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CANADIAN WILDLIFE FEDERATION

CONTEXT

The *Fisheries Act* offers the primary means of protecting fish and fish habitat in Canada. This is essential to Canadians because of the importance of fisheries, the ecosystem services provided by aquatic ecosystems, and the value we place in aquatic biodiversity. Commercial fisheries represent a $6 billion/year industry, and form the primary economies of many Canadian communities. Recreational fisheries represent an $8 billion/year industry and are an intrinsic component of Canadian culture for millions of Canadians. Aboriginal fisheries also contribute to the economy and have even more important roles in supporting traditional cultures and subsistence harvests. By protecting fish and fish habitat, the Fisheries Act offers protections for a variety of other vital services provided to Canadians by aquatic systems, such as providing clean drinking water and recreational opportunities. The federal government has exclusive legislative authority for "Seacoast and Inland Fisheries", and this includes the ultimate responsibility to protect fish habitat under Subsection 91(12) of the Constitution Act, 1867. The Standing Committee on Fisheries and Ocean's task of reviewing the habitat provisions in the *Fisheries Act* along with Fisheries and Oceans Canada's (DFO) capacity and implementation practices is critical in ensuring that the federal government fulfils its duty and protects this key resource.

The Canadian Wildlife Federation (CWF) reviewed changes to the *Fisheries Act* in 2012 and identified beneficial changes as well as lost protections. Prior to 2012, many elements of the *Fisheries Act* worked well to protect fish habitat; however, significant gaps contributed to ongoing declines in fish habitat across Canada (e.g., Harper and Quigley 2005)[1]. Many of these gaps remain after the 2012 changes, and fish habitat continues to decline in Canada. The current review of fish habitat protections provides an important opportunity to enhance protection for fish habitat by incorporating the strongest elements of both the current and former versions of the *Fisheries Act* with a series of modern safeguards aimed at steadily improving fish habitat quality across Canada while providing greater efficiencies for sustainable development. In this written submission, we offer a series of specific recommendations to attain these objectives.

[1] Harper, D. J., & Quigley, J. T. (2005). No net loss of fish habitat: a review and analysis of habitat compensation in Canada. Environmental Management. 36:343-355.

PROTECTIONS UNDER SECTION 35

In 2012, the prohibitions against harmful alteration, disruption or destruction (HADD) of fish habitat and against the killing of fish by any means other than fishing were replaced with a prohibition against serious harm to fish defined as "the death of fish or any permanent alteration to, or destruction of, fish habitat" (DPAD). This raised serious concerns within the conservation community. Though DPAD specifically prohibits the death of fish and destruction of fish habitat, changes in language coupled with the interpretation of section 6 has resulted in gaps in protection. These changes remain largely untested in court but that raise serious concerns for people that use and appreciate the resource as well as those that enjoy our wetlands, lakes, rivers, and coasts.
Specifically, the changes of concern are:

1. Loss of 25 years of jurisprudence for no apparent gain in legal clarity and enforceability;
2. Loss of protection against temporary alteration of fish habitat;
3. Confusion stemming from the use of the use of the word 'serious' in the Section 35 prohibition on harm which implies a hierarchy of harm despite a definition that contains no such hierarchy;
4. Apparent shift in the underpinning science evidence base for enforcement and prosecution from physical habitat to fisheries productivity due to the language in Section 6; and
5. Confusion over where the Act applies on the landscape and in the ocean resulting from the requirement for a direct or indirect connection to a commercial, recreational, or aboriginal fishery.

RECOMMENDATIONS:

We propose the following actions to ensure regulatory clarity and positive long term outcomes for fish and fish habitat:

1. Amend the language of Section 35 to prohibit the "harmful alteration, disruption or destruction of fish habitat";
2. Remove the word 'serious' from Section 35 and the definition in Section 2;
3. Maintain the application of Section 35 to activities;
4. Amend the language of Section 35 or the definition in Section 2 such that the prohibition applies to all bodies of water that contain fish; and
5. Amend Section 6 by removing paragraph 6(a) and correcting paragraph 6(c).

RATIONALE:

<u>Restore established jurisprudence by restoring HADD to the *Fisheries Act* and prohibit harmful disruption</u>
The case law established since 1986 around the protection of fish habitat from HADD provided certainty for proponents and prosecutors alike. The loss of this case law introduces uncertainty as to how the law will be interpreted and creates challenges in prosecuting offenders, thus placing fish habitat at risk. Because of case law established under HADD and the confusion stemming from the word 'serious', the CWF recommends returning to HADD over retaining the DPAD framework.

The removal of the word 'disruption' from the list of prohibitions eliminated protection of fish and fish habitat from the impacts of temporary alteration. For instance, spawning beds may be temporarily destroyed by a work, undertaking or activity (WUA) and reconstructed at the end of a project. The lack of

spawning during this time could have lasting effects on fisheries populations (Koops et al. 2013)[2]. Restoring HADD will also restore prohibitions against the disruption of fish habitat.

Remove the word 'serious' from prohibition on harm

The inclusion of the term 'serious' before 'harm' is unnecessary and creates confusion. It implies that some forms of permanent harm to or alteration of fish habitat, or death of fish may not be sufficiently serious to warrant prohibition or require offsetting, even though the literal interpretation of the Act offers no such distinction. Indeed, this appears be how Fisheries and Oceans Canada's (DFO) interprets the legislation when creating a system of triage for 'minor' works (see below for a detailed analysis). Even though such works can have non-zero residual impacts on fish habitat, these impacts are apparently interpreted by DFO as insufficiently serious to require an authorization and associated offset. This contravenes advice by DFO's scientists, who concluded that "*the net outcome of each project not requiring authorization (must) be either zero death of fish or residual impact on habitat or, an improvement in habitat.*" (Rice et al. 2015)[3]. It remains uncertain whether courts will follow this scientific interpretation, or will assign an arbitrary threshold between 'minor' and serious harm. Because of this ambiguity and the lack of a legal definition distinguishing 'serious' from 'non-serious' harm, this term should be removed from the Act.

Maintain application to activities

The 2012 changes added 'activities' to the list of prohibitions, along with works and undertakings. This provided added protection against activities such as riding all-terrain vehicles through a stream, which can damage the stream bed and increase siltation. Such activities harm fish habitat yet were not previously subject to the Act because they were not considered a work or undertaking that required authorization. The addition of 'activities' to 'works and undertakings' should be maintained.

Apply the prohibition to all fish and fish habitats

Prior to 2012, the *Fisheries Act* protected habitat for all fish species. The 2012 changes restricted the prohibition of serious harm to fish that are part of a CRA fishery or fish that support such fisheries. This change introduced considerable regulatory uncertainty, first in identifying which species are considered part of a fishery. The Fisheries Protection Policy Statement (FPPS) defines these species as follows: "Fish that are part of commercial, recreational or Aboriginal fisheries are interpreted to be those fish that fall within the scope of applicable federal or provincial fisheries regulations as well as those that can be fished by Aboriginal organizations or their members for food, social or ceremonial purposes or for purposes set out in a land claims agreement." Ambiguity arises for instance, when attempting to identify which species could not be fished by Aboriginal organization members for food, or how the wording of each provinces' recreational fisheries regulations affects protection.

Attempting to apply protection to some fish species but not others is inconsistent with DFO's Sustainable Fisheries Framework because it undercuts ecosystem-based and precautionary approaches to fisheries management. Canada has adopted the principle of ecosystem-based fisheries management, which is internationally recognized as necessary for the long-term sustainable management of fisheries. This principle acknowledges that fisheries cannot be managed by focusing on target species alone. Instead, non-target species, habitats, and ecosystems must be accounted for in management decisions, including the interactions between target species and their predators, competitors and prey species.

Likewise, the precautionary principle calls for caution when scientific knowledge is uncertain. Though distinguishing between unimportant and important species seems intuitive to the layman, such distinctions

[2] Koops, M.A., M. Koen-Alonso, K.E. Smokorowski and J.C. Rice. 2013. A science-based interpretation and framework for considering the contribution of the relevant fish to the ongoing productivity of commercial, recreational or Aboriginal fisheries. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/141. iii + 28 p.

[3] Rice, J., Bradford, M. J., Clarke, K. D., Koops, M. A., Randall, R. G., & Wysocki, R. (2015). The science framework for implementing the fisheries protection provisions of Canada's fisheries Act. Fisheries. 40:268-275.

remain theoretical and unsupported by empirical scientific evidence in most cases. Aquatic ecosystems are complex, and it is incredibly difficult to predict the ecosystem-level response of the loss (or reduction in abundance) of any given species (see Kenchington et al. 2013[4] for a review of the challenges in identifying which species support a fishery). To improve regulatory certainty, uphold the precautionary principle and apply an ecosystem-based approach to protecting fish and fish habitat, the CWF recommends amending the language of Section 35 such that the prohibition applies to all bodies of water that contain fish.

Elimination of paragraph 6 (a) and modification of paragraph 6 (c)

Paragraph 6 (a) introduced a great deal of unnecessary complexity and obscurity into the *Fisheries Act* by focusing regulatory decisions on fisheries productivity. The CWF recommends that this section be removed, and that DFO return to focusing on managing fish habitat. Although the term "serious harm" is clearly defined in the *Fisheries Act* as any permanent destruction or alteration of fish habitat or death of fish, paragraph 6 (a) has led DFO to interpret harm as the contextual effects of a UWA on fisheries productivity. This was among the most dangerous changes in 2012 from a legal perspective, and creates an unnecessarily complex and subjective process for developing and evaluating applications for authorizations.

Under the previous *Fisheries Act*, evidence that habitat was harmed or fish were killed was sufficient to lay charges and successfully prosecute. Demonstrating such harm was straightforward in court. Based on paragraph 6 (a), it is unclear whether the burden of proof has shifted from demonstrating simply that fish or fish habitat were harmed, to demonstrating that fisheries productivity was harmed. Though we acknowledge that the field of fisheries science has made great advancements in estimating and modelling fisheries productivity, the CWF maintains that this ecological concept is too vague to be the basis for enforcement of a prohibition. In most cases, productivity losses can only be modelled with high error. At best, years to decades of data on multiple parameters can support more specific estimates, but unlike the death of fish or the destruction of fish habitat, losses in productivity can rarely be explicitly quantitatively demonstrated.

A framework based on productivity is equally unsuitable for developing and evaluating applications for authorization because of the complexity of estimating productivity and the uncertainty surrounding estimates. If done properly (i.e., following guidelines developed in a recent series of Canadian Science Advisory Secretariat reviews), costs to proponents for developing an application for authorization could be exorbitant. It could take years to collect sufficient baseline data on each parameter and extensive analysis by a consultant with advanced ecological modelling skills. Similarly, review of such complex applications and calculation of appropriate offsetting ratios is resource-intensive for DFO. If done improperly or without rigour, the errors associated with estimates of productivity are high enough render any decision regarding appropriate offsets essentially subjective.

There are several major challenges in measuring or even estimating the effects of a UWA or project on fisheries productivity. Reviewing these illustrates how complex it is to demonstrate a link between a project and a decline in CRA fisheries productivity. Doing so requires information on the following processes and relationships:

A. The current and natural variability in productivity of the affected CRA fishery or fisheries must be estimated
B. A change in productivity must be identified and predicted
C. A causal relationship must be identified between this change and the project

[4] Kenchington, E., Duplisea, D.E., Curtis, J.M.R., Rice, J.C., Bundy, A., Koen-Alonso, M., and Doka, S.E. 2013. Identification of species and habitats that support commercial, recreational or aboriginal fisheries in Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/110. iv + 68 p.

D. The effects of the project on fish that support the fishery must also be estimated and linked to fisheries productivity
E. The relative effects of the project in the context of other stressors and conditions must be identified.

For A., aside from large commercial fisheries, productivity of CRA fisheries has rarely been quantified. It varies annually and aquatic systems often support many species with productivities that interact through competition and natural variation. Some or all of these species can be affected simultaneously by a project. At best, productivity can be modeled with high uncertainty; however, it has not been quantitatively measured for the vast majority of fisheries across Canada.

For B., natural variability in productivity makes it difficult to discern the difference between an actual decline and natural fluctuation. Lower abundance in one year may simply represent random fluctuation or a response to variable natural conditions such as temperature and precipitation. Productivity would need to be measured for multiple years before and after a disturbance, with sufficient replication to control for natural variation. Some threshold would need to be identified (e.g., a 5% difference between the averages before and after the disturbance) to conclude that productivity had decreased. Such relationships can be modeled to inform management based on current knowledge of ecological relationships; however, demonstrating such changes quantitatively is for an individual project would be extremely costly and time consuming.

For C., our ability to quantify the effects of a project on productivity remains limited. Even if a change in productivity is observed, demonstrating a cause-and-effect relationship between productivity and an individual disturbance while accounting for other effects is challenging. Detailed and replicated experimental designs can achieve this, but often require significant research funding and many years or decades of study. As an alternative, ecologists have studied such relationships at landscape scales, where fisheries and disturbances can be observed simultaneously across hundreds or thousands of lakes and rivers. Such studies provide insight into how various disturbances affect aquatic communities and are useful in informing fisheries management. However, they are insufficient to conclusively demonstrate the effects of an individual project on fisheries productivity.

For D., a species is only considered one that supports a CRA fishery if it is essential for sustaining the productivity of the CRA fishery (Kenchington et al. 2013). This is another concept that is simple to understand but remarkably complex to demonstrate. For instance, the simplest type of direct support is provided by prey species, but even determining whether or not a given prey species is *essential* is highly challenging. Based on a review by DFO scientists, the following factors may affect whether or not a prey species is considered essential (Kenchington et al. 2013):

- The CRA species' diet as a larva
- The CRA species' diet as a juvenile
- The CRA species' diet as an adult
- Sex-specific differences in the CRA species' diet
- Seasonal shifts in the CRA species' diet
- Whether the CRA species has a specialized diet at any life stage
    - This requires analysis of whether the specialized prey species is more common in the diet than in the environment
- Whether the CRA species' productivity varies in response to prey species productivity, or with it (i.e., because both species are responding to the same environmental conditions)
- The calorific value of the prey species
- Essential nutrients provided by a prey species

This list of considerations is only for prey species. Many other species directly or indirectly support CRA fisheries in different ways, such as by modifying the environment, or acting as keystone species or apex

predators (Kenchington et al. 2013). Each ecological role is equally difficult to quantify, and most aquatic ecosystems in Canada have multiple species and thousands of ecological relationships to consider.

For E., DFO has developed a system for assessing the relative effects of a project in the context of the cumulative effects of multiple stressors on fisheries productivity. This began with the development of productivity-state curves and identification of ecological thresholds. Figure 3 represents how fisheries productivity responds to the cumulative effects of all stressors. Though natural patterns vary widely from this theoretical figure, the main concept is that ecosystems are resilient to some level of harm and that fisheries productivity will not decline until a certain threshold of harm is reached. After this point, productivity will decrease with further change to the ecosystem, until the fishery is eliminated.

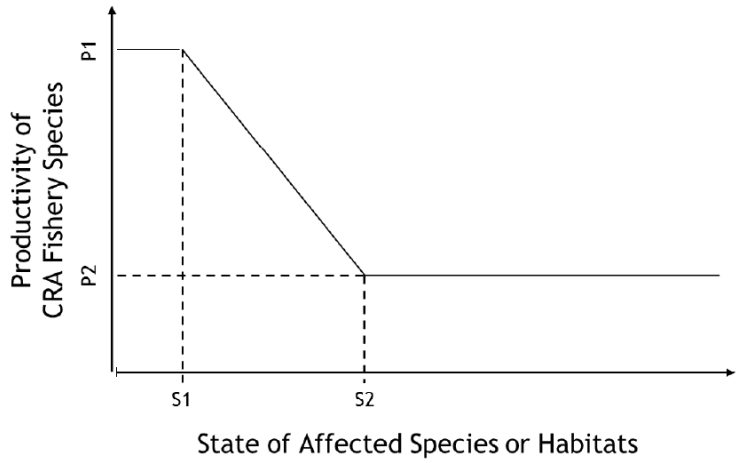

Figure 3: Schematic framework of how the ongoing productivity of CRA fishery species may be impacted by change to the state of the affected species or habitats. The X-axis indicates state as measured along a continuum from good (left) to poor (right). The Y-axis indicates productivity as measured along a continuum from low (bottom) to high (top). Four reference points are identified: S1 is the threshold below which change to the affected species or habitats has little or no impact on productivity of fishery species but above which additional change to the affected species or habitats translates into reduced productivity of the fishery species; S2 represents the point where cumulative change to the affected species or habitats is great enough that its contribution to the ongoing productivity of CRA fishery species is eliminated and the fishery is depressed; P1 represents the benchmark reference productivity of the CRA fishery species; P2 represents the depressed productivity of the CRA fishery species under maximum cumulative change to the affected species or habitats. Figure and description copied from Koops et al. 2013.

A scientific review by Koops et al. (2013) was conducted by DFO to support offsetting decisions. They recommended estimating the offset required to address the relative effects of a project in the context of all other stressors in an ecosystem. In this context, some projects occurring in nearly pristine ecosystems may not require an offset. Similarly, offsets would not be required in ecosystems that are so altered that fisheries have been eliminated. Conversely, proponents conducting UWAs in modified ecosystems may need to provide larger offsets because their project has a greater relative effect on productivity than one in a pristine ecosystem.

The response of productivity to change varies widely depending on the type of change, and multiple stressors can have synergistic or even antagonistic responses. Even for one type of stressor, different ecosystems and fisheries can respond in very different ways (Rice et al. 2015). Quantifying the actual

change in productivity attributable to a project in the context of all existing stressors places a heavy burden on proponents, who would need to hire ecological modellers to assess current ecosystem conditions and predict the contextual effects of a WUA (de Kerckhove 2015)[5].

The uncertainty associated with estimating the effects of a project on fisheries productivity creates opportunities to minimize projections of loss. Proponents wishing to reduce offsetting costs can develop ecological models with subjective measures to identify scenarios where their projects have minimal effects on productivity. Proponents could argue that the relative effects of the project are small compared to other stressors, or could suggest that the current ecosystem is in a pristine or degraded state. In such states, productivity-state curves predict a minimal response of productivity to disturbance. Or, proponents can simply develop a model with a favourable mean and error term.

Because of the complexity and uncertainty surrounding estimating fisheries productivity and how it responds to UWAs, the CWF believes it to be an inappropriate foundation for individual regulatory decisions. The excellent work by DFO scientists in developing a science-based framework for linking development projects to fisheries productivity has great value in informing implementation of the *Fisheries Act*. However, such tools are more appropriate for the development of policies and practices than for evaluating individual projects. To simplify the regulatory process, increase regulatory certainty, and improve efficiency, the CWF recommends eliminating paragraph 6 (a), and returning to focusing on managing fish habitat directly.

Paragraph 6 (c) states "whether there are measures and standards to avoid, mitigate or offset serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or that support such a fishery". However, this misinterprets a critical distinction between avoidance and mitigation. When proponents avoid all harm, no offset is required. What harm cannot be avoided can be mitigated but by definition, mitigation means that harm is reduced rather than eliminated. The residual harm must still be addressed by offsetting. Projects that cannot avoid all harm should mitigate *and* offset when possible, or simply offset if mitigation is not possible. As such, the CWF recommends that this paragraph be revised to state "whether there are measures and standards to avoid or mitigate and offset harm to fish or fish habitat".

PROTECTIONS UNDER SECTION 20 (FISH PASSAGE)

Connectivity is a vital element of fish habitat. Fish use different habitats during different parts of their life cycles, and fisheries productivity depends on the ability of fish to move freely among these habitats. Section 20 of the *Fisheries Act*, which addresses fish passage, is therefore related to this review. However, fish passage has received little attention to date from the Standing Committee on Fisheries and Oceans and their witnesses. The CWF has identified several beneficial changes to Section 20 that should be retained, and recommends additional important modern safeguards that should be considered in this review.

The language in the *Fisheries Act* relating to fish passage provisions was simplified and reorganized to improve clarity. Section 20 previously applied only to the "owner or occupiers of any obstruction", but now refers more clearly to the "person who has the charge, management or control of an obstruction or any other thing that is harmful to fish". Subsection 20(1) now provides the minister with the power to require studies, analysis, samplings, and evaluations for anything that harms fish or prevents fish passage. Previously, the minister did not have the ability to require studies beyond the process of issuing an authorization for a work or undertaking. This is a positive step towards evidence-based management.

[5] de Kerckhove, Derrick T. 2015. Promising Indicators of Fisheries Productivity for the Fisheries Protection Program Assessment Framework. DFO Can. Sci. Advis. Sec. Res. Doc. 2014/108. vi + 69 p.

Section 6 now applies to Subsection 20(2), providing greater clarity of the factors the minister must consider when addressing fish passage issues. In association with this change, the scope of the minister's considerations under subsection 20(2) was changed from "necessary for the public interest" to "necessary to ensure the free passage of fish or to prevent harm to fish". Additionally, the previous act referred only to obstructions or things that bar fish passage, whereas the 2012 changes expanded this section to include obstructions or things than harm fish.

Paragraph 20(2)(g) is highly similar to the previous subsection 22(3) in terms of fisheries protection. The issue is that neither section appears to have been widely enforced. The Environmental Commissioner of Ontario's 2014-2015 report[6] illustrates the severity of this issue: "Under the Fisheries Act, the federal Minister of Fisheries and Oceans may put conditions on dams and make orders to prevent harm to fish or to ensure fish passage, including ordering a dam owner to construct a fishway. However, this discretionary power has rarely, if ever, been used to require the installation of a fishway in Ontario; Annual Report 2014/2015 131 of the more than 2,500 dams in Ontario, less than 50 (2 per cent) have been identified as having a fishway. Likewise, of the more than 200 waterpower dams in the province, only a couple have a permanent fishway." Though the CWF is aware of one recent instance where an authorization for renovation works required effective fish passage (14-HCAA-00373 for the Chaudière Hydro Limited Partnership), the widespread lack of application of ministerial discretion to require fish passage is deeply concerning.

Based on current scientific knowledge of the importance of connectivity, a vital modern safeguard would be to require fish passage at all obstructions where migratory fish (including fish that migrate exclusively within freshwaters) are or may be present. The CWF recommends that subsection 20(2) be altered so that fish passage is required by law, granting the minister the discretion to issue an exemption after considering and addressing revised Section 6 factors. This discretion should have enforceable, science-based limits.

Additionally, DFO should direct staff to review existing barriers to fish movement and create a plan for restoring fish passage across Canada. Given the number of barriers that currently exist without fish passage, this issue cannot be resolved immediately without major economic consequences. However, a process must be identified to gradually restore the environmental benefits of fish passage over the next several decades in an economically feasible manner.

IMPLEMENTATION AND CAPACITY

Project review and "minor" works

A new service standard was issued requiring DFO to issue authorization decisions within 90 days of an application for authorization (previously, DFO took approximately two years). Simultaneously, the number of fish habitat managers responsible for the review and authorization of WUAs decreased drastically. Based on this service standard, staff capacity, and DFO's current service delivery model, the organization is severely understaffed. To compensate, DFO established a system of triage for requests for review and applications for authorization based on risks of serious harm to fish and fish habitat. Under this system, a triage team reviews all requests and applications, and identifies 'low-risk' projects for which no authorizations are required. Instead, a letter of advice is issued and proponents undertake the UWA without an offset. This is currently the result for a majority of requests for authorization. The number of authorizations issued has decreased drastically since 2012 (Olszynski 2015), a change that cannot be attributed to declines in economic development or changes in development practices that eliminate harm to fish habitat.

[6] Environmental Commissioner of Ontario. (2015). Small things matter: annual report 2014/2015.

DFO's triage process is based on a risk-assessment framework carried over from the previous regulatory regime. Under both regulatory regimes, DFO's risk assessment framework is based on the sensitivity of fish habitat and the scale of negative effects of the WUA (Figure 2). Under the previous regime, DFO had adopted an extra-regulatory process to exempt projects from authorizations if they were deemed low risk. Due to restricted staff capacity under the current framework, the level of risk requiring an authorization appears to depend on the number of authorization requests received. To meet their 90-day service standard for authorization, DFO simply triages lower-risk projects until the number of projects requiring review is sufficiently low that all can addressed on time given current staff capacity. What is unclear is whether medium risk or even high risk projects could be triaged and permitted without an authorization or offset depending on the number of requests for authorization relative to staff capacity.

Low-risk projects are now being addressed via the fallacy of 'minor' works. 'Minor' works are presumably WUAs that have low risk of causing major harm to fish habitat; however, this extra-regulatory term does not appear in the Fisheries Act, the Regulation on Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations (SOR/2013-191), DFO's Fisheries Productivity Investment Policy (FPIP), or DFO's FPPS. Though 'minor' works have a lower risk of causing major harm to fish or fish habitat, they still cause residual harm if all damage or alteration to fish habitat cannot be avoided. The legal definition of serious harm refers to any permanent destruction or alteration of fish habitat, without placing a lower threshold on the magnitude destruction or alteration. As such, by establishing thresholds where offsets are not required for 'minor' works that cause some permanent residual destruction or alteration of fish habitat, the Minister is failing to fulfil his obligation under the *Fisheries Act* of prohibiting serious harm.

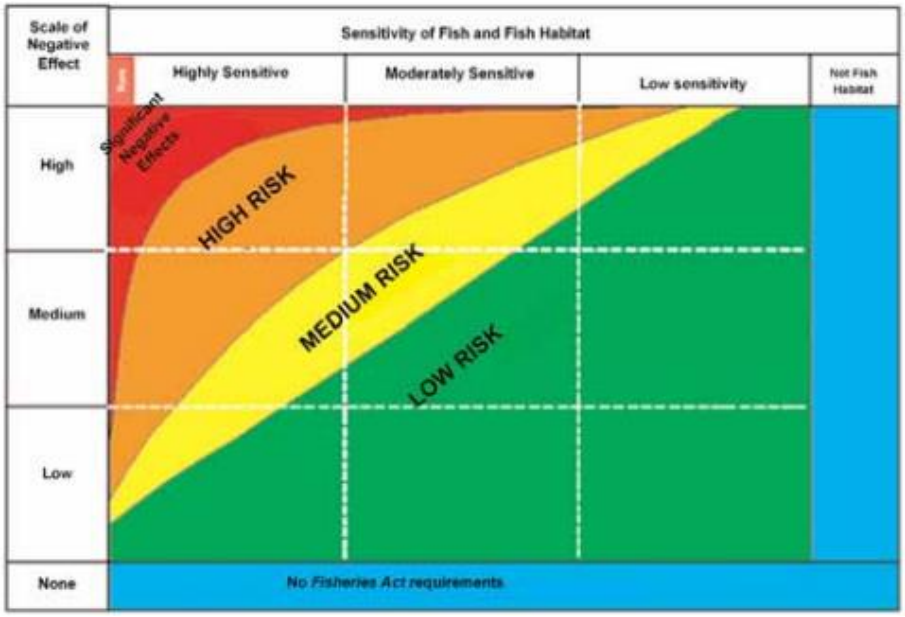

Figure 2: Risk assessment matrix used to illustrate various categories of risk. Copied from DFO's Practitioners Guide to the Risk Management Framework for DFO Habitat Management Staff v1.0 (http://www.dfo-mpo.gc.ca/Library/343443.pdf)

A group of DFO's leading habitat scientists clearly described the consequences of failing to fully offset harm caused by 'minor' works (Rice et al. 2015). They concluded "In development of the science framework for FPP implementation, attention turned often to the potential cumulative losses of productivity from multiple occurrences of projects that individually might have impacts too small to link to declines in fisheries productivity, particularly if the fisheries occur on other life history stages or in places removed from the activities causing the impacts. It was concluded that risk of failure to achieve the intent of the FPPs can only be managed with a decision rule that requires *the net outcome of each project not requiring authorization to be either zero death of fish or residual impact on habitat* or, an improvement in habitat. For

projects requiring authorization because they cannot be conducted without potentially detrimental habitat impacts or death of fish, these resultant impacts have to be fully offset in ways that take into account both fishery management objectives and the public good." The CWF does not recommend a return to requiring individual offsets for all small projects that leave residual harm to fish habitat; however, some mechanism for addressing this harm must be provided. Modern safeguards for offsetting small residual impacts on habitat are discussed below under cumulative effects.

Self assessment and public registries

Modern environmental protection requires oversight by government agencies. The CWF supports processes that increase efficiencies for both proponents and DFO, but efficiencies must not create unnecessary risks for fish and fish habitat. The recently introduced self-assessment process gives proponents the power to decide whether or not they need to request an authorization from DFO for a WUA. This creates a lack of accountability and oversight. The CWF acknowledges that not all WUAs should require individual reviews and authorizations, but recommends a registry coupled with operational statements describing conditions for prescribed works as an efficient alternative to the current self-assessment process.

All projects occurring in, on, or near waters should be reported by proponents to a publically accessible registry. Classes of prescribed works that avoid or mitigate harm can be developed (e.g., based on DFO's previous operational statements), and permits can be issued automatically when such projects are registered. For such prescribed works, the procedures that must be followed to avoid harm can be detailed on the permit. This should be coupled with a routine auditing process that includes random on-site reviews of a subset of projects by fisheries officers to ensure that permit conditions are met.

If a proponent is planning a novel WUA that is not regulated as a prescribed works, they should be required to submit a request for review or application for authorization. A letter of advice may be offered and no offset required if the proponent demonstrates that they can fully avoid harm. Otherwise, some form of offset must be required. Letters of advice and authorizations should also be posted on a publicly accessible registry.

The CWF recommends establishing a public registry and permitting process for all WUAs, and automating this where possible to improve efficiency. Requirements for a permit, letter of advice, or authorization would shift the current reactive authorization scheme to an affirmative authority permitting process. This would ensure that all projects with potential effects on fish habitat are tracked and can be reviewed individually or analyzed in aggregate to inform program-level evaluations and decisions.

The capacity of DFO to deliver on fish and fish habitat protection through project review, monitoring, and enforcement

Decreases in DFO staff capacity over the past decade and especially after 2012 represent the primary source of lost protections to fish and fish habitat in Canada. If there was no actual 'gutting' of the *Fisheries Act*, there was certainly a gutting of DFO. For instance, the number of DFO offices in Ontario was reduced from nine to one. The CWF recommends providing DFO with sufficient resources to enforce the *Fisheries Act*, develop policies and guidelines that improve practices and efficiency, thoroughly review proposed projects, and monitor the resource and program outcomes.

The decrease in the number of DFO's enforcement officers is deeply concerning. This has sent a message to proponents that there is little risk of prosecution. The government of Canada could immediately restore considerable lost protection by restoring DFO's enforcement capacity, then publicly stating that fish habitat is protected and that the *Fisheries Act* will be rigorously enforced. Enforcement is a critical component of environmental protection; environmental regulations and management programs only succeed if they are sufficiently enforced. The CWF recommends providing DFO with sufficient resources to enforce the

Fisheries Act, including auditing self-assessed or permitted UWAs and investigating public reports of *Fisheries Act* violations.

Decreases in DFO staff capacity have limited the organization's ability to develop more efficient processes such as defining prescribed works and waters, and to issue authorizations for all projects that harm fish habitat. Implementation of the new *Fisheries Act* required considerable investment by DFO policymakers via the creation of the FPP and associated policies and guidelines. Likewise, DFO scientists supported implementation via a series of Canadian Science Advisory Secretariat reviews. Four years after the revisions to the *Fisheries Act*, development of this program remains underway as evidenced by the lack of definitions of any prescribed works or waters or ecologically significant areas. It has led to the creation of a system of triage for requests for authorizations, whereby offsets are not required for WUAs that harm fish or fish habitat, in contravention of DFO's legal obligations under the *Fisheries Act*. Restoring DFO's staff capacity to issue authorizations would restore the protection that was lost when this system of triage was implemented. Increasing DFO's policymaking and partnership building capacity would hasten the development of more efficient processes that can promote sustainable development while protecting the environment. The CWF recommends increasing DFO's staff capacity to conduct research to support implementation of the *Fisheries Act*, to develop efficient policies and processes under the *Fisheries Act*, and to ensure that all projects that harm fish are reviewed and appropriately offset. If government resources are limited, a cost-recovery model could be developed by charging an appropriate fee for project reviews.

Prior to 2012 and since then, DFO has not conducted monitoring, particularly in freshwater systems. DFO habitat managers are focused on issuing authorizations while DFO's Science Branch is focused on developing mechanistic understanding of ecosystem functioning to support fisheries management. No branch of DFO has accepted responsible for designing and implementing routine monitoring programs to assess the status of fish habitat across Canada. Such monitoring data are essential for establishing baselines, setting goals and objectives for DFO's programs, and assessing outcomes and success. Monitoring data also enhance opportunities to learn more about the effects of disturbances and the success of restoration projects, by providing data on conditions before projects are undertaken or disturbances occur. The CWF recommends establishing an efficient and scientifically sound monitoring program as a critical modern safeguard to support management of CRA fisheries.

MODERN SAFEGUARDS

SECTION 6 FACTORS

The creation of section 6 helped to clarify what factors the minister must consider before exercising any powers under section 35; however, it lacks many of the standard safeguards associated with modern environmental law. The CWF recommends adding the following modern environmental law principles to the list of factors that the minister should consider when issuing an authorization:

- The precautionary principle
- Ecosystem-based management
- The polluter pays principle, or the internalization of environmental costs
- Intergenerational equity

The inclusion of the term "public interest" is ambiguous and has increased uncertainty regarding how the Act will be applied. The CWF interprets the public interest as referring to the protection of fish (and therefore fish habitat) as a renewable public resource; however, this could also be interpreted as the public's interest in economic development or social preferences. Essentially, it is so vague as to be meaningless. Section 6.1 could provide clarity that the public interest specifically refers the sustainability of CRA fisheries, but section 6.1 is not directly linked to the factors that the minister must consider. The CWF

recommends providing clarity in the legislation that the term 'pubic interest' refers to the minister's responsibility to protect fish and fish habitat as a public resource.
Section 6 offers the minister considerable latitude to authorize harm to fish and fish habitat. The CWF recommends that this discretion needs enforceable limits, which should also be specified in section 6.

NET GAIN

Given historic harms to fish habitat and the slow net loss that has occurred in recent decades, DFO has a responsibility to not only prevent further harm to fish habitat but to also restore aquatic ecosystems. The CWF recommends that DFO restores the overarching policy goal of net gain of fish habitat.

This important goal was lost with DFO's previous Fish Habitat Policy, which explicitly stated that:

> "The guiding principle of DFO's Fish Habitat Policy is to ensure "no net loss" in productive capacity of fish habitat. This is achieved by balancing unavoidable habitat losses with habitat replacement on a project-by-project basis. As well, DFO has an overall goal to achieve a "net gain" of habitat by: (1) habitat conservation (i.e., protection); (2) habitat restoration; and (3) habitat development."

Conversely, DFO's FPPS states more vaguely that:

> "The goal of the Department in applying this Fisheries Protection Policy is to provide for the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries."

Similarly, DFO's FPIP states that:

> "The objective of the fisheries protection regime is to maintain or enhance the ongoing productivity and sustainability of commercial, recreational and Aboriginal fisheries."

Though this later objective incorporates enhancement, it still falls back on the possibility of 'maintaining' the status quo for fisheries productivity. The CWF recommends replacing these statements with:

> "DFO has an overall goal to achieve a "net gain" of habitat by: (1) habitat conservation (i.e., protection); (2) habitat restoration; and (3) balancing unavoidable residual habitat losses with additionality in habitat offsets on a project-by-project basis."

This would ensure that DFO's efforts are focused on both protection and restoration. In addition to restoration efforts, the CWF recommends that a requirement for 'net gain' be formally established for offsets. Fisheries are likely to decline over time under a "No Net Loss" offsetting policy for four reasons:

1) Time lags in construction. Many offsets are not constructed until after a WUA begins or is completed. Fisheries benefits are lost during this time and not addressed by a 1:1 offset;
2) Time lags in development of offset functionality. Many offsets do not instantaneously provide fisheries benefits. Time may pass before they are colonized, either by the target species or by other species that will ultimately attract and support the target species. Losses occur until the offset becomes fully functional;
3) Uncertainty in offset performance and in value of lost habitat. Restoration ecology remains an emerging discipline, and our ability to create or restore habitats that function exactly as intended is limited. A restored habitat rarely provides equivalent fisheries benefits as the same area of natural habitat. If an out-of-kind offset is offered, several other areas of uncertainty contribute to this problem, such as uncertainty regarding the value of destroyed or altered habitat, and uncertainty regarding equivalency ratios between habitat types; and
4) Risk of abandonment. Proponents are responsible for the construction, monitoring, and maintenance of habitats. Offsetting plans must contain contingency plans if monitoring reveals that the offset is not working as intended. Losses can occur if a proponent company closes or goes bankrupt before an offset is completed or found to be inadequate.

Despite the loss of 'net gain' as the overarching program goal, Fisheries and Oceans Canada's new FPIP addresses many of the shortcomings of a 'no net loss' policy. Under the second guiding principle (benefits from offsetting measures must balance project impacts), additional habitat is required to account for time lags and uncertainty. The fourth risk is largely mediated by the requirement for proponents to obtain a letter of credit demonstrating that sufficient funds are available to complete the offsetting and monitoring plan; however the proponent's accountability for the long-term functioning of the offset remains uncertain, and additional lags are introduced if it takes years to discover that an offset is not performing as intended. These measures should be retained but could be further enhanced.

Although the FPIP has laid out a clear process for addressing the potential shortcomings of offsets, it fails to establish minimum standards, indicating that 1:1 offsets may be acceptable under certain situations (e.g., if the offset is constructed before the WUA occurs, involves creation of in-kind habitat, and the effectiveness of the offsetting mechanisms is known with high certainty). Even in such ideal circumstances, some risk remains in the performance of the offset. The CWF recommends establishing a minimum ratio (e.g., 2:1, but at least >1:1). This ratio should only be offered when proponents can demonstrate equivalency with high certainty.

Further standards are required to ensure that proponents do not underestimate time lags and uncertainties for less effective or established offsetting techniques, and especially when calculating equivalencies for out-of-kind offsets. Equivalency estimates can have extremely high error rates. This injects a high level of subjectivity into equivalency analyses that can be exploited by proponents who wish to identify low equivalency ratios. To ensure that offset ratios are not routinely underestimated, the CWF recommends establishing minimum ratios based on a series of rules.

Calculations of equivalent offsets provide both a mean and an estimate of error (e.g., a 95% confidence interval). The mean is usually selected as the required offset, but the precautionary principle requires a larger ratio, such as one that covers the 95% confidence interval. Precautionary offsets that truly account for uncertainty could be extremely high because uncertainty compounds with each parameter included in the estimate (e.g., estimate of the loss, estimate of the benefits of the offset, estimates of the relationship between fish that support a fishery and fisheries productivity),. For instance, Moilanen et al. (2009)[7] suggest that offsets may need to be >100:1 to account for this uncertainty. Such high ratios are not likely feasible in a sustainable development framework, but 1:1 is clearly unacceptable.

Instead, CWF recommends that a tiered approach to offsetting ratios be established in DFO's offsetting policies, with a minimum measure of additionality in all scenarios. For instance, in-kind offsets should be at least 2:1 and out-of-kind offsets should be at least between 4:1 and 8:1 (e.g., Minns 2006)[8] if proponents can provide strong evidence of equivalency below this ratio with high certainty. If estimates of equivalency demonstrate that a higher offset ratio is required, then the ratio should account for uncertainty. For instance, the required ratio could be based on the mean plus one standard deviation. Standard minimums additionality are required to limit underestimates of equivalency ratios, and to compensate for the subset of projects that ultimately do not perform as intended or are abandoned.

OUT-OF-KIND OFFSETS

[7] Moilanen, A., van Teeffelen, A. J. A., Ben-Haim, Y. & Ferrier, S. (2009). How much compensation is enough? A framework for incorporating uncertainty and time discounting when calculating offset ratios for impacted habitat. Restoration Ecology. 17:470-478.

[8] Minns, C. K. (2006). Compensation ratios needed to offset timing effects of losses and gains and achieve no net loss of productive capacity of fish habitat. Canadian Journal of Fisheries and Aquatic Sciences. 63:1172-1182.

The new FPIP formally recognized the difference between in-kind and out-of-kind offsets, acknowledging that either may be acceptable depending on the circumstances. The CWF recognizes the potential benefits of out-of-kind offsets given the right circumstances, and agrees with a shift towards offsetting choices that best achieve fisheries management objectives. We also support the greater flexibility that this offers proponents. However, caution is required to ensure that out-of-kind offsets are used to improve fisheries, rather than to simply reduce costs for proponents. For reasons described above and by Clarke and Bradford (2014), habitat equivalency analyses are fraught with uncertainty and subjectivity, creating opportunities for proponents to argue that a small out-of-kind offset offers great fisheries benefits relative to a more significant in-kind offset. Though such scenarios may exist, equivalent or <1:1 exchanges are risky and contravene the objective of net gain. The CWF recommends that standards be established for out-of-kind offsets to prevent this tool from becoming an excuse to minimize offsetting efforts. For instance, out-of-kind offsets should at minimum cover the same spatial extent as the UWA. Additionally, cost estimates should be provided demonstrating that the out-of-kind offset is at least as costly as an acceptable in-kind offset. Proponents may still benefit from undertaking out-of-kind offsets with such standards in place. For instance, out-of-kind offsets provide greater flexibility in offsetting choices, and can allow proponents to select an offset that can be completed more quickly with higher certainty of effective long-term performance. Additionally, proponents benefit from the social licence obtained by implementing an offset that more clearly benefits local fisheries.

Further guidance could also be provided on when out-of-kind offsets are an acceptable alternative. Though the CWF disagrees with using thresholds and productivity-state curves to identify the magnitude of offset required for the relative effects of a WUA, these concepts have a useful management application. Such thresholds can help determine what *type* of offset is required, rather than *whether* an offset is required. If a threshold has been reached, and a WUA will harm fish or fish habitat in a way that affects productivity, the offset should be equivalent in form to the WUA. For instance, if the WUA will destroy a Walleye (*Sander vitreus*) spawning shoal and will limit Walleye spawning ability in a lake, another Walleye spawning shoal should be created as the offset. However, if spawning habitat is not a limiting factor for Walleye (i.e., the threshold has not been reached), an out-of-like offset may be more beneficial for the ecosystem and associated fisheries. For instance, a coastal wetland severed by the road may be reconnected to restore access to spawning habitat for Northern Pike (*Esox lucius*). Or, a fee could be collected in lieu of offsetting to support more beneficial restoration efforts elsewhere. In relatively pristine environments where thresholds have not been reached, such out-of-kind and fees in lieu of offsets can offer greater flexibility to proponents while providing greater benefits for CRA fisheries.

In recent years, certain offsets for major WUAs that involve the destruction of entire lakes have involved the construction of a nearby man-made lake with equivalent productive capacity for fisheries. Though such projects have been carefully designed and monitored and appear to be successful in offsetting the losses associated with the WUA, the CWF questions the overall value of this approach. The resources required to re-create an entire freshwater ecosystem are tremendous, and may be better spent elsewhere restoring a proportionately greater degree of historic harms. Such decisions can be difficult, especially if local stakeholders lose a fisheries resource and do not benefit from offsetting efforts elsewhere. Still, such out-of-kind offsets should be considered in lieu of whole-ecosystem replacement, particularly in relatively pristine watersheds. Consultation with local stakeholders would be a pre-requisite.

ADDRESS CUMULATIVE EFFECTS

The greatest gap in the implementation of the *Fisheries Act* is the lack of a mechanism to address the cumulative effects of projects that leave residual harm to fish habitat, but are too small to effectively offset individually. The CWF calls for this gap to be addressed in the upcoming revision to the Act.

DFO has invested considerable thought into addressing cumulative effects; however, they have primarily used this term in a different context than the conservation community. Conservationists are concerned with the cumulative effects of small projects that harm fish habitat without being offset. In total, these cumulative effects are severe enough decrease aquatic ecosystem health and fisheries productivity. In contrast, most DFO documents referring to cumulative effects focus on estimating the cumulative effects of existing stressors so that they can identify the *relative* effects of proposed WUA to identify an appropriate offset.

The CWF agrees that direct offsets are not appropriate for small projects that pose low risk to fish habitat. The cost of constructing, monitoring, and maintaining tiny offsets are too high relative to their ecological value. Modern understanding of ecosystem restoration dictates that restoration should begin from the top-down in an ecosystem context, by addressing harms to ecosystem-level process before fixing local habitat problems. Tiny offsets generally attempt restoration from the bottom-up and fail because of insufficient size or because larger processes undermine their effectiveness (e.g., there is little point in creating a spawning bed that fish do not have access to because of a barrier to migration). Overall, this is costly and inefficient for proponents yet offers little benefit to the environment. Indeed, such offsetting requirements were a major point of contention prior to 2012, and among the reasons for the changes to the *Fisheries Act* and FPP. Unfortunately, no alternative mechanism was developed to address cumulative harm from multiple 'minor' works, leading to a slow net loss of fish habitat.
The CWF offers two alternative mechanisms to address such cumulative effects, both of which rely on a registry and permitting system for small projects, which would allow DFO to track the number and types of projects that must be addressed. These mechanisms could be part of a broader approach by DFO to assess and address the cumulative effects of all stressors at watershed scales.

Mechanism 1: Fees in lieu of offsets. By charging a fee for all permitted prescribed works, DFO could combine fees from multiple small projects to pay for meaningfully large and strategically relevant offsets. Such fees would need to be handled as dedicated funds and used only to pay for local restoration projects in the same watershed or region as the original WUAs. A similar system has already been implemented for fines collected for fisheries protection offences. Recent amendments to the *Fisheries Act* now require that such fines be directed to the Environmental Damages Fund, and that such funds be disbursed in the same geographic region with a priority for restoration projects that address the damage caused by the original incident.

The excellent work by DFO's scientists to review the relationships between stressors and productivity may be difficult to apply to individual regulatory decisions or legal cases, but could provide a strong basis for establishing appropriate fees associated with permits for prescribed works. Similarly, DFO's risk assessment framework is currently inappropriately used for triage by allowing projects that cause harm to proceed without an offset. However, this risk assessment framework would be a powerful tool in determining *which* offsetting mechanism (fee in lieu versus direct) is appropriate for a given project, in that fees should only be accepted in lieu of offsets for low risk projects. The previous version of the *Fisheries Act* contained a mechanism for collecting fees in lieu of harm:

> "20. (2) Where it is determined by the Minister in any case that the provision of an efficient fish-way or canal around the obstruction is not feasible, or that the spawning areas above the obstruction are destroyed, the Minister may require the owner or occupier of the obstruction to pay to him from time to time such sum or sums of money as he may require to construct, operate and maintain such complete fish hatchery establishment as will in his opinion meet the requirements for maintaining the annual return of migratory fish.)"

This allowed the minister to collect fees (sums) in lieu of spawning habitat destruction. The fee was dedicated to the operation of a fish hatchery. This concept could be reinstated and applied to small projects and associated restoration efforts as a modern safeguard to finally address cumulative effects.

Mechanism 2: Instead of paying a fee to DFO, proponents could be required to purchase credits from habitat banks (see below). This would require a habitat banking system to be established, with banks providing opportunities to purchase credits in each watershed or Region, and could gradually replace the need for DFO to collect fees in lieu of offsets over several decades.

Modern safeguards are required to address the cumulative effects of small projects. DFO's process of allowing net harm to fish habitat prior to and post 2012 must not continue. Beyond implementing mechanisms to efficiently offset small projects, the CWF recommends that DFO develop regional plans, establish cumulative impact thresholds for various common land transformations and other stressors beyond UWAs, and shift from requiring the use of minor impact technologies to requiring the use of zero impact technologies (e.g., arch culverts).

HABITAT BANKING

Habitat banking is a modern, market-based tool and a creative way of implementing offsets, but are not currently fully supported by DFO. The CWF recommends that DFO begin supporting third-party habitat baking to fully achieve the benefits of this modern safeguard. Habitat banks work by restoring or creating units of habitat, then later selling or using these units as offsets. They are beneficial to industry because they provide a fast, simple option for offsetting and ideally absolve the proponent of liability for ongoing offset performance (for a fee). Proponents generally wish to focus on business rather than on maintaining fish habitat. Habitat banks provide regulatory certainty, requiring primarily the purchase of credits rather than application, review, authorization, and implementation. Habitat banks also offer several conservation benefits:

1. Banks can be designed and implemented in a strategic manner to address top fisheries management objectives, as opposed to the one-off, opportunistic approach frequently used for offsetting.
2. Large restoration projects can be undertaken as habitat banks, including those that would be too large to undertake as an individual offset for most projects.
3. Banks are created and maintained by organizations with expertise in habitat restoration, generally offering greater certainty regarding fisheries benefits than one-off offsetting projects.
4. Banks are established prior to the project and provide ongoing additional fisheries benefits until associated projects occur.
5. Habitat banking exchange ratios typically involve a measure of gain that gradually increases fisheries benefits.

Under the new FPIP, DFO has shown some leadership by initiating a framework to support proponent-led habitat banking; however, this form of habitat banking has limited applicability. A proponent must be planning several small projects or a large project with several small impacts for a habitat bank to be worthwhile. Even then, the proponent remains liable for maintaining the habitat bank.

For the full benefits of habitat banking to be realized, DFO must be willing to authorize the transfer of liability from proponents to habitat bankers. This is a prerequisite to commercial banking, and would create a new industry in Canada that could both benefit the environment and facilitate economic

development. See Hunt et al. (2011)[9] for a detailed review of fish habitat banking opportunities and requirements in Canada.

ADAPTIVE MANAGEMENT

Adaptive management is a powerful concept in natural resource management, but the term is frequently misinterpreted to imply simply revising management decisions over time (i.e., managing actively). Instead, the term refers to a process of deliberate experimentation to learn by doing. In fisheries science, this approach stems from the fact that fisheries can rarely be closed entirely simply to learn how the ecosystem responds. Instead, alternate management strategies must be applied incrementally and their outcomes verified by monitoring (Lee 1993)[10]. Ideally, alternate management strategies are applied simultaneously in a replicated experimental design with appropriate controls, a process termed active adaptive management (McCarthy and Possingham 2007)[11]. When replicate systems are not available, alternative management strategies must be applied and evaluated incrementally (passive adaptive management). In each case, the difference between formal adaptive management and managing actively is that, for adaptive management, predictions or hypotheses regarding the outcomes of the management strategy are stated at the outset, then outcomes are monitored and evaluated to directly inform refinement of management strategies.

In the context of the *Fisheries Act*, most offsets are restoration projects, yet restoration ecology remains a young discipline, creating an ideal scenario for formal adaptive management. Fisheries and Oceans Canada should commit to learning about offsetting effectiveness, and has made recent progress in doing so by developing effectiveness monitoring guidelines (Smokorowski et al. 2015)[12]. However, a full understanding of how ecosystems respond to change (including both disturbance and restoration) requires a significant investment in research. The resources and timelines required to adequately assess effectiveness are beyond the reasonable scope of most WUAs. This can require monitoring for several years before the change occurs, replication of both controls (Underwood 1994)[13] and treatments, and subsequent monitoring of ecosystem responses for years or decades. For most offsets, the primary goal of effectiveness monitoring is to understand whether the offset is functioning as intended so that improvements can be made if necessary to prevent a net loss of fisheries productivity. Often, this provides valuable knowledge of the effectiveness of offsetting techniques, but the experimental design lacks the power of a formal adaptive management experiment.

As a modern safeguard, DFO should consider implementing an 'experimental' class of offsets in an adaptive management framework. This form of offset would be suitable for evaluating the effectiveness of novel restoration techniques. The use of novel techniques is currently discouraged, given that proponents are currently liable for the long-term effectiveness of offsets. A separate class of offsets could help encourage experimentation by absolving proponents of long-term liability in exchange for a greater investment in offset size, replication, and detailed long-term monitoring. Though some experimental offsets will fail,

[9] Hunt, K., Patrick, P., and Connell, M. 2011. Fish habitat banking in Canada: opportunities and challenges. Econ. Commer. Anal. Rep. 180:vi + 66p.
[10] Lee, K. N. (1993). Compass and gyroscope: integrating science and politics for the environment. Island Press. Washington DC.
[11] McCarthy, M. A., & Possingham, H. P. (2007). Active adaptive management for conservation. Conservation Biology. 21:956-963.
[12] Smokorowski, K.E., Bradford, M.J., Clarke, K.D., Clément, M., Gregory, R.S., Randall, R.G. 2015. Assessing the effectiveness of habitat offset activities in Canada: monitoring design and metrics. Can. Tech. Rep. Fish. Aquat. Sci. 3132: vi + 48 p.
[13] Underwood, A. J. (1994). On beyond BACI: sampling designs that might reliably detect environmental disturbances. Ecological applications. 4:3-15.

environmental benefits will be obtained from those that succeed, and particularly from the knowledge gained. This knowledge will inform and improve future offsetting efforts.

The new FPIP introduced the concept of 'complementary measures', which partially achieves these objectives yet falls short of supporting full adaptive management. Complementary measures allow 10% of offset costs to be dedicated to research and effectiveness monitoring under strictly defined conditions. The CWF supports the recent inclusion of complementary measures, and proposes that similar conditions be established to allow for a class of fully experimental offsets in a true adaptive management framework.

WATERSHED AND RIPARIAN PROTECTION IS REQUIRED

The *Fisheries Act* focuses entirely on WUAs that occur in the water; however, modern understanding of aquatic ecosystems extends beyond the shoreline. Human activities in terrestrial habitats within a watershed can have significant effects on the health of associated aquatic ecosystems and fisheries. Deforestation (for timber harvest or conversion to croplands) can lead to aquatic ecosystem degradation and improper farming practices or increases in impervious surfaces (i.e., urbanization) can be even more severe. Changes to the riparian zone have particularly pronounced effects on aquatic ecosystems because of the direct role that this zone plays in forming and regulating aquatic habitat. The riparian zone filters chemicals and sediment from runoff, regulates flow and temperature, and directly provides both nutrients and habitat to aquatic systems. Large woody debris that falls from the riparian zone into adjacent waterbodies is among the most important habitat features that support fisheries. The CWF recommends that the *Fisheries Act* be revised to offer direct protection to watersheds and riparian zones, but acknowledges that UWAs in most terrestrial habitats must be handled differently from a regulatory perspective.

Riparian zone protection is the most straightforward and has been provided by several provinces; however, riparian zones are not protected across Canada. The CWF recommends that the *Fisheries Act* provisions against harm to fish habitat be extended to the riparian zone to a minimum distance from all shorelines (e.g., 15 m). Works, undertakings, and activities that occur within this zone should be subject to the same provisions as those that occur in the water.

Fisheries and Oceans Canada should recognize the value of floodplains as fish habitat, and the importance of maintaining lateral connectivity between streams and rivers and their floodplains. Mechanisms should be developed to protect these habitats and access to them. Similarly, DFO must develop mechanisms to protect watersheds from damaging land use practices, or to limit such practices below thresholds where aquatic ecosystems exhibit harm. As a step towards this, watershed-scale planning can help assess current ecosystem status and established desired future states, along with priorities for aquatic restoration. However, further mechanisms must be established to limit or offset the effects of damaging land use practices on aquatic habitat to avoid a net loss of habitat quality.

PROTECTING AND RESTORING HABITAT THROUGH PARTNERSHIPS

<u>Government to non-government partnerships in restoration</u>

The RFCPP, launched in 2013, provides federal funding for habitat restoration that benefits recreational fish. This program was initially funded for one year at $5 million, and is currently funded for three years at $10 million per year. Projects require matching funds from non-federal sources. Improvements have been made since the program's inception, including increased funding and stability, and revisions to allow a portion of funding to cover project planning costs. Many successful restoration projects have been funded by the RFCPP, but the program suffers from several challenges. First, proposals and reporting are onerous

given the low cost and small scope of most projects (<$100,000). Second, the program lacks overall goals and strategic direction, and typically funds one-off restoration projects without following an ecosystem (top-down) approach to restoration. Third, no hierarchy of habitat values is provided for the suite of restoration project types fundable by the RFCPP. This means that project types with dubious fish habitat value (e.g., armouring banks) are encouraged to the same degree as projects with known benefits (e.g., restoring natural meanders to a channelized stream). Fourth, calls for proposals are issued irregularly with short application windows, limiting applicants to those who have the capacity at the time to rapidly develop a detailed proposal. Previous instances where DFO received a limited number of applications to the program can be attributed to these challenges. Fifth, the RFCPP provides an important source of federal funding to address previous harm to fish habitat; however, this amount is small relative to the need for aquatic restoration across Canada. To improve restoration partnerships, the CWF recommends the following:

1. Increase federal funding for fish habitat restoration
2. Establish a permanent funding stream for fish habitat restoration
3. Establish stable annual dates for calls for proposals for this funding
4. Develop a simple application process to minimize time burden on applicants
5. Establish priority areas and develop long-term objectives for each area
    - Establish restoration priorities from an ecosystem (top-down) perspective
6. Review scientific evidence of the effectiveness of existing restoration techniques, and prioritize techniques accordingly for funding.
7. Establish an external peer review process to award funding (e.g., see the process used by the Great Lakes Sustainability Fund)
8. Reduce reporting requirements, focus reporting on outcomes for fish habitat, and track program success
9. Strategically require and fund effectiveness monitoring in an adaptive management framework to increase knowledge of the effectiveness of novel or poorly understood restoration techniques

<u>Eliminate need for letters of credit for restoration projects</u>

The CWF recommends immediately ending the practice of requiring letters of credit for restoration projects. Currently, restoration projects undertaken by conservation organizations or governments (e.g., municipalities, conservation authorities) are treated as WUAs. Fisheries and Oceans Canada requires authorizations and associated letters of credit when the restoration WUA is considered a 'major' work to ensure implementation and monitoring of the restoration project. Such requirements are counter-intuitive and hamper efforts to restore aquatic habitat in Canada. This forces conservation organizations to spend money that could otherwise further support restoration on term insurance for the letter of credit. A suite of defined restoration projects should be quickly defined as prescribed works that do not require individual authorizations, offsets, or letters of credit. Novel restoration projects may require review and authorization by DFO, but should not require letters of credit, especially if the project contains a clear experimental design and robust monitoring protocols to ensure that knowledge is gained. This class of prescribed works should not be freely available to industry-sector proponents. When development projects directly benefit fish habitat, an authorization should still be obtained. Industries wishing to obtain a prescribed works designation for an actual restoration project should do so in partnership with an independent non-governmental organization. Likewise, governmental organizations undertaking infrastructure development projects, rather than restoration projects, should be subject to the normal authorization process and offsetting requirements.

<u>National Aquatic Habitat Conservation Partnership Initiative</u>

With support from DFO and the Canadian Electricity Association, the CWF recently hosted a workshop to assess interest in a national, multi-stakeholder initiative to support aquatic habitat conservation. The workshop involved participants from all sectors of Canadian society (federal and provincial governments, First Nations, conservation authorities, industry groups, consultants, ENGOs, academic researchers). There was widespread interest in moving forward with a partnership to address aquatic habitat

conservation. There was support for forming a national multi-sectoral policy advisory committee on aquatic habitat. This committee could address concepts such as protection, habitat banking, net gain, adaptive management, fees in lieu of offsets, and habitat equivalencies. The group could provide multi-sectoral advice on processes for implementing these ideas and conduct relevant reviews of scientific evidence and policy options. There was similar interest in multi-sectoral collaboration on science and planning, with potential for the group to set priorities for both restoration and research. Similarly, participants thought that the partnership could work to identify additional funding sources for both restoration and science. Participants acknowledged that certain activities are regional/watershed responsibilities, rather than National. Examples include setting specific restoration or protection priorities, or offering recommendations on decisions such as authorizing out-of-kind offsets. The national partnership could help found and support a network of regional working groups that could address local issues. Finally, a national partnership could make a major contribution to aquatic habitat conservation simply by collecting and sharing effective policies and restoration practices, scientific discoveries, and funding sources.