

**Knowledge, Perception and Application of the
Mitigation Hierarchy Among Officials in Canadian Federal
Regulatory and Resource Management Agencies**



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List of Acronyms and Abbreviations

“The Agency” – term commonly used by interviewees for the Impact Assessment Agency of Canada or its predecessor Canadian Environmental Assessment Agency

CEAA - Canadian Environmental Assessment Act, also Canadian Environmental Assessment Agency (predecessor to IAAC), if not italicized

CEAA 2012 – Canadian Environmental Assessment Act, 2012.

CER – Canadian Energy Regulator

CNPA – Canada National Parks Act

CNSC – Canadian Nuclear Safety Commission

CWS – Canadian Wildlife Service (a branch of Environment and Climate Change Canada)

DFO – Fisheries and Oceans Canada (formerly Department of Fisheries and Oceans)

ECCC – Environment and Climate Change Canada

EPOD – Environmental Protection Operations Directorate (a directorate of Environment and Climate Change Canada)

GPOP - Guiding Principles and Operational Procedures (Parks Canada policy)

IAA - Impact Assessment Act

IAAC – Impact Assessment Agency of Canada

IUCN – International Union for the Conservation of Nature

PCA – Parks Canada Agency

SARA – Species at Risk Act

TC – Transport Canada

Executive Summary

In the face of a steep decline in biodiversity there is an urgent need to develop new policy tools and improve the application of existing tools, including the assessment and mitigation of environmental impacts at the project level. As impact assessment has evolved as a profession and discipline impact assessment has developed frameworks and doctrines.

Among those frameworks is the mitigation hierarchy. This prescribes that that one should avoid impacts first and foremost, then minimize those impacts not avoidable, then restore onsite where possible, and finally rely on offsetting or environmental compensation only as a last resort. It is a dictate that is found in policies, academic literature and professional guidance around the world, and in Canada.

The rationale of the mitigation hierarchy is that intact functional ecosystems, those left undisturbed by avoidance and minimization measures, are more mature, complex and resilient than those created or restored by artificial means, the kind which form the basis for onsite restoration and offsetting. The practical challenges of offsetting in particular are well-documented.

Despite the widespread acceptance of the mitigation hierarchy, three previous case studies examining the United States, Australia and the Province of Alberta have noted a tendency on the part of both regulators and proponents to move too quickly to offsetting as the preferred form of mitigation, thereby contradicting the hierarchy by effectively skipping several key stages. Some have suggested that this disregard of the hierarchy in practice is widespread. This may forego opportunities to optimize environmental outcomes by overlooking avoidance and minimization options.

The purpose of this study was to examine whether that suspicion that the mitigation hierarchy is often disregarded was valid with respect to Canadian federal regulatory and resource management agencies. The qualitative method used to do this combined a review of legislation and policies, and of impact assessment processes, with 36 interviews with officials in eight different federal agencies and stakeholders with experience in dealing with those agencies. This was intended to explore experiences, perceptions and ideas among the interview participants.

Our findings were:

- 1) While some familiarity with the mitigation hierarchy is widespread, there is no common framework or vocabulary across the federal family for considering mitigation options.
- 2) Knowledge of the mitigation hierarchy is not evenly distributed among participants from the examined federal agencies. Those participants in agencies with a focus on process management appear to have less working familiarity with the hierarchy than those in agencies having a more focused conservation mandate.
- 3) While many of the participants recognized the risk that offsetting could be used inappropriately to displace avoidance and minimization measures, this was viewed as uncommon in practice. Rather the more common view among participants was that the cost and practical difficulties of offsetting provide an incentive to avoid and minimize as much as possible to eliminate the need to consider offsetting. Some suggested that it was the very lack of clear policy direction and tools to enable offsetting that made it so difficult and reinforced this deterrent to offsetting. If

this is so, those charged with developing offset policy and tools should be careful not to inadvertently enable offsetting as preferred mitigation.

- 4) We found no consensus among participants with respect to who is responsible for application of the mitigation hierarchy.
- 5) Many participants felt that the active consideration of the mitigation hierarchy may come too late in the IA process to encourage the use of certain mitigation options. In particular, there may not be enough opportunity to engage on early options for avoidance and minimization. As well, leaving the development of offsetting and other mitigation plans to the post-permitting stage shifts regulatory responsibility in a manner that may make effective mitigation more challenging.
- 6) Policy guidance and standards of practice published prior to and outside of any particular development application are effective aids to mitigation. They provide useful guidance to both proponents and regulators as to what kinds of activities are considered acceptable.

Based on the above we conclude that the implementation of the mitigation hierarchy in Canada's federal impact assessment process appears to be better than that previously studied in other jurisdictions. However, this appears to be less a result of a common understanding and dedication to the principles of the hierarchy than to the influence of situational economic incentives that deter proponents from pursuing offsetting. Based on that perception of our situation we make five recommendations to improve the application of the hierarchy in the federal regulatory realm:

- a) Develop a government-wide policy on the mitigation hierarchy and promote a shared vocabulary and setoff principles and practices.
- b) In each federal review process there should be a clear assignment of responsibility to oversee the use of the mitigation hierarchy.
- c) Consider the mitigation hierarchy at all stages of impact assessment, especially in the early planning stages.
- d) Minimize the use of post-permitting conditions, when the proponent has little incentive to be ambitious.
- e) Prior guidance on best practices and acceptable site selection is extremely useful.

I. Introduction

In the face of a steep global decline in biodiversity, there has been an urgent need to develop new policy tools and improve the application of existing tools. Canada has recently reiterated its commitment to this important work in the form of its adoption of the Kunming-Montreal Global Biodiversity Framework (Convention on Biological Diversity, 2022).

Among the most common tools to alleviate negative impacts on biodiversity and other environmental components is project-level impact mitigation, usually as part of an impact assessment process. This process is not new in Canada or internationally, but has evolved over several decades. Coincident with that evolution, weaknesses and gaps have been identified in the impact assessment process. Among these is how a wholistic concept like biodiversity can be dealt with in impact assessment statements (Gannon, 2021) and how its complexity can be managed in a governance system, fragmented, however, understandably, by federalism and multiple resource management agencies (Johnston & Ray, 2023).

As a strength, however, the field of impact assessment has established certain practices that can help in optimizing its effectiveness in protecting the environment. One of these is the prescription that those responsible should prioritize some forms of impact mitigation over others. The “mitigation hierarchy” dictates that one should avoid impacts first and foremost, then minimize those impacts not avoidable, then restore onsite where possible, and finally rely on offsetting or environmental compensation only as a last resort.

Canada has expressed the mitigation hierarchy and interest in the use of offsetting to conserve biodiversity in several policy documents, including a succession of policies from Fisheries and Oceans Canada and an *Offsetting Policy for Biodiversity* recently released for comment by Environment and Climate Change Canada (2020). With this growing interest in offsetting there is a need to develop an understanding of its role in impact mitigation and its appropriate deployment.

We undertook this study to determine the extent to which the mitigation hierarchy is understood and applied by Canadian federal regulators in a manner consistent with policy guidance, professional guidance, and academic literature. It does so through a review of policies and interviews we conducted with 36 people within the federal family of regulators, administrators and expert advisors, or stakeholders with extensive experience with the federal impact assessment and permitting regimes.

The federal agencies which were our focus were:

- Canadian Energy Regulator (CER)
- Canadian Nuclear Safety Commission (CNSC)
- Environment and Climate Change Canada – Canadian Wildlife Service (CWS)
- Environment and Climate Change Canada – Environmental Protection Operations Division (EPOD)
- Fisheries and Oceans Canada (DFO)
- Impact Assessment Agency of Canada (IAAC)
- Parks Canada Agency (PCA)
- Transport Canada (TC)

As discussed in Section III, some of these agencies have mandates which primarily emphasize conservation and expert knowledge (CWS, DFO, PCA), while others primary function is managing the complex processes of impact assessment (IAAC, EPOD). Finally, some offer special expertise in the process of regulating particular complex industry sectors (CER, CNSC).

After completing our interviews and policy review we realized that the CNSC and Transport Canada's mandate was to mitigate the impacts of their particular sectors' operations, such that the broad suite of mitigations that are the subject of the mitigation hierarchy, and the concern of the other agencies, did not easily apply to them. For that reason those agencies did not receive extensive attention in this study.

Based on these interviews we identify patterns in the understanding and application of the mitigation hierarchy that have implications for the effectiveness of impact mitigation and the smooth operation of the impact assessment and mitigation process. We also make recommendations that we believe would help to improve both this process and environmental outcomes.

II. The Mitigation Hierarchy in Theory and Practice

The mitigation hierarchy is a long-standing and near-universal framework for the priority in which mitigation measures are to be considered and applied (Arlidge et al, 2018; Bull et al., 2013; BBOP, 2013; Cross-Sector Biodiversity Initiative & The Biodiversity Consultancy, 2015; Darbi et al., 2010; eftec & IEEP, 2010; IFC, 2012; IUCN, 2016; McKenney & Keisecker, 2010; Noble, 2021; Poulton, 2015). The hierarchy dictates that, as the first step, proponents and regulators must avoid impacts, such as scrutinizing the overall appropriateness of the project or by siting the project in an area of low environmental sensitivity. Secondly, those impacts that are unavoidable are to be minimized, such as through modifications to the project design or the use of abatement technologies. Losses onsite which can be rendered temporary through restoration or rehabilitation onsite are to be so treated. Only after these prior steps are taken is offsetting to be used, as a last resort, to address the impacts that remain (commonly known as residual impacts or effects).

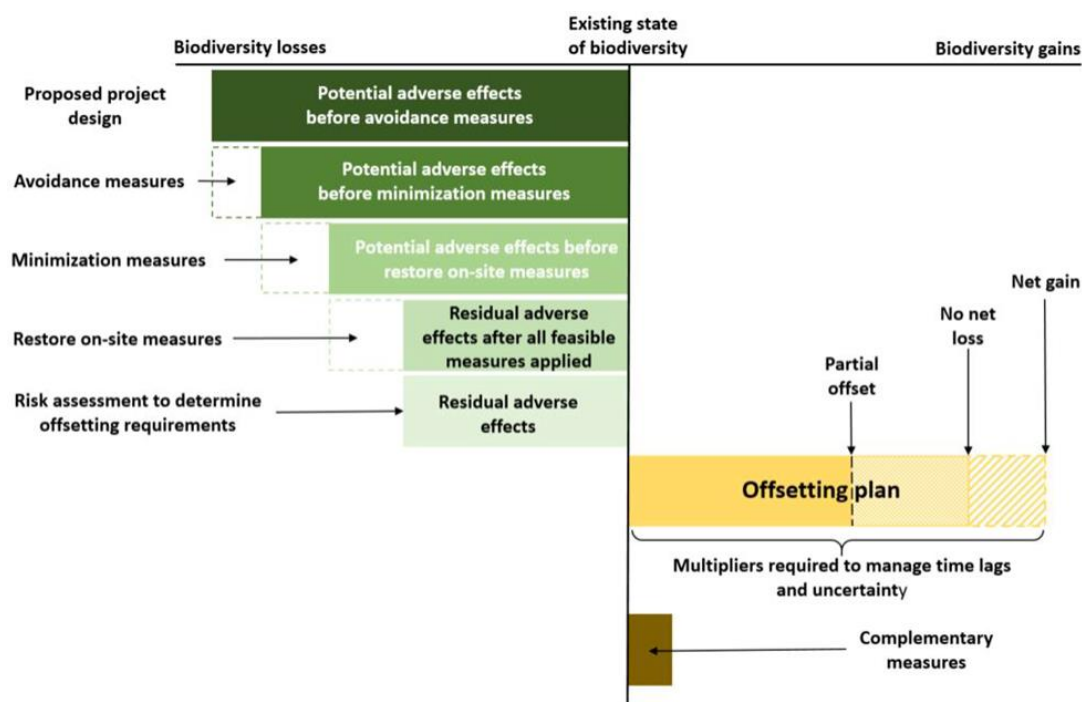


Figure 1: A graphic representation of the mitigation hierarchy. From Environment and Climate Change Canada (2020).

Articulations of the mitigation hierarchy do not often clearly lay out the rationale underlying it. A review of the literature on the various forms of mitigation, however, reveals that intact functional ecosystems, those preserved by impact avoidance, have a complexity and resiliency that is very difficult to replicate through artificial means. The restoration of ecosystems that onsite restoration or offsetting often rely upon has a greater risk of failure, and even in success is unlikely to reproduce all of the features or depth and complexity of ecosystem function that one would find in an intact natural system.

Offsetting in particular is beset by issues revolving around:

- Limits to offsetting (BBOP, 2012; Pilgrim et al., 2013)

- Equivalency, metrics and baselines (Bull et al., 2014; Gibbons et al., 2016; Maron et al., 2015a; Marshall et al., 2020; Parkes et al., 2003; Quétier & Lavorel, 2012; Salzman & Ruhl, 2000)
- Additionality (Gillenwater 2012; Maron et al 2015b)
- Compensation for risks and time lags (Moilanen et al., 2009; Curran et al., 2014; Laetila et al., 2017; Bull et al., 2017);
- Permanence and long-term management (BBOP, 2013; Damiens et al., 2021)
- Social aspects of offset design (Bideau et al., 2018; Sonter et al., 2018; Griffiths et al., 2019; Jacob & Dupras, 2020).

For all of these reasons offsetting is viewed as a last resort in the hierarchy, and substantial reliance on offsetting to adequately compensate for shortcomings in other forms of mitigation is ill-advised.

Despite the repeated emphasis on the importance of the hierarchy, three prior case studies have found a common tendency to disregard it, instead using offsetting as the preferred mitigation approach.

1) United States

In the United States the U.S. Army Corp of Engineers, responsible for the implementation of wetland mitigation, was initially resistant to applying the earlier steps of the hierarchy, preferring offsetting as the primary form of mitigation (Hough & Robertson, 2008, Gardner, 2011). Neither of the cited sources unambiguously suggest that this is problem achieved a final resolution.

2) Australia

The official review of the performance of Australia's *Environmental Protection and Biodiversity Conservation Act* (EPBC Act) in 2020 found problems with both offset design and implementation (Samuel 2020). Among these was a failure to apply the mitigation hierarchy, described as follows.

The 'avoid, mitigate, offset' hierarchy is a stated intent of the policy. This is not how the policy has been applied in practice. Proponents see offsets as something to be negotiated from the outset, rather than making a commitment to fulsome exploration (and exhaustion) of options to avoid or mitigate impacts. (Samuel, 2020, p. 138)

It should be noted, however, that Evans (2017) found, in evaluating the implementation of offsetting under the EPBC Act, that assessment officers routinely asked for evidence of avoidance and minimization, and that proponents often found "good, creative" ways to apply such mitigation. In a subsequent article, however, the same author described a reliance on offsetting as a condition of project approval and a reluctance to insist on the avoidance and minimization of impacts (Evans, 2023).

3) Alberta

The closest look at the actual implementation of the requirement of avoidance was carried out by Clare et al (2011) with respect to wetland conservation in the Alberta. Based on 33 interviews with key informants involved in provincial wetland policy implementation, they found that avoidance was commonly overlooked in the permitting process for wetland disturbance, despite the fact that it was clearly articulated in policy guidance. The interviews revealed a pronounced reluctance to require avoidance and a reliance on compensation as the primary means of wetland conservation. Among the reasons that interviewees gave for this was a lack of clear criteria for what constituted avoidance,

perceived pressure to “make the system work” for proponents, and a perception that regulators cannot realistically say no. This last point was sometimes reinforced by the assumption that regulators did not have the legal authority to do so (though this deficiency is doubtful).

While each of these cases may not be seen as representative of anything beyond their own circumstances, a comparison by Darbi et al (2010 at pages 184 and 185 respectively) of the implementation of offsetting in seven countries found “there is a fundamental problem: the mitigation hierarchy is not always clearly applied” and “even though the mitigation hierarchy is applied in principle, the practical implementation in some cases remains doubtful.” Likewise, a recent review of offset performance (zu Ermgassen et al, 2019) referred to the disproportionate attention that offsetting receives when the pursuit of no net loss of biodiversity values relies on avoidance and minimization.

We are left with an uncomfortable juxtaposition of two propositions. On the one hand, the mitigation hierarchy is an important tool for assuring that high quality and low risk mitigations are applied to potential impacts from project development to meet no net loss or even net gain objectives. On the other hand, in several different circumstances responsible officials have not applied the hierarchy, preferring instead to place undue emphasis and reliance on offsetting as a mitigation option. Hence the focal question of this study, whether Canadian regulators appropriately interpret and apply the mitigation hierarchy.

At this point we should make clear that the mitigation hierarchy is not an iron-clad dictate. It is a principled tool in service of optimal environmental outcomes and should be interpreted and applied in that spirit. An influential European source has cautioned against focusing on excessively costly avoidance and mitigation measures when greater ecological gains could be made from well-conceived offsets (eftec & IEEP, 2010). It should be emphasized, however, that this qualification is a reference to cost-effectiveness in terms of environmental benefits, not simply to cost minimization. We suggest that any departure from the hierarchy should be justified in terms of optimizing environmental benefits after due consideration of the rationale of the hierarchy, rather than for reasons of administrative or business expediency.

III. Major Project Assessment and Permitting Under Canadian Legislation

The current impact assessment structures and processes are the result of a reworking of the system by the federal government in 2019. This included the adoption of the *Impact Assessment Act* (2019, IAA) and the creation of the Canadian Energy Regulator. Both of these were presented as reforms to the prior assessment regime. The IAA was a successor to the *Canadian Environmental Assessment Act, 2012* (2012, CEAA 2012), which in turn was the successor to the *Canadian Environmental Assessment Act* (1992, CEAA). The CER was the successor to the long-standing National Energy Board.

These establish a mechanism for the collaborative assessment of projects within the jurisdiction of each agency. The reach of the Impact Assessment Agency of Canada is established by a list of designated types of projects promulgated in the *Physical Activities Regulations* (2019). The assessment of designated projects falls to IAAC by default. If designated projects fall within the overlapping mandate of either the CER (energy projects within federal jurisdiction) or the Canadian Nuclear Safety Commission (nuclear facilities and activities), then those agencies take the lead in the assessment of those projects.

In the regime that applies to each of these agencies, the assessment process is constituted to draw on the various sources of expertise residing in the many agencies of the federal government. Section 23 of the IAA provides that “Every federal authority that is in possession of specialist or expert information or knowledge with respect to a designated project that is subject to an impact assessment must, on request, make that information or knowledge available . . .” The IAAC, the CER, and the CNSC, then, all act as managers of the assessment process within their respective spheres, but are able to take advantage of the broader range of expertise found in various agencies across the whole of the federal government. This expertise may come from, for example, Fisheries and Oceans Canada with respect to fish and aquatic conditions, Health Canada with respect to health impacts of a project, Parks Canada with respect to impacts on national parks, Natural Resources Canada with respect to resource implications, and Environment and Climate Change Canada (ECCC) with respect to a multiplicity of possible environmental implications. The assessment agencies have expertise in-house as well.

The advisory role of ECCC requires fuller explanation. Because the department contains several hubs of environmental expertise, the Environmental Protection Operations Directorate (EPOD) which acts as a single window between ECCC and IAAC, farming assessment notices and requests out to the various expert parts of ECCC. Among those is the Canadian Wildlife Service, which has responsibility for species at risk, migratory birds, and the administration of the federal wetland policy, which are often contentious subjects in major project assessments. In our interviews EPOD staff has emphasized that it has its substantive own expertise and may offer advice into the process. According to one EPOD participant (P57) this has been a point of some recent tension within ECCC.

There are, therefore, agencies charged with managing the assessment process and agencies required to provide expert knowledge and advice. The third, and most critical function, is decision-making. Neither IAAC nor the CER make the final determination of whether a project is approved. They issue reports to the Minister of Environment who makes the final determination of whether a project is in the public interest (IAA, s. 60), or may refer that decision to the Governor in Council (federal cabinet, IAA, s. 61). The final decision is formalized in a decision statement which almost always will contain legally binding

conditions. In contrast to this process, decision-making authority with respect to nuclear facilities and activities lies with the CNSC.

Figure 2 illustrates the structure for assessments for designated projects under IAAC and the CER. It is colour-coded to identify three roles, in addition to that of the proponent. Gray denotes process management as a primary role, green, expert advisors, and red, decision-making authority. EPOD is shown as both green and grey as it plays a dual role.

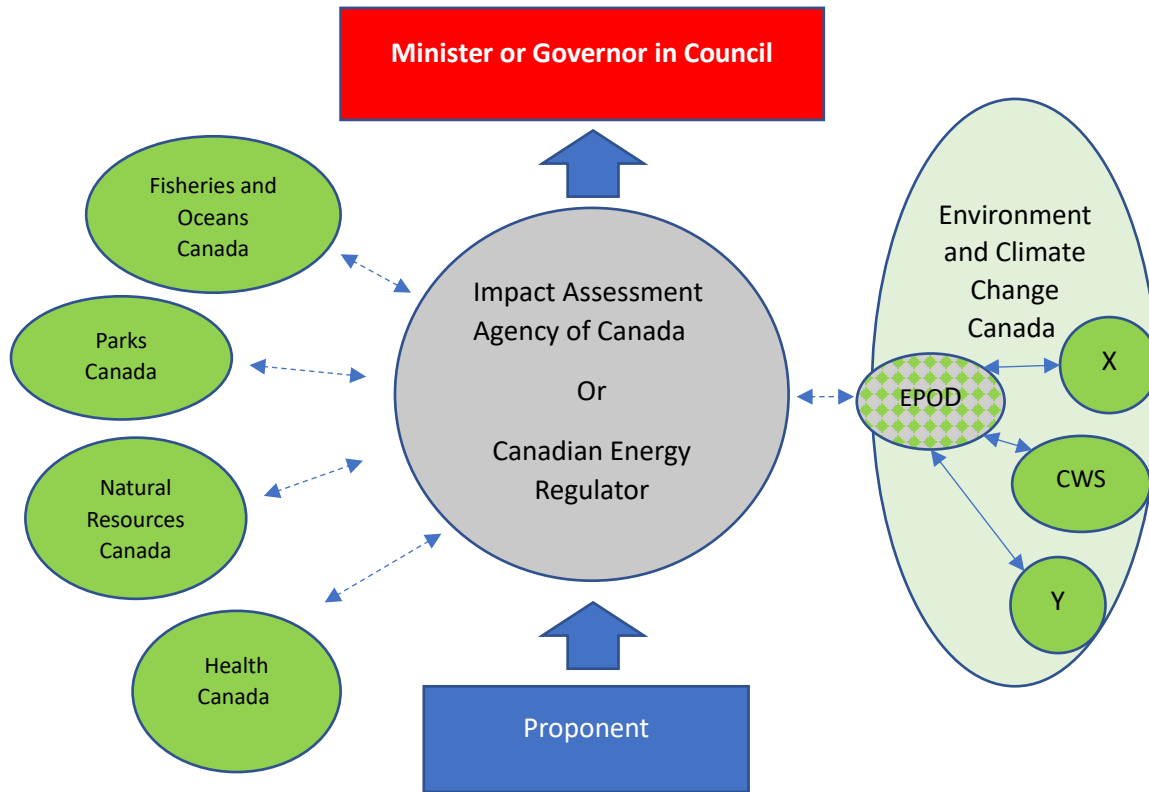


Figure 2: The structure of assessment, federal expert advice and decision-making under the IAA.

Those agencies which are shown here as expert advisors have their own decision-making authority with respect to non-designated projects. For example, DFO makes authorizations for activities creating harm to fish and fish habitat, or affecting aquatic species at risk; CWS issues permits for terrestrial species at risk and migratory birds.

Overlying and constraining this whole system is the Canadian constitution. The Canadian constitutional authority to legislate and regulate with respect to the environment is complex and often contested. The division of powers between the federal and provincial governments is dealt with in sections 91 and 92 of the *British North America Act* of 1867, Canada’s foundational constitution, as well as some subsequent agreements and amendments. Those provisions do not mention the environment or any synonymous concept. Instead, they list a series of “heads” of power that reflective of 19th century concerns. Of this situation the Supreme Court of Canada has said:

It must be recognized that the environment is not an independent matter of legislation under the Constitution Act, 1867 and that it is a constitutionally abstruse matter which does not comfortably fit within the existing division of powers without considerable overlap and uncertainty (*Friends of the Oldman River*, 1992, p. 64).

The practical effect of this is that there are areas where federal constitutional authority is settled, such as those over fisheries, navigable waterways, and migratory birds. There are other areas, however, where federal jurisdiction is uncertain or not yet tested, authority over terrestrial species at risk, for example. The constitutionality of the *IAA* itself is currently being considered by the Supreme Court of Canada pursuant to a challenge from the Province of Alberta (Attorney General of Canada). As a result of this legal complexity, there is no unified approach to environmental management or permitting involving federal and provincial governments across Canada.

IV. The Mitigation Hierarchy in Canadian Policy

As one of the purposes of this study is to assess Canadian regulatory authorities' approach to the mitigation hierarchy against stated policy, it is necessary to review those policies for each of the authorities dealt with here as well as for the federal government as a whole.

The mitigation hierarchy is not broadly promoted in Canadian law or policy. Rather, some but not all, regulatory regimes have expressions of it, though these do not appear to be drafted with any consistency. Further, several policies focus on the use of offsetting rather than optimizing the whole suite of tools covered by the hierarchy. This focus on the last resort in mitigation could distract from options that would yield better environmental outcomes. The only policies of the Government of Canada (as opposed to individual departments) respecting the mitigation hierarchy applies to the narrow confined of wetlands within federal jurisdiction and species at risk.

a) Federal Wetland Conservation Policy

The Federal Policy on Wetland Conservation (Government of Canada, 1991) commits “all federal departments” to the goal of no net loss of wetland functions, in service of which was a commitment to “ensure the mitigation of the impacts of Federal Government activities affecting wetland functions, and, where appropriate, develop compensatory measures” (Government of Canada, 1991, p. 7). A following implementation guide for the policy (Lynch-Stewart et al, 1996) set out the contribution that the mitigation hierarchy was expected to make to the no net loss goal:

"No net loss of wetland functions" recognizes that further degradation of the wetland resource is not acceptable. However, all wetland loss cannot be avoided: some loss occurs naturally, some results from past activities, and some losses may result from beneficial human activities. The goal ventures to balance the unavoidable loss of wetland functions, through rehabilitation of former degraded wetland or enhancement of healthy, functioning wetland. As a last resort, compensation for lost functions could be sought through non-wetland replacement of functions, or creation of wetland where there was none before. In short, "no net loss of wetland functions" means that unavoidable losses of wetland functions must be compensated.

In practice, the "no net loss" goal provides a structured approach to land management decisions involving wetlands. No net loss requires project proponents to work through a strict sequence of mitigation alternatives – avoidance, minimization, and compensation – with clear criteria and defined outcomes. Mitigation alternatives and associated criteria should recognize the limitations in our understanding of wetland functions (and ways and means to assess such functions), as well as our capacity to rehabilitate or create new wetlands.

In some areas of Canada **"no further loss of any remaining wetland area"** is prescribed. Impacts and intrusions on wetlands in these regions must be avoided: "minimization" and "compensation" cannot be considered as mitigation options in this region. (p. 5, bold in original.)

b) Species at Risk Act

The *Species at Risk Act (SARA)* provides for the listing and recovery planning of species whose population faces particular pressures. It is thus a critical part of the protection of biodiversity in Canada. Section 79 of *SARA* provides that every person that undertakes a federal assessment of environmental effects and finds that a project is likely to affect a listed species must ensure that mitigation measures, consistent with recovery strategies and action plans for the species, are taken to avoid or lessen those effects.

Section 73 of *SARA* invokes the mitigation hierarchy with respect to the authority of the competent minister to enter into an agreement to allow an activity affecting a listed species. Among other requirements the minister may only enter into such an agreement if of the opinion that (s. 73(3)):

- (a) all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted;
- (b) all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and
- (c) the activity will not jeopardize the survival or recovery of the species.

Clauses (a) and (b) call for all reasonable avoidance and minimization measures, while clause (c) raises the prospect of offsetting and its limitations. Subsection 73(6) also allow conditions to be placed on an authorized activity, thereby opening the door to the imposition of offset conditions. This is confirmed by the published guidelines for permitting under Section 73, which direct the reader to regional offices of the responsible department for guidance on the use of offsets (Government of Canada, n.d., p. 4)

Section 74 extends the reach of Section 73 permitting to any federal “agreement, permit, license, order or similar document” authorizing an activity that affects a listed species. Between section 73, 74, and 79, these provisions apply to all agencies touched on in this report to the extent that species at risk are affected by activities.

c) Impact Assessment

The most prominent definition of mitigation in Canadian law or policy is found in the *Impact Assessment Act (IAA)*, which reads:

mitigation measures means measures to eliminate, reduce, control or offset the adverse effects of a project or designated project, and includes restitution for any damage caused by those effects through replacement, restoration, compensation or any other means. (s. 2)

This definition does not prescribe any hierarchy to the various forms of mitigation that it lists. Rather, it reads like a menu from which items can be selected in any combination. It should be noted that the mention of offsetting in the first line is an addition to the comparable definition found in the prior legislation, *CEAA 2012*.

The *IAA* is supplemented by *Practitioner’s Guide* (Impact Assessment Agency of Canada, n.d.), an online “evergreen” document, which makes reference to the mitigation hierarchy (Tailored Impact Statement Guidelines Template for Designated Projects Subject to the *Impact Assessment Act*, Section 20: Mitigation and Enhancement Measures). The document is a template for what proponents can expect

when Tailored Impact Statement Guidelines (TISGs) are developed for any particular project. The relevant provisions are set out in Appendix I.

This expression of the hierarchy, however, suffers from some significant limitations. First, it is buried deep within a long and technical document, and thus does not amount to a cohesive, much less prominent, statement of principles. It reads as mere requirement to provide documentation. Secondly, being directed to prospective proponents, it does not commit either the Impact Assessment Agency of Canada nor an eventual decision-maker to abiding by the mitigation hierarchy as stated. Such an intention may be read into the document, but that implication is far from clear.

d) Environment and Climate Change Canada

In 2012 Environment Canada (as it was then called) released its *Operational Framework for Use of Conservation Allowances* (Environment Canada, 2012), which reviewed the actual and potential use of offsets (called conservation allowances in that document) by the federal government and setting out a series of offset principles and expectations. Relevant excerpts from the *Operational Framework* are found in Appendix II.

The *Operational Statement* was an important first statement of offset principles by Environment and Canada, and was referred to by the National Energy Board in a series of decision statements requiring pipeline proponents to offset impacts on caribou habitat and other environmental components under federal jurisdiction. Despite this, however, the participants in our interviews made little reference to the *Operational Framework* and it appears to have largely faded from institutional memory across the federal family.

The draft *Offsetting Policy for Biodiversity* released by ECCC in December of 2022 (ECCC, 2020) explicitly replaces the *Operational Framework*. The *Offset Policy*, still under development after a period for comment, committed to a goal of no net loss “for all project developments that adversely affect biodiversity under ECCC’s wildlife mandate.” It also recommits to and restates the mitigation hierarchy at some length. The relevant text is excerpted in Appendix III.

e) Fisheries and Oceans Canada

The *Fisheries Act, 1985* (s. 35) prohibits the harmful alteration, disruption or destruction (“HADD”) of fish habitat except as authorized by the Minister, who can impose conditions on the authorization. This provision has, since at least 1986, been the foundation for a series of policies allowing for the offsetting of fish habitat lost to development. The most recent of these is the *Fish and Fish Habitat Protection Policy Statement* (Fisheries and Oceans Canada, 2019a). That policy notes that the 2019 version of the *Fisheries Act, 1985* includes a provision (s. 34.1 (1) requiring the Minister, prior to exercising any authority to allow any HADD activity to consider

(c) whether there are measures and standards

...

(ii) to avoid, mitigate or offset the harmful alteration, disruption or destruction of fish habitat;

While this provision in itself does not describe a hierarchy of mitigation measures, the 2019 policy statement reads that interpretation into it, saying “The concepts of ‘avoid, mitigate and offset’ build a hierarchy that is internationally recognized as a best practice in reducing risks to biodiversity” (Fisheries

and Oceans Canada, 2019a, p. 20). Both the policy statement and following *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat under the Fisheries Act* (Fisheries and Oceans Canada, 2019b) elaborate on the application of the mitigation hierarchy at some length. Relevant excerpts from both of these policies are included in Appendix IV. These statements are the most recent in a series of policy statements on offsetting and the mitigation hierarchy dating back to 1986 when the goal of no net loss of fish and fish habitat was initiated.

f) Canadian Energy Regulator

The CER's online Filing Manual for facilities applications (CER, n.d.) makes little mention of the mitigation hierarchy, saying only that "[i]f project effects cannot be avoided, mitigation must reduce or compensate for them" (Section A.1.2.6.2, paragraph 1). This statement is a weak expression of a ranking or preference among mitigation options, if it can be considered one at all. The manual does go on to say that the selection of mitigation options should be described and explained. Like the IAAC Tailored Impact Statement Guidelines Template, this document is instructions to proponents, not a statement of policy or commitment on behalf of the CER.

While the CER has received submissions from others on the mitigation hierarchy (see, for example, Northern Resource Analysts, 2013), it has done so without comment, passing up the opportunity to develop any position on the hierarchy.

g) Canadian Nuclear Safety Commission

The *Nuclear Safety and Control Act* (1997) establishes the CNSC and charges it with regulating nuclear energy facilities and the use of nuclear substances "in order to prevent unreasonable risk, to the environment and to the safety of persons" (s. 9(a)(i)). The Commission has published a guidance document on how it approaches its environmental responsibilities entitled *Environmental Protection: Environmental Principles, Assessments and Protection Measures* (CNSC, 2020). That document makes clear that the threshold for an environmental review as part of the CNSC's licensing program is potential or actual "interactions" between the facility in question and the environment. If such interactions are found to be likely then mitigation measures are to be put in place and monitored.

The *Environmental Protection* document makes no mention of the mitigation hierarchy, instead simply directing the mitigation measures, and the risk assessment on which they are based science-based, recognize the complexity of environmental risk assessment and include monitoring for effectiveness.

h) Parks Canada Agency

The *Canada National Parks Act* (2000) establishes Canada's system of national parks and designates the Parks Canada Agency (PCA or "Parks Canada") to administer them. An important part of the Act is section 8(2) which provides that "Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks."

Parks Canada Agency's *Guiding Principles and Operational Procedures* (Parks Canada, 1994) lay out broad principles for pursuing the ecological integrity mandate while allowing visitors to visit and appreciate the lands and waters encompassed by national Parks. This document makes no direct reference to the mitigation hierarchy, or to mitigation overall. It does, however, set out some valuable direction that is consistent with the hierarchy. For example, it directs (s. 4.3.2) that in order to avoid impacts on park

ecosystems, whenever possible commercial facilities and Parks Canada's own facilities should be located outside parks in adjacent communities or nearby lands. Such facility siting for an express environmental purpose is a form of avoidance as dictated by the hierarchy.

PCA has provided guidance on the assessment of new developments (as either proposed by itself or external proponents) in the form of its *Guide to the Parks Canada Process under the Impact Assessment Act* (Parks Canada, 2020). This guide distinguishes three different levels of assessment, depending on a project's size and projected impacts. It makes no reference to the mitigation hierarchy or equivalent concept, noting only that impacts assessment is a means for PCA to evaluate projects "to ensure they are as well-designed as possible to avoid or reduce adverse effects" (s.1). It also defines residual adverse effects as those "that cannot be prevented or avoided through the application of mitigation measures" (s. 2.6).

Interview participants from PCA said that they do have internal guidance that strongly emphasizes the mitigation hierarchy, and that it is a feature of internal training programs.

i) Transport Canada

We were unable to find any reference to the mitigation hierarchy in any Transport Canada policy documents.

We should recognize that above policies may incent the use of avoidance and minimization, and thus the mitigation hierarchy overall, in a manner which is not explicit on the face of the policy documents. The very fact that a proponent may face an unwanted regulatory process may lead them to redouble their efforts to eliminate or reduce their planned impact to a level that is not considered to be substantial enough for a regulatory regime to apply.

This mechanism is explicitly recognized by at least DFO and the CNSC. DFO has a program of working with proponents to design their project so as not to have any impact on fish or fish habitat (especially by not constructing in water, manifest in the guidance on the department website "Measures to Protect Fish and Fish Habitat: Fisheries and Oceans Canada, 2022b), so as not to require a *Fisheries Act* authorization. Similarly, the CNSC notes repeatedly that if an initial screening indicates that there is no interaction between the subject project and the environment then no environmental protection measures will be required. While other regimes may not make this encouragement explicit, they may have the salutary effect on the plans of proponents.

Having said that, this review of policy guidance highlights the lack of a single coherent approach to the mitigation hierarchy, and perhaps to mitigation overall, across the federal family of resource management agencies.

V. Methods

This study draws upon 36 interviews conducted between April 2022 and April 2023. Interviewees consisted of two sub-groups: 1) officials working in, or recently retired from federal agencies with a mandate to decide, manage processes or advise on project-level impact mitigations, and 2) external stakeholders with experience in dealing with such federal agencies.

The former category was further divided among eight federal agencies:

- Canadian Energy Regulator (CER)
- Impact Assessment Agency of Canada (IAAC)
- Environment and Climate Change Canada – Canadian Wildlife Service (CWS)
- Environment and Climate Change Canada – Environmental Protection Operations Division (EPOD)
- Parks Canada Agency (PCA)
- Fisheries and Oceans Canada (DFO)
- Canadian Nuclear Safety Commission (CNSC)
- Transport Canada (TC)

These agencies were considered to be highly likely to deal with impacts on biodiversity or play key roles in the collective process of impact assessment, though the list does not encompass all agencies that might meet that criterion on any given project. They were also selected for the diversity of perspectives they might bring.

We selected potential interviewees in three ways. First, a limited number of individuals were previously known to the authors or to the project's sponsors and advisors. Secondly, the structure and staff complement of these agencies was explored using the online Government of Canada Employee Directory Service (GEDS, 2022), noting those with titles such as "Impact Assessment Officer," "Impact Assessment Manager," "Team Lead, Environment," etc. Thirdly, a snowball method was followed, whereby each interviewee was asked at the end of the interview who else we should talk to about the issues discussed. While not all names suggested by the snowball method were approached, those that were mentioned by more than one participant were pursued with special interest.

Though it is not expected that this selection method yielded an array of interviewees who are necessarily representative of their agencies, an effort was made to sample officials in various branches of agencies and at different levels of seniority and authority. This was a safeguard against over-representing perspectives that might be idiosyncratic to a small sub-set of officials who work closely together or find themselves in similar positions on issues.

Potential interviewees were contacted initially via e-mail from a University of Queensland account. The initial e-mail included a Participant Information Sheet, a Consent Form, and a Letter of Reference from the Impact Assessment Agency of Canada. (The Letter of Reference was helpful; several participants said that it encouraged or enabled them to participate.) If the first e-mail received no response, reminders and follow-up requests were done via e-mail or phone calls, to a maximum of four attempted contacts.

Prior to each interview informed consent was received, either in the form of a sign consent form or by a recorded verbal consent. This process was authorized by the University of Queensland Human Research Ethics approval process (Project Number 2021/HE002837).

All participants were promised anonymity to encourage frank conversation. As one mechanism to maintain that anonymity each participant was randomly assigned a number between 1 and 100 for all reference to each of them. This is reflected later in this report where individual participants' response are identified with the number signifier (for example, Participant 21, or P21).

The number of requests made and responses received is set out below in Table 1.

Agency	Requests Made	Interviews Conducted	Interviews Declined	Non-Responses
CER	7	4	3*	0
IAAC	14	5	4	5
CWS	10	6	1	3
EPOD	6	2	0	4
PCA	6	5	0	1
DFO	8	5	0	3
CNSC	1	1	0	0
TC	2	1	0	1
External	8	7	0	1
TOTALS	62	36	8	18

Table 1: Numbers of officials contacted with requests for interview and responses, classified by agency.

We sought to understand the knowledge, perspectives and opinions of participants based on their own experiences day-to-day and over their careers. For this reason interviews were only roughly structured, in order to allow participants to take the conversation where they wished. While a set list of interview questions was prepared, this was not shared with participants and was drawn on selectively by the interviewer during interview sessions. Questions were not necessarily asked in the same manner or sequence in every interview.

The duration of the interviews ranged from 53:49 to 4:22:41, with an average time of 1:37:52.

All interviews but one were conducted online over the Zoom platform, which was also used to record the interviews. One interview was conducted in person. Recordings of the interviews were submitted to the online automated transcription service Otter.ai. Transcripts were reviewed and corrected by comparison to the respective recordings. The one in-person interview was recorded and simultaneously transcribed by Otter.ai.

The corrected transcripts were uploaded into the qualitative research software NVivo, in which they were coded for the characteristics and affiliations of each participant, and for the topics discussed. These codes were used as a tool to search and compare the responses of participants to similar questions or their comments on similar topics. The goal was to identify areas of commonality and

* Requests were made to three Commissioners of the CER. They were collectively declined by an e-mail from the CER legal department.

divergence with respect to issues important to the understanding and application of all aspects of the mitigation hierarchy.

It is important to note the limitations of this research method. This method is intended to explore the experience, perceptions and ideas of the participants. It is not intended to yield results representative of any larger population, nor does it make any claim to do so.

Further, because of the only semi-structured nature of the interviews not all questions and answers are directly comparable. As well, the fact that participants were not provided with questions or detailed guidance on the research topics in advance may have elicited answers which were incomplete or poorly articulated compared to what they might have offered if given the opportunity to prepare. That aspect was weighed, however, against the value in having participants spontaneously reflect their typical, everyday perceptions and opinions.

Section IV of this report makes extensive use of quotes from participants. The selection of these quotes is necessarily – selective, and cannot convey all of the context and nuance of the full conversation. Notwithstanding that, the quotes have been deliberately chosen to fairly reflect the individual participant’s stated views on a given topic and the variety of views among participants. Such selection is, however, inherently subjective and fallible.

Interview data, of course, relies on the reliability of the accounts of the participants. As in all communications there is potential for deception, obfuscation, faulty memories, and self-serving. In our interviews, however, we found all participants to be helpful and forthright, for which we are appreciative.

Finally, because the *IAA* is still relatively new legislation no major projects have yet made it all the way through the *IAA* process. Many interview participants made clear that their comments were based mainly on their experience with assessments under *CEAA* and *CEAA 2012*. While it is assumed that those comment will be relevant to the implementation of the *IAA*, how much that is true remains to be seen.

VI. Findings

- 1) There is no common framework or vocabulary across the federal family for considering mitigation options.

As it has evolved as a doctrine, field of study and policy development worldwide, the mitigation hierarchy has been described using various terminology. The terms used in this report – avoidance, minimization, onsite restoration, offsetting – are based upon a growing semantic consensus in several major sources (BBOP, 2013; Cross-Sector Biodiversity Initiative and the Biodiversity Consultancy, 2015; Phalan et al, 2017; Brownlie and Treweek, 2018; Arlidge et al, 2018). This is also the language used by Environment and Climate Change Canada in its draft *Offsetting Policy for Biodiversity* (Environment and Climate Change Canada, 2020), released for public comment in December 2022.

Not all sources have used these terms, however. In particular the word “mitigate” has been used to in two different senses. In the above sources it generally refers to the whole range of methods encompassed by the mitigation hierarchy from avoidance through to offsetting. In some of the literature, however, including the influential definition of biodiversity offsetting of the Business and Biodiversity Offset Programme (BBOP, 2013) “mitigation” is used to refer only to the second step in the hierarchy, what most now call minimization. In the absence of further clarification or context there is thus some ambiguity with respect to the scope of what is meant by “mitigation.” It should be noted in the policy review in Section IV above that Fisheries and Oceans Canada in its legislation and policy uses “mitigation” in this manner. In this second meaning of the word offsetting is not a form of mitigation.

These semantic shifts and debates would be of little significance if they did not pose a barrier to communication and collaboration. It has been noted in one previous study, however, that such inconsistency in the use of language can impair stakeholders’ understanding of the assessment and mitigation process (Bigard et al, 2017). In our interviews several participants made reference to the lack of common vocabulary across the Canadian government as a barrier to common understanding across agency boundaries.

P19 (CWS)

Like, if you don't have common framework, common values, common language, common interpretations and understandings, you're not - the end of roles and responsibilities, like all of it, you're not going to get the change that you need. And I watch how long it's taken us with caribou in particularly - massive effort, massive - and we're just now getting to a point where things are, some commonalities are starting to be seen, but it's far from perfect.

P47 (CER)

Like if you have like decisions on the north corridor and the previous projects like, there is, I would say there is kind of - not a gap- but the understanding is a little bit different. Even the definition of mitigation is different. I have seen across jurisdictions, so <yes> I think there needs to be some work done to come up with a kind of boutique common understanding of what it means. <Definitely.> Different interactions with like other departments like ECCC, like, we were like, Oh, this is not mitigation, like this is, this is not offset measures. This is actually mitigation to us. It's like no, but mitigation includes offsets.

P22 (IAAC)

I would say that conversations I've had internally with the federal government, there's different views on what offsetting is. And I can say that even some recent discussions I've had is the view that is being put forward about offsetting it's not mitigation; it's separate from mitigation. And, you know, I've I've indicated, okay, well, for me to do anything in our decision statements, it has to be mitigation, right? If this option is not mitigation, and the question is, what is it? . . . You know, so I would say it's, for me, and I'm always focused in on the legislation, right, under the provisions, we have the authorities. What do we think of offsetting? I think it's great, as long as it's seen as mitigation. If it's not seen as mitigation, then I'm left with a question of, well, what is it and what am I supposed to do with it?

Interviewer

Yeah. Well, if I can give you a bit of ammunition for the next time you're in that discussion, the definition in the Act says offsetting is one form of mitigation.

P22

Well, I can tell you that I've reviewed some documents in the last two weeks have been put out by another federal entity who have a different definition. They've said it's built on internationally, I guess, accepted sort of definitions, which is would be, but there's really nothing I can do unless it's seen within the context of our legislation.

P87 (DFO)

Now, just before I start, different departments, like different regulatory departments, define mitigation and offsetting differently. <Okay.> Like there are some regulatory departments that define mitigation really broadly to include like offsets. <Yes.> And that gets really confusing, right? <It does.> And so within our DFO process, we've got like, the avoidance measures. <Yeah.> And then we've got the mitigation measures, which, you know, minimize, <Yes.> Because if they avoided the avoidance measures, and then because they only minimize, we also have offsets <Right.> that deal with the residual. But not all, I mean, even Environment. I can't remember. But anyway, other, and it could be the Agency. I can't remember. It could be the Agency. Anyway, folks seem to define those things differently. <Yes.> In DFO that's kind of how we, how we've divided it up.

P31 (PCA)

So I mean, one of the things that came up was something like I think sometimes something as simple as making sure that everyone's using the same words for the same thing, so that you know what you're talking about, right? Because there's a lot of like, you know, compensation versus offsetting versus, you know, and so I think that's a key thing that I think getting us all speaking the same language. And, and understanding what the words - having a common understanding of what those words mean, and what we're working towards, I think that's a key thing.

A second term of uncertain scope is “avoidance.” In this study we include the consideration of whether a project should proceed in light of its environmental impacts. This is in keeping with the guidance provided by the Secretariat for the Ramsar Convention on Wetlands (Gardner et al, 2012), and the IUCN (2016) and recent academic guidance on avoidance by Phalan et al (2017) and Bull et al (2022), both of which treat the consideration of the “no project” option or other substantive alternatives to the project to be important aspects of avoidance.

For some others, however, avoidance refers only to the evading of particular impacts without departing from the scope of the project as proposed. This may be because their mandates are framed such that mitigation conditions are only imposed on a proponent as part of a project approval or authorization, so that the consideration of whether a project proceeds is procedurally separated from how it should proceed. This approach is understandable in terms of the form of some of the federal regulatory processes, but does mean that an important aspect of avoidance may receive less attention than it otherwise might.

P24 (CER)

I would put project denial in a different category, I think in the consideration phase. I mean, a project denial is a decision. It's not, and it's not something that the company is going to bring forward, the proponents not going to bring forward and we think you should deny this, right. So it's a different, that's a different beast. So so the mitigations are things that, that the company brings forward to mitigate potential impacts of the project. And they are challenged and reviewed and assessed by the Commission, who may eventually decide this project is the pits so we're not going to recommend it.

P55 (PCA)

So what you're talking about is, is how we identify what mitigations are the appropriate mitigations?

Interviewer

Yes. And how you consider development permitting generally, I suppose, and reach a decision about it.

P55

Oh, so not necessarily just the actual mitigations. But the decision on the overall? Well,

Interviewer

I'm kind of lumping the decision as to whether a project proceeds or not as one form of mitigation.

P55

Okay, that's not really mitigation . . .

The current development of the *Offsetting Guide for Biodiversity* by ECCC could serve as a common reference for all departments if that were desired. As drafted, however, it appears to only be targeted to ECCC itself. We understand, however, that the preparation of that policy has opened up a conversation within the federal family of pursuing a more consistent approach.

- 2) Knowledge of the mitigation hierarchy and consideration of its application and implications is not evenly distributed among participants from examined federal agencies.

In advancing this finding we reiterate the limitations of the research method used. The selection of participants was not intended to be representative of the larger population of personnel within their respective agencies. Also, the unstructured nature of the interviews was intended to elicit spontaneous responses, which might not reflect more complete thoughts that might have emerged if participants had the opportunity to prepare.

Bearing those limitations in mind, in general participants from agencies with a conservation focus or a clear policy articulation of the mitigation hierarchy (DFO, PCA, CWS) exhibited a more full understanding and deeper commitment to the hierarchy than those agencies more process-oriented (IAAC, EPOD).

In order to assess participants' familiarity with the mitigation hierarchy, those participants who did not spontaneously make reference to the hierarchy were referred to the many types of mitigation listed in the *IAA* definition and asked if they knew of any framework or hierarchy for prioritizing some types of mitigation measures over others. While this question was not asked in exactly the same way verbatim in each interview, it was generally presented as:

The Impact Assessment Act refers to several kinds of impact mitigation. The statutory definition mentions reducing, controlling, eliminating and offsetting adverse effects. It also mentions restitution through replacement, restoration, compensation, or "any other means." Are you aware of any framework or hierarchy for assigning priority to the various kinds of mitigation? How do you determine which forms of mitigation to use in any particular circumstance?

This question was intended to point in the direction of the hierarchy without prompting any participant for whom the hierarchy was not already top of mind. If participants did not respond with a reference to the hierarchy a direct prompt was made by way of follow up.

While almost all respondents showed some familiarity with the mitigation hierarchy, the degree of that was not evenly distributed among the various federal agencies. Participants from IAAC tended (with exceptions) to refer only to the hierarchy in general terms, and discussed less its details or its implications. This was also true of EPOD, though perhaps to a lesser extent. In contrast, participants from DFO, CWS, and PCA often were able to refer to policy guidance applicable to their agencies and in some cases to training that they had received on the hierarchy. They more frequently spoke of it as central to their work.

Comments from the participants from the CNSC and Transport Canada are not included in this section, as they both made clear that they rely on the advice of other agencies with respect to habitat and biodiversity protection.

a) IAAC Participants

The comments of the following IAAC participants indicated only a moderate familiarity with the mitigation hierarchy or commitment to its application through the assessment process.

P22

Yeah, not in the act, although I would say that we have put in place in our decision statements based on the valued component a mitigation hierarchy. And so you want to try to get you a couple of examples we've done that. Murray River is a good example for how we approach it for caribou there. And I can see what else we've done say for some wetland stuff. But yeah, we've entrenched that in terms of are the approaches that the proponent is to give preference to in terms of how they're mitigating?

Interviewer

Okay. And can you just quickly go through the hierarchy for me?

P22

Now you're testing me. So no, I can't, I'd have to have the wording in front of me. But before you're getting to replacement, you're trying to get the proponent to minimize the impact they're having, say, on the original habitat, and that they are sort of doing, say progressive reclamation, as opposed to full replacement later on.

P50

I'm not aware of prioritization <Okay> of these types of mitigation. For our work, we are staying away from economic compensation.

...

Interviewer

Now, are you familiar with something called the mitigation hierarchy? It's the notion -

P50

Is this like, avoid, avoid prior to, that, that hierarchy?

Interviewer

Yes, avoid, minimize, restore on site, and offset only as a last resort. <Yeah.> Do you use that concept in your work? Is it sort of a prominent framework for you to apply?

P50

It's the it's the first, it's the first condition in the decision statement past the definition.

P39

I - under the Impact Assessment Act, I'm not super clear on the conceptual framework, but generally you want to avoid. So avoidance is like your very first thing. And I'm just going off the top of my head, so there's avoidance, there's comp - offsetting is generally considered the worst because you're incurring an impact, or, and you've acknowledged that you cannot control any effects, you cannot manage them or avoid them in any way. . . . Try not to wreck what's there, avoid it entirely. If you can't, if you can't avoid it, try to mitigate the immediate impacts by redirecting contact water, for example, what have you. <Right.> And then if you can't do that, you get into some sort of offsets, reclamation. You also have to look at the impact, like is it, is it a permanent impact? Is there a temporal element to it where you can rebuild later on? And then yeah, it's -. But there is a priority you really want to avoid? Yeah.

Interviewer

Yeah. The phrase I was waiting for there that you just about said was the mitigation hierarchy, right? That's what you're talking about.

P39

I don't like using hierarchy in that. <Okay, that's interesting.> Because it just has it, it immediately, at least from our perspective, puts one mitigation over another. And we need the flexibility to have different types, including ones that are so called lower on the hierarchy. And the reason is, is because effects are - . It's basically the theory of relativity. If you are some, if you're some person living in Vancouver, who looks at a mine, that's, you know, in northern BC, and you look at the effects, and you mitigate those effects. Okay. That's your perspective. But if you're, let's say, an indigenous person living there, and you look at those effects, and the way to mitigate them, your perspective will change entirely.

...

Interviewer

So is the hierarchy, actually invoked as a prioritization scheme? or as a decision-making tool? Or is it just something that kind of lies in the background?

P39

The latter, it lies in the background.

Interviewer

Would you say that it's broadly understood by everybody involved in the discussion?

P39

No. <No, okay.> no. That which is sort of goes with the fact that it lies in the background, you can go through the entire environmental assessment, not talking about the hierarchy at all. Because at the end of the day, people don't really care about it. They care about what's important to them. <Yeah, okay.> So like a - Yeah, like, just because everybody has their own hierarchy, the hierarchy almost becomes meaningless.

In partial contrast to the above the following comments of IAAC participants showed a higher familiarity with the hierarchy and appreciation of its rationale and importance.

P6

As an analyst we want we want to understand the potential effect. <Yeah.> We want to then have some sort of mitigation or avoidance. You know, we start with avoidance, there's a hierarchy, right? <Yeah.> They avoid, mitigate, accommodate or, or compensate, offset type approach that is supposed to be followed.

P84

Yeah, I think so. I think I mean, I don't have that list in front of me. But there, there certainly is a kind of a hierarchy of, and that's true in impact assessment in general, right, I think. When it comes to what to do with environmental effects, right, I think you first see what you want to avoid them where possible. You know, you want to avoid, you want to then mitigate and then compensate, if you can't mitigate, I think. That that's like the general, kind of general hierarchy. Now, in terms of some of the other you know, the other kind of more granular level of things there, I guess it would, it would really, it would really depend. <Yeah.> Ideally, you want to take the course of action that is that first will will leave you with the zero residual effect, if you can. And then also that would in the least alter the environment as it is.

b) EPOD Participants

While the following EPOD participants did show a good awareness of the mitigation hierarchy they seemed to attribute it to an outside source or reference, rather than a central part of their own work.

P20

Well, always, I mean I used to [reference to prior employment removed to protect anonymity]. I mean, the first thing is, if you could avoid a sensitive area, yeah, so you don't have to mitigate. The next thing is, if you could replace whatever is has to be sacrificed in the actual area of development, if you could enhance another area, so that the overall population, you know, is still good. <Right.> And, yeah, so I mean, that would be so the first priority would be see if you could avoid an area that's sensitive. Next, enhance other areas to make up any areas that are lost. I mean, that's sort of how the fish habitat compensation process works, right? <Yeah.> You try to avoid and they try to like, avoid sensitive areas, enhance other areas, increase - so put in artificial structures. <Right.> Like, you know, they can put in artificial nesting structures and things like if they will use them.

Interviewer

Yeah. So that's in the context of fish habitat. Do you see a similar sort of framework being applied in in the rest of your work?

P20

I think so like for wildlife, like you'll see them say like you avoid nesting seasons, you avoid areas of sensitive forests. But there are some things that aren't always workable.

P57

I've never thought about that. So I guess that's maybe that's the answer. We've never thought about it. But I mean, we do have a hierarchy. If you look at something like the offsetting, we have an Operational Framework for Compensation Allowances, you may be familiar with that. <Yes. 2012.> There, yeah, there may be a hierarchy in there, that's like, you avoid the effect. First and foremost, that's what you should be looking to do. Secondly, you should be mitigating or reducing the effect. Third, you should be looking to offset it. So it does, that is the hierarchy we use. And that's, that's generally I think, what what the Agency supports as well. So they're comfortable putting into a condition, if they have to do like a mitigation plan, or an offsetting plan to say, here is the order in which you should be considering your mitigation measures.

As discussed in Section III, one of the main functions of EPOD within ECCC is to act as the liaison between the various expert bodies within ECCC and the regulators, assuring that the necessary information flows into the right hands in a timely manner. If this were EPOD's only function then any lack of commitment to the substance of the mitigation hierarchy would not be very consequential. However, interviews with both EPOD (P57) and CWS staff revealed that EPOD also has acknowledged substantive subject matter expertise and contributes its own content to the expert advice presented to the regulators. Therefore, if the suggestion here EPOD does not share the knowledge of and commitment to the mitigation hierarchy that the more specialized experts do, that might result in a dilution or distortion of the specialized experts' advice, if unintentionally. This could be compounded by IAAC's role to compile and synthesize the various views and piece of advice for presentation to the decision-makers. We do not want to put too much weight on this point, however, as the above quotes are far from definitive on the matter.

c) CER Participants

The CER has issued a number of decision statements over the last decade requiring offsetting, particularly for caribou habitat. This has required CER staff to engage in a series of discussions and consultations with respect to the merits of offsetting and, by extension, its position in the mitigation hierarchy. Thus, while the hierarchy is not reflected in the documentary guidance issued by the CER (Filing Manual, see Section IV f)), CER staff appear to be well versed in it.

P26

We're still pretty old school, I guess, with the just the Big Four, like straight up, avoid, you know, minimize, restore, and then offset sort of thing.

...

... we, at the CER, like in the environment group, we really do root, it's sort of like first principles, right? Like, and like bringing stuff back down to the, you know, basic units and your equations, like, it really is like avoidance, first, you know, minimization second, you know, and then you know, from there, you can kind of keep going, ...

P47

When I think of mitigation, I mean, the first thing that comes to mind is the whole the technical, technically and economically feasible mitigation. Right. And then we expect the proponents to go to that mitigation hierarchy in terms of avoiding, reducing, and if they cannot reduce the effects, you know, they should be offsetting or compensating any residual effects.

...

I mean, to me, like, it's kind of like the order of preference, right. So I think what we require the proponent is, first of all, try to avoid the impact. So we talked about avoidance, they could look at the alternative means to reduce the impact, for example, it could be changed in the construction design, it could be different routing, there are so many things that they can look at the alternative means right, how can they avoid it? And then if they are not able to avoid it, then we would expect them to kind of minimize the impacts. And and then, after the minimize, there would be still some residual effects. And we would expect them to offset those residual adverse effects. And moreso, and moreso what we have seen, it's more so in the context of the cumulative adverse effects. And to when we talk about the offset measures, I mean, to me, it's kind of like it has to be above and beyond the standard mitigation or business as usual.

d) DFO Participants

Fisheries and Oceans Canada has since 1986 published policy guidance explicitly emphasizing the mitigation hierarchy in the management of fish and fish habitat (see Appendix IV for the latest version). This is likely one important factor for the familiarity with the hierarchy that DFO staff exhibited in interviews.

Participant 13

Yeah, and so we've really, we've really tried to enshrine avoid, mitigate, offset into all of our, our policy approaches, and the way that we think about our project reviews. And really, for us, it was a big thing in 2012, 2013, to incorporate it into the Act and actually have it laid out in the Act as a consideration that has to be taken into account when we're decision making. But even prior to that, I think our program, the way that we approach the conversation with the project proponent or the or our regulatory review process is really about, you know, how can we relocate, redesign? How can we improve design elements of project to avoid impacts. And so really, often we talk about, you know, once we get to the point where we're actually authorizing the Fisheries Act, that's not where we want to be, we'd prefer to be somewhere before that in the hierarchy. And we want to work with a project proponent to establish those things. So when we when we present our process to someone who's looking to do work in or near water, that's often how we present it, say, here's the approaches you can take and best practices you can follow to avoid impacts. If you can do that. We're happier if you can do that and not come to us for regulatory review.

P48

Now the priority that we have in our own policies avoid, mitigate and offset, which you may have heard. So first thing you want to do <I have.> Yeah, exactly. So what it as much as possible, you know, and then what's absolutely unavoidable, you use every technology available to reduce the impact as much as possible. And then what you're left over with, you have to do an offset.

e) CWS Participants

P32

Yeah. So again, I think CWS is taking the lead of Fisheries and Oceans on that front. And if you'd be familiar with the '86 policy for the management of fish habitat that was coined by DFO in '86. And it was a culmination, culmination of a lot of work that took place from the late '70s, right through till '86 that led them down that path. And it started the early description of what we now call the mitigation hierarchy. And then DFO, in 2012, and then again, now in 2019, rewrote their policy statements to incorporate what they call the the hierarchy of measures, which, again, is based on the mitigation hierarchy. And I, CWS is following a similar path so that there's consistency across the federal family that employs the the mitigation hierarchy as the fundamental basis on how decisions should be made priority being given to avoidance being the most important, minimizing those effects that you can't avoid. Then restoring the site itself back to its original condition, and then looking to replace that habitat with an offset should there be residual effects left over.

f) PCA Participants

Staff at Parks Canada who were interviewed made easy reference to the mitigation hierarchy despite the fact that it is not explicitly mentioned in any of PCA's public documents. Rather than pointing to a rule these participants frequently grounded their awareness of the hierarchy of the full suite of protective measures present in national parks including the ecological integrity mandate found in s. 8(2) of the *Canada National Parks Act*, the designation of park wilderness zones, the park management planning process, that policy review process for any new developments brought forward.

P31

Oh, yeah, I would say yes. Because again, through our impact assessment team, they have developed Parks Canada guidance, right? And so they talk about the mitigation hierarchy, which I might not - I might get it wrong, right? But it's like avoid, minimize, offset. Maybe I'm missing one probably. But yeah, there's definitely - and we're starting to see that as well in some of the SARA policies that are being developed, like there's a SARA policy on offsetting being developed and that very much is bringing in that mitigation hierarchy. I would say we do that in our work. So again, I would say all of our impacts assessment projects would include that. When it comes to species at risk, even just when you look at like the preconditions for issuing a permit, it kind of talks about, like, you know, you have to consider reasonable alternatives. And so that's kind of the avoid, how could you like do something different? And then this, and then after that, you'd look at feasible mitigations, or feasible measures to reduce the impact. And then there's that offsetting piece. So yeah, we definitely, I think, go through this like step by step.

P37

But first and foremost, in terms of mitigations, the first is always to avoid, like bar none. The idea is to avoid any impact. So that's always the first, but when it comes to mitigations, and applying those when avoidance is just not possible, then minimizing the impact. So how we're going to be minimized. How can it be lessened? What are the mitigations that can be put in place that lessen the location, scope, magnitude, timeframe, creation of the impact. So there is an assessment process for looking through those pieces. And only when there's like, you can't avoid it, you can't minimize, reduce it and unless and then to a degree, or other things put in place where you know, the impact may be relatively accepted and but then we have to put in the other after and post pieces such as monitoring such as, you know, reclamation or restitution or other things like that. Those are kind of like the last, like those are not preferred pieces. And, and so the goal is always to avoid. That is the goal, but obviously that's not possible when you have a landscape that is because people want it and industry and business and things happening, right? So yes, but I hadn't, you know, and honestly I have to fall a lot with you on the exact order of that, but certainly it is something that informs decision-making. We all receive the highest standard of, you know, starting with avoiding it altogether.

P3

I don't know, if you have read our DIA handbook, it's online, but we do have a hierarchy on them. I'm just trying to see if I can actually pull it up somewhere. But anyway. So obviously, first step is to have mitigations to eliminate the impact altogether. And then the next one is to minimize it, if you're still going to have a, an adverse effect. And it does talk about going through the the rabbit hole of offsetting and compensation, etc, etc.

Interviewer

Right. Yeah. Are you familiar with what's often known as the mitigation hierarchy? <Yeah.> Avoid, minimize, restore, and then offset. <Offset, yeah.> Is that, is that sort of consciously considered as you choose between mitigation options?

P15

Yeah, in in Parks Canada, I mean, I think the first, you know, I think it's different on provincial lands and other other agencies. But in Parks Canada, I think we have the luxury based on the and GPOP to actually consider that mitigation hierarchy. And I'll point to - I don't know the exact section in the management plan - but there is a specific clause in the most recent 2022 management plan that says, no new developed, no new developed footprints. You know, for me, that starts off the mitigation framework, right?

P55

Yeah, we would follow the mitigation hierarchy in terms of avoiding being our first priority and then reducing and then, and then, you know, we put the emphasis on it's it's very rarely appropriate to do compensation as well in a National Park.

- 3) Many of the participants recognized the risk of offset overuse but many observed it to be an incentive to better mitigation.

One of the central research questions for this study was whether regulators or proponents or both tend to use the availability of offsetting as a pretext for disregarding the mitigation hierarchy or placing undue reliance on offsetting at the expense of mitigation measures earlier in the hierarchy. Recall that the prior case studies in the United States, Australia, and Alberta had all indicated that this was the case, or at least an active possibility.

Our findings were to the contrary. While several participants acknowledged that that risk was real, or understandable, the more popular view was that the demands of offsetting drove extra attention and effort to the earlier steps in the hierarchy in order to reduce the residual impact and avoid the need to offset.

Participants were told that there is a perception that the availability of offsetting might be used by proponents or regulators as a means of shortcutting the mitigation hierarchy and lowering standards around avoidance or minimization. They were then asked if they wished to comment on that perception.

Of those who offered comments only two said that had seen situations where they thought offsets were used too liberally to compensate for impacts that should not properly have been allowed. Neither of those participants, however, named the projects or offered any details.

A much higher number, ten, indicated that they saw a real risk that offsetting could be abused in the manner posed. Many of them were quick to say, however, that they had no experience with that actually happening.

Four participants said fairly categorically that the mitigation hierarchy is adhered to and offsetting is not used to circumvent other forms of mitigation.

P96 (External - Consultant)

I, I've seen a lot of proponents behave in a lot of different ways. I've never seen one run towards a compensation or offset discussion. Yeah, no, I, I have not experienced that to be that way. It, I really do see it be a last resort.

Perhaps the most interesting perspective came from the nine participants who said that the costs and demands of offsetting were, or could be, an incentive to redouble efforts to eliminate residual impacts by making greater efforts at avoidance and minimization. Four of those nine went deeper to opine that the effectiveness of this incentive was tied to the challenges of offset expectations, and that the incentive was expected to vary according to the rigour of those expectations. One participant (P6 – IAAC) said that he knew of regulatory regimes that had very lax standards, where proponents would rightly assume that offsetting would be an easy and acceptable alternative to other mitigation, but also knew of other regimes where stricter standards deterred any serious consideration of offsetting. The strength of the incentive, then, was seen to be proportionate to the rigour of offset expectations.

Of significance to policy development, some of those participants who spoke of this deterrent effect of offset expectations referred not only to the financial costs, but to the logistical difficulties, the regulatory uncertainty and the public approbation that came with pursuing offsetting.

P48 (DFO)

I think it's a fair criticism, I hear it a lot. It's, you know, something that we want to sort of keep emphasizing that, you know, that's it's not an easy out. . . . I'm also learning more about is that really good offsetting opportunities are not always easy to find. So I think that's hopefully going to, you know, and I've heard this from regional people as well as from proponents. So, offsetting is not necessarily an easy out because offsetting in itself is not necessarily an easy thing to be able to do. So. So I'm not sure how much that stereotype actually reflects reality.

P11 (External – Industry)

I would say it's a combined social influence and cost. Because the costs are getting extremely considerable, because what's actually happening in many of these kind of offsetting situations is there's a monitoring requirement, and perhaps even a few intervention requirements, if you had to fix things that were going wrong. <Right.> And that can be extremely, extremely costly. As well, as, you know, the negative social sort of stigma you may get with disturbing, you know, <Right.> too much, too much, of this and too much of that. But, but those pressures are both becoming more at the forefront of the decision making.

Interviewer

Because there's a suspicion out there that the prospect or the availability of offsetting gives both proponents and regulators an excuse to lower standards around avoidance and other mitigation, that it becomes a potential shortcut. I'm not hearing you say that.

P11

No, that's interesting. I never really looked at it from that avenue. But I could see if you didn't really - or perhaps if the inner workings and that was a bit less understood you could see you could perceive that. But it's, it's so difficult to find appropriate offsetting locations, and to do, you know, and the - it's just really super hard and costly to do and you just don't even want to be there. <Yeah.> It's so so I could, yeah, I could see all that [UNINTELLIGIBLE] and it could be perceived that as just as easy, easy, easy thing to get. No, that's, it's not the case.

. . . the cost and the, yeah, the effectiveness of what you've done is kind of in question, right? It can be difficult to yeah, yeah, for sure. It's not an easy thing to demonstrate the effectiveness of that.

Some of these factors that participants identified suggest a caution for regulators and policy developers who are working to streamline offset mechanisms and clarify offset processes and standards. They suggest the possibility that the clarification of processes and standards and efforts to earmark land for offsetting may make offsetting a more attractive prospect and perversely diminish the incentive to avoid and minimize. This may be a trap for unwary policy developers.

These findings are contrary to those described in the previous case studies in the United States, Alberta and Australia to move too quickly to offsetting as a mitigation option. This dictates caution about attempting to generalize about the effect which the availability of offsetting has on decision-making by either proponents or by regulators. The likelihood that the mitigation hierarchy will be complied with is more likely to be dictated by economic and social factors in the particular context and regulatory system than by a blanket approach from either proponents or regulators.

- 4) There was no consensus among participants as to who is responsible for application of the mitigation hierarchy.

After the first handful of interviews we noticed that participants tended to speak of the mitigation hierarchy as a doctrine or ideal detached from policy or administrative or accountability mechanisms. A question was added, therefore, as to who holds responsibility for assuring that the mitigation hierarchy is properly applied. Interestingly, many participants said that they had never considered this. Answers ranged from proponents to reviewers to decision-makers to “everybody” with no clear consensus on any

one of those. The lack of consensus on this point seemed to go beyond what could be attributable to different accountability structures in different agencies.

P22 (IAAC)

So I guess going back to the mitigation hierarchy, I guess your question is who's responsible. Well the proponent can be compliant, right? They can demonstrate they made best efforts to use the hierarchy.

P39 (IAAC)

We do our best. Us, the Agency. <You do see that as an Agency responsibility?> Not me personally, but as an agency, we try to get the best mix.

P6 (IAAC)

It's, it comes down to the people reviewing the particular area. So in a in a federal authorities system, we get, we get people who do the environment slash analysis and approvals work for Fisheries and Oceans. A team for the purposes of analyzing that stuff and if they don't usually do a hierarchy system or check it off, or look at it, and critique it, they don't.

P57 (EPOD)

I think that's a really good question. And we will, in a lot of cases we provide - it's the proponent; the proponent has to develop his plans. And they may have a mitigation plan or an offsetting plan, and they have to put that forward. And they have to say, here's how we're going to avoid, here's how we're going to mitigate etc. We look at that; we'll provide technical expertise on it. If it's in the form, if it's required as part of a condition, then the agency has enforcement capacities on that. So, you know, they're looking at and they're like, yeah, no, this isn't, you haven't even made an attempt.

P32 (CWS)

So ultimately, it's that those ministers [Environment and Climate Change and Fisheries and Oceans] are responsible for applying those measures to end up with the best outcome that they can with respect to the resources they're managing.

P19 (CWS)

I could tell you what I would like but I'll tell you what I think is proper. I think that in the context of the Impact Assessment Act, it's the responsibility of the decision body.

P78 (CWS)

I would say it falls under the Agency. Like the the Act should be a lot stricter and they should have clearer guidance on this. And especially in the early planning stage.

P3 (PCA)

It would be the impact assessment practitioner's. Yeah.

P5 (External)

Well, I think I, in all of these cases, I think it's the regulator's job. I'd like to think that every proponent and all of their consultants would follow it. But in the end, since there's a gate where a regulator has to make a decision about does your documentation you're submitting conform with our requirements, they have to make a decision on whether the project is in the public interest, they have to grant permits and approvals. I think in the end, those decision backstops, it relies on those regulators.

P23 (External)

Ultimately, it's the regulator but I think it's it - at the end of the day, yeah, at the end of the day, it's a regulator. But having said that, I mean, as a consultant, <Yeah> that was - I mean, we had a professional ethic that we follow. It's not like we were just kind of figuring out how to get somebody an approval. <Yeah.> That wasn't the end goal. The end goal was trying to minimize the impacts.

- 5) In the IA process active consideration of the whole of the hierarchy may come too late to encourage the use of certain mitigation options.

Timing is an important factor in the selection, planning and implementation of mitigation measures. At the front end of the hierarchy, avoidance options are best considered before project design and site selection are complete (Cross-Sector Biodiversity Initiative & The Biodiversity Consultancy, 2015; Phalan et al, 2017). At the other end, time lags between negative impacts of project development and the realization of benefits from offset measures is a pervasive challenge for offsetting, creating a deficit in the ecological accounting (BBOP, 2013; Moilanen et al, 2009; Maron et al, 2016). It is therefore important that the mitigation hierarchy be employed as guidance at all stages of project planning, review, and implementation (Johnston and Ray, 2023). We have identified two issues in this respect: opportunities for early engagement and the development of offset options late in, or subsequent to, permitting.

Early and ongoing engagement on mitigation options is often a way to optimize environmental outcomes, for it is at the early stages that the greatest range of avoidance and minimization options are available (Cross-Sector Biodiversity Initiative & The Biodiversity Consultancy, 2015, Phalan et al, 2017). It may also be economical for both proponents and regulators by minimizing reconsideration of project details after decisions have been made and costs incurred.

Both participants from industry and from the various regulatory agencies voiced frustration that structures and processes were a barrier to early and ongoing engagement. They did, however, express hope that new processes of the Tailored Impacts Statement Guidelines Process under the IAA, and the pre-application meetings instituted by the CER might help to improve this.

P11 (External – Industry)

[I]t seems to be what's trending, what I see is trending is just this lack of initial discussions up front. So what we do is we do our best efforts with our kind of consultants and their discipline experts to put together something we think that the, we think that the, you know, the regulator would like. And then gotta go back and forth from there. So we don't really have - I wouldn't say from a federal project standpoint, like a really open window to discuss mitigation upfront.

...

I would rather have where you have a little bit more engagement with the regulator upfront and say, hey, this is what we're proposing; this is what we're think we're going to do. What do you guys think about it? And develop a- you know - , just kind of get rid of some of the, some of that, those issues that may develop later on.

P6 (IAAC)

[The mitigation hierarchy is] a framework that comes in quite often too late in the project lifecycle, so in the CEAA 2012 projects that I've worked on, it comes in after you've already got a set design, and that you've got fixed things that you've got costings on. So the proponents already costed out their project. They already you know, have an idea of what they can afford and things like that. And so then you look at what the - trying to avoid something - the whole road, where you have to move, you know, you know, say it's mine, the ore's not going to move. <Yeah.> So, so you've got to come up with some grand, grand program to figure out how to deal with it. So the new Act, when they did the consultation, they listened to that. Right? We've got to get this happening before, in the new Act there's the pre-EIS stage, where they talk to - they get everybody to talk to the indigenous groups and, and understand the scope and scale and understand the issues so that they're not designed first. So that avoidance can actually happen, and they can show the avoidance from - based on their knowledge and understanding what the issues are.

P31 (PCA)

And what was happening is that people were then encountering the whole alternatives concept, way late in the process, right? And so we were saying we need to take that alternatives conversation and bring it to the front of the impact assessment. So that that's a really primary consideration. . . . That alternatives thing, because it has to come really early before people have, you know, - like, isn't because one of the things we would find, like, for example, that people had not considered things in their, like the, in their budget, right, that they did like that, you know, we maybe there's a reasonable alternative that costs a bit more, but it's actually feasible to do, <Right> but they hadn't budgeted for it. So we were like, you gotta bring that like, right to the forefront of the considerations.

P78 (CWS)

And I think that's what the Impact Assessment Act was trying to get at, like get involved early in the process so that we can influence the design of the project. But I think it needs to go even before that, like I think the company needs to realize that avoiding is cheaper than than offsetting, and mitigating in the longer in the longer term. And it helps everybody. So so I think, and I'm not sure how this is doable, but you need to come in early enough in the system so that you can support the design of the mine, of the pipeline, of the whatever, or you have enough guidelines upfront. That that that you can demonstrate all of this, like the avoidance is priority over everything. But what often happens is that the proponent comes in with a canned project to the Agency. And so they got a canned project and so then they need to retrofit, oh, yeah, we avoided this, we're going to mitigate this, but then we don't have a choice for this. So we're going to offset this. So it's kind of a fait accompli kind of thing.

There is an inherent tension in the timing of planning and implementation of offsets. On the one hand, it is very clear that the time lag between negative impacts and the implementation of offsets creates at least a temporary loss of environmental values. This is extended by the time it takes for an offset to mature and become ecologically functional and deliver its intended benefits. This temporary loss may become permanent if intervening factors make the offset's ecological function impossible.

On the other hand, one of the goals of offsetting is to match the offset benefits to the residual losses occasioned by development, with a goal of no net loss (or net gain in some cases). The actual residual losses cannot be determined with certainty until after the project is complete and the effectiveness of avoidance, minimization and onsite restoration mitigation measures is observed. This suggests that offset planning and implementation may not occur until years after the development project has been undertaken.

Federal regulators have taken two different approaches to this issue. DFO tends to include detailed offset conditions in the authorizations that it issues for impacts to fish and fish habitat, basing offset requirements on the projected impacts. IAAC and the CER, however, have strongly tended to defer the

details of offsetting and other mitigation until after the permitting process, with the only condition being that plans be developed, often to the satisfaction of the relevant expert agency, and monitoring reports periodically provided. This process has, in the Australian context, been referred to as “backloading” mitigation responsibilities (Evans, 2013).

The following condition, from CEAA’s decision statement (under *CEAA 2012*) on the Murray River Coal Project in British Columbia (CEAA, 2017), is an example of this:

7.13 The Proponent shall, in consultation with Saulteau First Nations, West Moberly First Nations, McLeod Lake Indian Band, Environment and Climate Change Canada, and other relevant authorities, mitigate the adverse environmental effects of the Designated Project on the critical habitat for the Quintette herd of Southern mountain caribou (*Rangifer tarandus caribou*) identified pursuant to condition 7.12, during all phases of the Designated Project. Mitigation shall be implemented prior to or immediately after the occurrence of the adverse environmental effects. Initial mitigation shall be implemented to the satisfaction of Environment and Climate Change Canada prior to construction. In doing so, the Proponent shall give preference to avoiding the destruction or alteration of critical habitat over minimizing the destruction or alteration of critical habitat, to minimizing the destruction or alteration of critical habitat over restoring altered or destroyed critical habitat onsite, and to restoring altered or destroyed critical habitat onsite over offsetting.

Note how the proponent is directed to adhere to the mitigation hierarchy in mitigation planning, but this is only done at the final stage of the permitting process with the issue of the decision statement, allowing the project to proceed.

Participant 26 (CER) justified such an approach, saying that any prescription of mitigation measures prior to the project commencement would only be based on “guesstimate” of impacts, but that mitigation could be adjusted in response to implementation and monitoring reports provided by the proponent as the project proceeds.

Various participants from within the various federal agencies voiced dissatisfaction with the way of proceeding.

P90 (CWS)

[S]ometimes the risk is managed through putting a condition to require some piece of information on key mitigation, when they don't know what that look like. . . . So it's kind of all assumed that it's going to work.

P22 (IAAC)

I would say too there's a natural bureaucratic inclination to want to kick things into the future. . . . I've seen certainly a desire to want to just be so general to say, oh, proponents will mitigate and mitigate impacts to little brown bats <Right>, without actually having that analysis actually done as part of the impact assessment process, right? Like, so I would say, that's the other challenge I face is this desire not to deal with the top issues at the time decisions are being made, and maybe work it out later on under the veil of adaptive management, which, again, is one of those terms that's applied in a certain way by, and in many cases, a lack of understanding of what adaptive management is meant to do.

...

And if you're simply saying, oh, mitigate the effects to caribou without actually having that analysis done, I would say it's doing a disservice to the decision makers, like they should be knowing what the impacts to caribou or little brown bat are at the time the decision is being taken. And you're not asking proponents then to essentially do a mini impact assessment after a decision is taken.

P46 (CWS)

And what that does is that just shifts the onus from the decision maker to CWS, to try to negotiate something after the fact and that's a hard place for us to be in and often challenging to be successful.

...

I think there's a sweet spot, we need to find that's prescriptive enough to meet the requirement to have a meaningful offset, but not too prescriptive to meet the flexibility. So, you know, like concepts of, you know, why don't we put offsetting ratios in conditions? Why don't we put amounts of habitat required in conditions? And I hope that that will eventually change. But there is, that's not easy right now.

A recent study of this issue of post-permitting conditions in Australia, also based on interviews with responsible officials, found similar concerns that the process diminished official bargaining power to insist on quality mitigations, likely leading to “watered down” mitigation measures. It was, however thought to be a means of relieving decision-makers from the pressure to determine and require appropriate mitigations. It appears that these same issues are very much alive in Canada.

6) Prior policy guidance and standards of practice are effective aids to mitigation

Many of the interview participants, both from federal agencies and from external stakeholders, spoke of the usefulness of guidance documents published outside of, and prior to, particular development applications. These may take various forms from land-use plans, the identification of “no go zones,” wilderness zoning in national parks, codification of best management practices, incorporation of Canadian Standards Association (CSA) standards, or simple practice tips.

These provide both proponents and regulators a visible standard against which to plan and evaluate. They also save both the time and expense of proving the validity of a mitigation practice repeatedly if it is already well-accepted.

Fisheries and Oceans Canada has been particularly active in the regard. For several years the department published Pathways of Effects, describing the relationship between ecosystem functions and possible impacts, which could be used to identify effective points of mitigative interventions. Currently, the department has on its website a list of a series of “Measures to Protect Fish and Fish Habitat” for project close to water (Fisheries and Oceans Canada, 2022b). If proponents follow these measures they may well avoid any harm to fish or fish habitat and thus avoid any need to seek a *Fisheries Act* authorization or deal with the department at all. Thus the step of avoidance in the mitigation hierarchy is made easier and more transparent. For project that cannot fully avoid harm to fish and fish habitat, DFO also publishes a series of codes of practice for common activities such as culvert maintenance or routine dredging for navigation (Fisheries and Oceans Canada, 2022a.)

One participant (P31, PCA) agreed with the suggestion that in the absence of such prior guidance it is difficult for a review or decision-maker to use their own discretion, however, well-founded, to insist on mitigation measures for which the proponent had no prior reference.

VII. Discussion and Recommendations

The mitigation hierarchy is widely acknowledged to be a foundational framework of environmental impact mitigation, promoting the best possible environmental outcomes in the face of project development. In order for it to produce those results, however, it must be clearly and consistently understood. Circumstances will require that it be applied flexibly, and the pursuit of environmental benefits may depend on cost-effectiveness that deviates from the standard mitigation sequence. Flexibility and deviation, however, should be grounded in the knowledge and understanding that underlies the hierarchy, that restoration and offsetting are higher risk approaches than leaving functional ecosystems intact. Flexibility should strive to improve environmental outcomes based on a recognition of those factors.

Based on the interview data we collected and the analysis offered above, we do not see a consistent and well-considered understanding of the hierarchy in the Canadian federal family of resource agencies sufficient to create confidence that the best approaches to mitigation selection mitigation are being taken.

We have noted a variety of policy positions across the different agencies. While these are not contradictory, neither are they complementary. Each has its own vocabulary, assumptions, and methods of application. This seems to lead some confusion and conflict between the different agencies, and may well confuse stakeholders as well.

While nearly all interview participants had some familiarity with the mitigation hierarchy, that understanding did not appear to be uniform in depth or consistent in content.

Despite these vulnerabilities, our interview data indicates that the suspicion that offsetting is used excessively in contravention of the mitigation hierarchy is not borne out in the case of the Canadian federal regulators we have reviewed. While several participants acknowledged that such there is a risk of such an abuse of offsetting, only a small minority claimed to have seen it. Instead, both regulators and proponents indicated that offset truly is seen as a last and exceptional mitigation option.

From a proponent's perspective, adherence to the hierarchy seems to be based less on strict and consistent guidance from regulators and more on circumstantial economic incentives. Offsetting is seen as difficult and expensive. Of concern, participants external to the government said that one of the sources of the cost and difficulty of offsetting is the absence of clear policies and procedures, the lack of available land for offsetting and the public approbation against environmentally intrusive development. This suggests that Canada's positive adherence to the hierarchy is less a product of careful and consistent policy implementation and more a default to industry and consultant practices in the light of a confusing policy landscape and propitious combination of economic incentives. Those incentives, however, are likely to be dependent on circumstance and prone to shifting. This means they ought not to be relied on as the basis for sound environmental planning and practices, certainly not beyond the short term.

If the greatest promoter of the mitigation hierarchy at present is the costs and uncertainty of offsetting, those charged with the development of new offset policies and tools should be wary that they do not fall into the trap of creating processes and tools that ease the mechanics of offsetting, thereby

undermining the economic incentive to adhere to the hierarchy, while not improving offset practices and environmental outcomes.

We offer the following recommendations:

a) Develop a government-wide policy on the mitigation hierarchy and promote a shared vocabulary and set of principles and practices.

In Part IV we reviewed the various piece of policy guidance offered by different agencies of the Canadian government. Those that do explicitly make reference to the mitigation hierarchy do not do so using the same framing or vocabulary. Some offer a rationale for the hierarchy, while others do not. And there are several agencies that make no public commitment to implementing the hierarchy. As we saw in our first finding, this inconsistency leads to difficulties on communication and collaboration among the different agencies who should be working together to protect the environment.

This should be among the least challenging of issues to address. Environment and Climate Change Canada has recently issued a new *Offsetting Policy for Biodiversity* and internal and external consultations are now underway. The goal in that process should be to have single unified policy across the Government of Canada that can be applied by each agency according to its own needs and mandate, but with a common understanding and purpose. A future version of the *Federal Sustainable Development Strategy* or the *Impact Assessment Act* itself may be a good vehicle to deliver such a unified version of the hierarchy.

b) In each federal review process there should be a clear assignment of responsibility for overseeing use of the mitigation hierarchy.

If the principles underlying the hierarchy are to be honoured consistently it is necessary that in each regulatory process someone be assigned responsibility for overseeing the use of the mitigation hierarchy. When various people are looking to the proponent, the decision-maker, the expert advisors, or “everybody” to perform that task it is far too easy for it to fall through the cracks.

A transparent accountability will reinforce the need for and value of the unified policy referred to in our first recommendation.

c) Consider the mitigation hierarchy at all stages of impact assessment, especially at early planning stages.

In our fifth finding we saw an example of a CEEA decision statement, for the Murray River coal project, requiring the application of the mitigation hierarchy. That decision statement marked the conclusion of the permitting process for that project. While not futile at that stage, because so many of the important mitigation were left, for better or worse, to be determined after decision statement, the insistence on the use of the hierarchy should have come much, much earlier in that process, and in other processes.

d) Minimize the use of post-permitting conditions, when the proponent had little incentive to be ambitious.

In the second part of our fifth finding we saw that officials wrestle with the practicalities and implications of not dealing with the details of mitigation measures until after a development permit has

been approved. This practice deprives decision-makers of the best information to determine the most likely impacts of their decisions. It also places pressure on the officials charged with approving the eventual mitigation options to not insist on measures, however ecologically justifiable, that might undermine the economics of a project already approved. Finally, it raises the real prospect that a project might be approved on the basis of future mitigations that ultimately turn out to be impractical or impossible to comply with.

To remedy this situation we suggest that the impact assessment process aim to develop the best possible assessment of impacts and mitigation effectiveness in addressing those impacts. Residual impacts, those remaining after avoidance, minimization and onsite restoration measures should be estimated as well as possible, recognizing the degree of uncertainty in that process. This should then form the basis for requiring offsets to compensate for that level of impact as part of the permitting process. The post-permitting part of mitigation planning should be focused on refining and adjusting the mitigations required in the permit, not on developing mitigation from scratch after the development is underway.

e) Prior guidance on best practices and acceptable site selection is extremely useful.

Neither proponents nor regulators want to deal with impacts and mitigation options in a vacuum, relying on their discretion at every turn without any references. Issues of site selection will be minimized if land use plans identify which activities can happen where. Standard mitigation practices can achieve quick recognition and approval providing they are applicable to the circumstances.

Fisheries and Oceans Canada has established the usefulness of providing prior guidance on Measure to Protect Fish and Fish Habitat, and codes of practice for when harm to fish or fish habitat is expected. Many other fields have similar guidance, though not necessarily so public and transparent. Use of such tools should be optimized.

This assumes, however, that the standards and practice themselves will be regularly reviewed and updated. They should not become a means of ossifying practices in the midst of evolving knowledge and technologies. This requires that somebody be charged with the responsibility of maintaining and updating standards. It also means that in exceptional circumstances, where better environmental outcomes can be achieved by departing from the recognized standards, that regulators retain the discretion to allow that on a principled basis

This study has found that the consideration of the mitigation hierarchy in Canada's federal impact assessment process appears to be better than that previously studied in other jurisdictions. We have not found a broad shared understanding or dedication to the hierarchy, however, so that does not explain our performance. Rather we seem to be relying on a set of situational economic incentives and practices in proponent industries and their consultants. That is a shaky foundation on which to stake our environmental outcomes in a time when steady improvement is needed. It is hoped that this report and the above recommendations may contribute to that improvement.

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Appendix I- Excerpts from Section 20, Tailored Impact Statement Guidelines Template (IAAC)

20. Mitigation and Enhancement Measures

Every IA conducted under the *IAA* must identify measures that are technically and economically feasible and that would mitigate any adverse environmental, health, social and economic effects of the designated project. Conversely, the proponent must identify enhancement measures to increase positive effects. . . . Measures are to be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation and implementation.

...

As a first step, the proponent is encouraged to use an approach based on the avoidance and reduction of the adverse effects at the source. The proponent is also encouraged to work with the community to align project goals with an aim to enhance positive project effects. Such an approach may include the modification of the design of the project or relocation of project components. The Impact Statement must:

- describe the standard mitigation practices, policies and commitments that constitute proven technically and economically feasible mitigation measures and that are to be applied as part of standard practice regardless of location as well as any new or innovative mitigation measures being proposed;
- describe the designated project's environmental protection plan and its environmental management system through which the proponent will deliver this plan. The plan must provide an overall perspective on how potentially adverse effects would be minimized and managed over time;
- discuss the mechanisms the proponent would use to require its contractors and sub-contractors to comply with these commitments and policies and with auditing and enforcement programs;
- describe mitigation measures that are specific to each environmental, health, social or economic effect identified. Mitigation measures are to be written as specific commitments that clearly describe how the proponent intends to implement them and the outcome these mitigation measure are designed to address;
- identify and describe mitigation measures, including alternative means of carrying out the project that would avoid or lessen potential adverse effects to terrestrial and aquatic species and/or critical habitat listed under Schedule 1 of the *Species at Risk Act*. These measures:
 - are to be consistent with any applicable recovery strategy, action plan or management plan and will also identify and describe mitigation measures to avoid or lessen adverse effects to COSEWIC-assessed species; and
 - must be described in terms of the effectiveness of each measure to avoid the adverse effect and include a comprehensive science-based rationale for proposing the selected mitigation measures.
- identify measures to prevent and mitigate the risk of engaging in harmful, destructive or disruptive activities in key sensitive periods and locations (e.g. spawning, migration and nesting)

to fish or migratory birds, their nests and eggs, in water or areas frequented by fish and/or migratory birds;

- identify measures to avoid the deposit of substances harmful to fish or migratory birds in water or areas frequented by fish and/or migratory birds;
- provide best technically and economically feasible mitigation approaches to habitat mitigation that follow the hierarchy:
 - avoid potential impact;
 - minimize potential impact;
 - provide biodiversity offsets to address any residual adverse environmental effects that cannot be avoided or sufficiently minimized; and
 - provide justification for moving from one mitigation alternative to the next.
- provide offsetting or compensation plans to address all residual effects to species at risk, and their critical habitat, migratory birds, fish and fish habitat and/or wetland functions (if applicable) for review during the IA process; . . .
- describe measures included in the design of the project to mitigate its GHG emissions. These could include design decisions such as the use of low-emitting technologies, the use of low-carbon or renewable fuel, electrification or carbon capture and storage;
- describe information on any offset credits that have been or will be obtained, including the offset regime that issued the credits, project type, project start date and vintage year;
- provide an assessment of the likely effectiveness of the proposed technically and economically feasible mitigation measures. The reasons for determining if the mitigation measure reduces the extent to which the effects are adverse must be made explicit;
- identify other technically and economically feasible mitigation measures that were considered but are not proposed for implementation, and explain why they were rejected. Justify any trade-offs between cost savings and effectiveness of the various forms of mitigation measures;

Appendix II- Excerpts from *Operational Framework for Use of Conservation Allowances* (Environment Canada, 2012).

5. Determining whether to use conservation allowances

Conservation allowances are the last step of the mitigation hierarchy, a conceptual framework that, in its basic form, has three steps:

- Avoid proposed impacts;
- Minimize proposed impacts; and
- Address any residual environmental effects that cannot be avoided or sufficiently minimized with the use of conservation allowances.

For each of these steps, all alternatives should be considered, with the “best practicable option(s)” being applied in each case. The best practicable option means the best method for preventing or minimizing the proposed adverse effects of a land- or resource-use activity on the environment having regard, among other things, to:

- The nature of the proposed impact and the sensitivity of the receiving environment to adverse effects;
- The financial implications, and the effects on the environment, of that option when compared with other options;
- The current state of technical knowledge and the likelihood that the option can be successfully applied; and
- The ability to successfully mitigate the effects, for example, by replacing the affected habitat with a new area performing similar ecological functions to those that were lost.

The options considered should include the possibility of not proceeding with the land- or resource-use activity.

Consideration of whether to use conservation allowances should be undertaken as early as possible for a planned land- or resource-use activity when it is apparent that there will be residual effects after all practicable avoidance and minimization measures have been adopted. The analysis of alternatives should be documented, and the level of effort devoted to the analysis should be commensurate with the risks associated with the proposed land- or resource-use activity.

Applying the mitigation hierarchy

- **Identify all potential adverse impacts** – including direct, indirect and cumulative. Include not only physical impacts but also other effects on species, individuals or functional habitat such as increases in noise or predators.
- **Determine whether potential impacts can be avoided.** The viability of avoidance and mitigation options should be examined with respect to ecological risk, whether ecological features are replaceable,

economic viability, land ownership, technological feasibility and logistics in light of the overall project. A relatively high cost of an alternative may not necessarily make it “impracticable.”

- **Determine whether potential impacts can be minimized.** This should consider modifications such as changes to engineering designs, alternative construction techniques, contingency planning, timing considerations and location considerations.

- **Determine whether residual effects may still be expected.** After all avoidance and minimization options have been fully considered, determine whether conservation allowances would be an appropriate means to address residual environmental effects.

Appendix III - Excerpts from *Offsetting Policy for Biodiversity* (ECCC, 2020).

Mitigation hierarchy

Policy statement 2:

The mitigation hierarchy is followed by applying measures to avoid, minimize, and restore onsite to address, by avoiding or reducing, the adverse effects on biodiversity resulting from project developments. Offsetting is the last step in the mitigation hierarchy for replacing the residual adverse effects on biodiversity.

The mitigation hierarchy establishes an order of preference that promotes project development designs with the least environmental effect (for a visual illustration of the description provided in next three sections, please see Figure 1*). It functions to eliminate as many potential adverse effects through the impact assessment process, prioritizing measures in the following order:

- avoidance (e.g. re-design or re-locate project)
- minimization (e.g. adjusting the project construction schedule to protect critical life stages of species and implementing erosion and sediment control measures)
- onsite restoration (e.g. revegetating disturbed areas after construction)
- offsetting (e.g. habitat restoration, enhancement, creation or protection projects)

Offsets are used to address residual adverse effects, including cumulative adverse effects, after it has been determined that all options in the previous steps of the mitigation hierarchy have been fully considered and applied.

Avoidance and minimization measures take priority because they address adverse effects proactively, thereby reducing environmental harm and reliance upon onsite restoration and offsetting measures. All technically feasible measures should be assessed. Analysis of the success of the measures should be conducted and be proportional to the level of risk and uncertainty posed to biodiversity, the uncertainty of the measures, and expected benefits of conducting the analysis. It is important to demonstrate at each step of the mitigation hierarchy that the measures to avoid, or minimize adverse effects are applied to the fullest extent possible.

In situations where adverse effects remain after implementation of all avoidance and minimization measures, onsite restoration measures will be used to rehabilitate impacted ecosystem components and functions at project sites once construction activities are complete (e.g. temporary work areas, laydown area, access roads). The extent to which all preceding mitigation reduces adverse effects informs the need for and extent of offsetting.

* Adapted from Barbé, H. and Frascaria-Lacoste, N. 2021. Integrated ecology into land planning and development: between disillusionment and hope, questioning the relevance and implementation of the mitigation hierarchy. *Sustainability* 13, 12726 <https://doi.org/10.3390/su132212726>

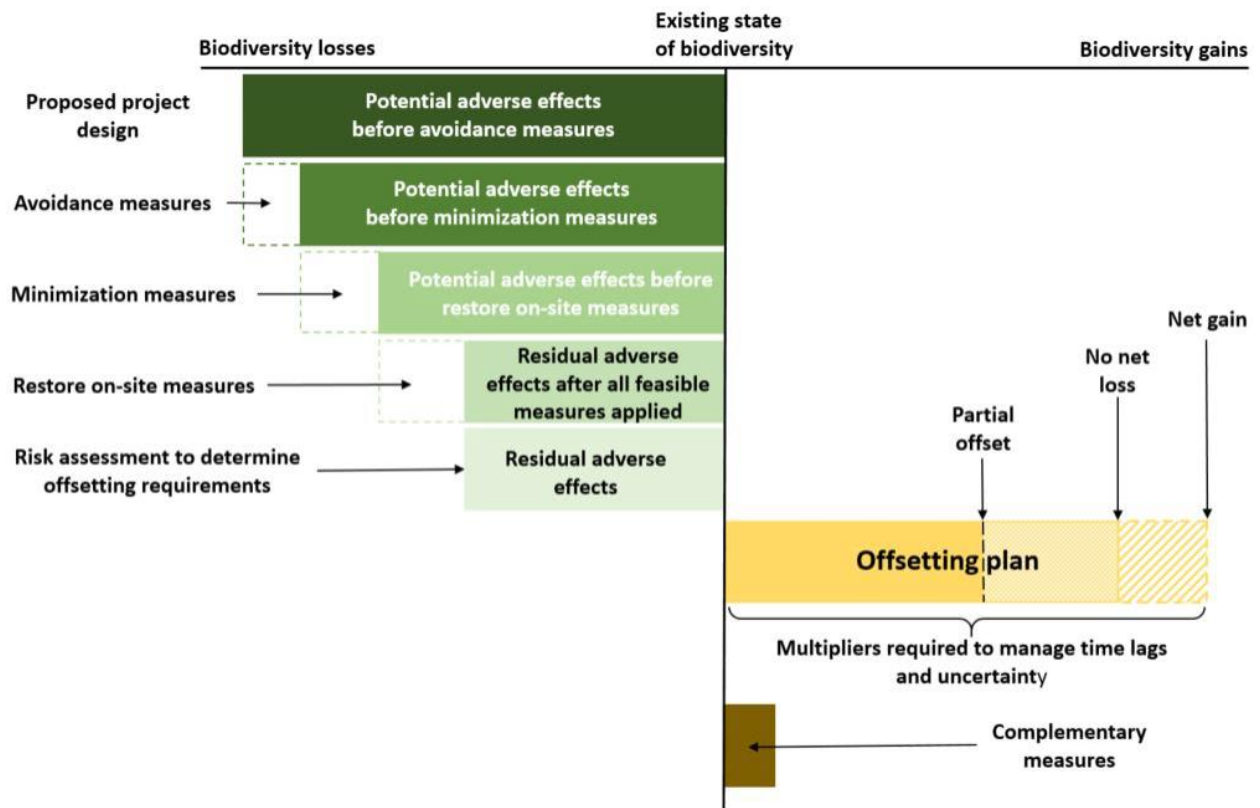


Figure 3 The mitigation hierarchy, showing the residual impact on biodiversity after the application of avoidance, minimization, and onsite rehabilitation/restoration measures. Biodiversity offsets aim to achieve no net loss (NNL) or net gain (Adapted from Barbé and Frascaria-Lacoste, 2021).

Long description of Figure 1:

This diagram illustrates the steps to be taken when there are biodiversity losses to the existing state of biodiversity caused by the design of a proposed development project.

Step 1: Apply all possible avoidance measures to reduce potential adverse effects caused by the project.

Step 2: Apply all possible minimization measures to reduce potential adverse effects further.

Step 3: Apply all possible restore onsite measures to reduce potential adverse effects even further.

After all feasible measures have been applied, any remaining effects are known as residual adverse effects.

A risk assessment is then required to determine the components of an offsetting plan including how much offset is necessary and if an offset is achievable. This assessment includes an equivalency analysis and assessment of the risk associated with time lags and uncertainty of the offset which will determine the size of multipliers.

To balance the residual adverse effects from the project, offsets are implemented to achieve the goal of no net loss or, where possible, net gain for biodiversity. For some development projects, offsets cannot fully balance the residual adverse effects to achieve no net loss and these offsets are known as partial offsets.

Complementary measures may be used in combination with offsetting. These measures can, for example, address knowledge or information gaps associated with the offset plan through scientific and Indigenous-based research and data collection. They are used to support and improve on the design and delivery of future offsets.

Appendix IV: Excerpts from Fisheries Policy Statements (DFO)

Excerpt from *Fish and Fish Habitat Protection Policy Statement* (Fisheries and Oceans Canada, 2019a) Pages 20-22.

The concepts of “avoid, mitigate and offset” build a hierarchy that is internationally recognized as a best practice in reducing risks to biodiversity. This hierarchy of measures emphasizes that efforts should be made to first prevent (avoid) the occurrence of harmful impacts. When avoidance is not possible, then efforts should be made to minimize (mitigate) the extent of the death of fish and harmful impacts on fish habitat caused by the proposed work, undertaking, or activity in question. Any residual harmful impacts should then be addressed by offsetting; offsetting measures typically counterbalance this loss through positive contributions to the aquatic ecosystem.

Fisheries dynamics and fish habitat functions are complex. It is much more difficult, expensive and uncertain to repair or restore damaged ecosystems than it is to avoid harmful impacts. For this reason, the Department emphasizes avoidance and mitigation as the initial steps in the hierarchy, followed by offsetting as a means of last resort.

Proponents are required to demonstrate that measures and standards have been fully applied to first avoid, then mitigate, and then finally, offset any residual harmful impacts to fish and fish habitat. Measures to avoid, mitigate and offset, as well as requirements for monitoring and reporting, may be included as conditions of authorization. The Department interprets these measures as follows:

Avoid

Avoidance is the undertaking of measures to prevent the harmful impacts to fish and fish habitat. Avoidance measures may include the choice of appropriate location and design of a work, undertaking or activity. In some cases, works, undertakings or activities may need to be redesigned to avoid harmful impacts. Careful timing of certain activities may also avoid impacts to fish and fish habitat. For some works, undertakings, or activities, harm may be fully avoided while for others, it may only be partially avoided.

When impacts to fish and fish habitat cannot be fully avoided, mitigation measures must be undertaken.

Mitigate

Mitigation measures reduce the spatial scale, duration, or intensity of harmful impacts to fish and fish habitat when such impacts cannot be avoided. The best available mitigation measures or standards should be implemented by proponents. Mitigation measures include the implementation of best management practices during planning, construction, operation, maintenance, temporary or permanent closures, and decommissioning of a work, undertaking or activity.

Offset

After efforts have been made to avoid and mitigate harmful impacts to fish and fish habitat, any residual impact must be addressed by offsetting. An offsetting measure is one that counterbalances unavoidable death of fish and harmful alteration, disruption or destruction of fish habitat resulting from a work, undertaking or activity with the goal of protecting and conserving fish and fish habitat. Offsetting

measures should support available fisheries management objectives and local restoration priorities and be conducted in a manner consistent with the department’s offsetting policy.

Excerpt from *Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat under the Fisheries Act* (Fisheries and Oceans Canada, 2019b)

Hierarchy of Measures for the Conservation and Protection of Fish and Fish Habitat

The concepts of “avoid, mitigate and offset” together establish a hierarchy known as the ‘hierarchy of measures’ that is based on an internationally recognized best practice for reducing risks to biodiversity*. This hierarchy of measures emphasizes that efforts should be made to first prevent (measures to avoid) the occurrence of adverse effects. When avoidance is not possible, then efforts should be made to minimize (measures to mitigate) the extent of the death of fish and adverse effects on fish habitat resulting from the proposed work, undertaking, or activity in question. Finally, as a last resort, any residual adverse effects should then be addressed by efforts to counterbalance this loss of fish and fish habitat through positive contributions to the aquatic ecosystems (measures to offset).

A conceptual diagram of the hierarchy measures is provided in Figure 1.

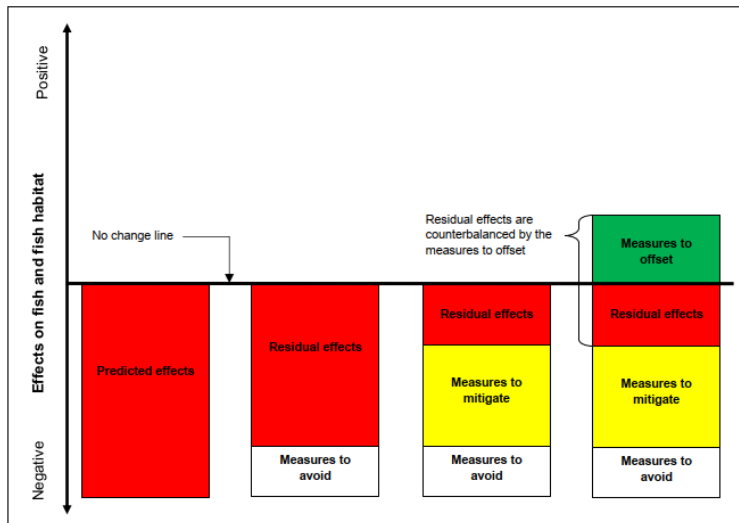


Figure 1. Conceptual diagram of the hierarchy of measures. (Note: the size of these boxes is for illustrative purposes only)

Figure 1. Conceptual diagram of the hierarchy of measures. (Note: the size of these boxes is for illustrative purposes only)

* References for the hierarchy of measures include: Business and Biodiversity Offsets Programme and the IUCN/ICMM Independent Report on Biodiversity Offsets.

Fish habitat components, their function and attributes, and the fish populations that rely on them (i.e. aquatic ecosystems) are dynamic and complex. It is more difficult, costly and uncertain to restore, enhance, or create, aquatic ecosystems than it is to avoid adverse effects in the first place. For this reason, the Department emphasizes measures to avoid and mitigate as the preferred steps in the hierarchy of measures, followed by measures to offset as a means of last resort.

Proponents are therefore required to demonstrate that measures to first avoid, then mitigate have been fully considered, for all life cycle phases of the works undertakings or activities, before finally contemplating measures to offset any residual effects on fish and fish habitat. Measures to avoid, mitigate and offset, as well as requirements for monitoring and reporting, may be included as conditions of authorization.

The Department interprets these measures as follows:

Measures to Avoid

Measures to avoid are actions taken to prevent adverse effects to fish and fish habitat. Measures to avoid may include but are not limited to:

- carrying on works, undertaking or activities in areas where no harm will occur;
- designing works, undertaking or activities so that no harm occurs; and
- timing certain works, undertaking or activities to prevent interactions with fish at key life stages such as spawning or migration.

Measures to Mitigate

Measures to mitigate are actions taken to reduce the spatial scale, duration, or intensity of adverse effects to fish and fish habitat that cannot be avoided. The best available measures to mitigate should be implemented by proponents while carrying out any work, undertaking or activity.

Measures to mitigate may include but are not limited to:

- carrying on works, undertakings and activities (e.g., physical infrastructure and other physical disturbances) where adverse effects are minimized;
- employing best practices that minimize harm when carrying on works, undertakings or activities;
- undertaking measures to stabilize disturbed sites to minimize ongoing adverse effects; and
- timing certain works, undertakings or activities to minimize interactions with fish and fish habitat.

Measures to Offset

Measures to offset are actions taken to counterbalance the residual effects on fish and fish habitat at a given location, with measurable benefits for fish and fish habitat. These measures may take place where the residual effects will occur or elsewhere. Measures to offset may include but are not limited to:

- restoring degraded fish habitat to improve conditions for the production of fish.
- enhancing fish habitat to improve conditions for the production of fish; and

- creating productive and sustainable fish habitat where none existed before.