Part 2 – Step 3 Estimating Pathogen, Parasite or Fellow Traveller Risk Potential

The overall Risk is assigned a single value based on the **Probability of Establishment** and the **Consequences of Establishment**.

Component	Rating (H, M, L)	Level of Certainty (VC to VU)
Probability of Establishment estimate ²⁵		
Consequence of Establishment estimate ²⁶		
FINAL RISK ESTIMATE ^{27, 28}		

Explanatory notes

25. As estimated in Step 1 – Use “final rating for probability of establishment” and “final rating for the level of certainty”, respectively.
26. As estimated in Step 2 – Use “final rating for consequences of establishment” and “final rating for the level of certainty”, respectively.
27. Under “element rating”, Table 1 below provides a guide for categorizing the final risk estimate.
28. See Note 20.

Definition of “**Pathogen, Parasite, Fellow Traveller Organism Risk Potential**”

- HIGH** = Organism(s) of major concern (major mitigation measures are required). It is advised that the proposal be rejected unless mitigation procedures can be developed to reduce the risk to Low.
- MEDIUM** = Organism(s) of moderate concern. Mitigation is justified. It is advised that the proposal be rejected unless mitigation procedures can be developed to reduce the risk to Low.
- LOW** = Acceptable risk - organism(s) of little concern. It is advised that the proposal be approved as presented. Mitigation is not needed.

Note: It is advised that the proposal be approved as presented only if the overall risk associated with each identified potential hazard (as defined in Step 1) was estimated as LOW.

Note: It is advised that the proposal be approved as presented only if the overall confidence level for which the overall risk is VERY CERTAIN OR REASONABLY CERTAIN

Note: For an overall HIGH or MEDIUM risk, a second risk assessment needs to be conducted to determine whether the proposed mitigation procedures are adequate to reduce the overall risk to LOW

Part 2 – Step 4 Completion of Risk Assessment Documentation

Specific Management Questions (Mitigation Factors or Measures)

Additional Factors and Notes

Mitigation measures could reduce risks to a low rating. Examples of mitigation measures include the following:

Reducing risk of transferring accompanying pathogens, parasites and/or fellow travellers

- health inspection and certification
- pre-treatment for pathogens, diseases and parasites
- inspection for fellow travellers
- disinfection prior to discarding water in which the organisms arrived
- vaccination
- disinfection of eggs
- importation as milt or fertilized eggs only
- quarantine incoming organisms and use as broodstock, release F₁ progeny only if no pathogens, parasites or fellow travellers appear.

Table 1. How to Categorize the Final Risk Estimate²⁹

Probability of Establishment	Consequences of Establishment	Final Risk Estimate
High	High	High
High	Medium	High
High	Low	Medium
Medium	High	High
Medium	Medium	Medium
Medium	Low	Medium
Low	High	Medium
Low	Medium	Medium
Low	Low	Low

Explanatory Note

29. If there is no probability increment between the two estimates, (i.e., if the Probability of Establishment is **High** and the Consequence of Establishment is **Medium**) the final risk estimate takes the value of the highest of the two probabilities to err on the side of safety (precautionary approach).

**NATIONAL CODE ON INTRODUCTIONS AND TRANSFERS
OF AQUATIC ORGANISMS**

Organism Risk Assessment Summary Report Form

To be completed by Introductions and Transfers Committees

Name of Proponent:

Summary Prepared By:

Date submitted:

History, background and rationale for the request:

Description of aquatic organism or activity to be assessed:

Volume, quantity, and frequency of importation:

Time schedule associated with introduction and transfer activity:

Hazard Identification

Organism Risk Assessment Summary Information

Summary of the Ecological and Genetic Risk Assessment

Summary of the Pathogen/Parasite/Fellow Traveller Risk Assessment

Pathogens:

Parasites:

Other “fellow travellers”:

Comments:

Mitigation Measures:

Concluding Statement on Total Organism Potential Risk:

Advice to Decision-Making Authority:

Approved by

Signature

Date