

# Feasibility of Habitat Banking in Manitoba

by

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## **ABSTRACT**

According to the habitat protection provisions of the *Fisheries Act*, industry must develop or restore habitat as compensation for a “harmful alteration, disruption or destruction to fish habitat” to achieve “no net loss of the productive capacity of fish habitats (NNL).” Occasionally, compensation projects completed in accordance with the conditions of a *Fisheries Act* Authorization do not achieve NNL of fish habitat. The feasibility of using habitat banking as a compensation tool was investigated through qualitative document review, semi-directed interviews, site visits, and a modified Delphi approach workshop.

Results indicated that habitat banking is feasible in Manitoba; however, feasibility in northern Manitoba diminishes because much of the land is owned by the Crown and is sparsely developed. It is recommended that DFO National Head Quarters develop a standard tool for measuring the productive capacity of fish habitat and strive for Canada-wide consistency in their application of the habitat banking policy.

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The destruction of aquatic and terrestrial habitats across Canada has always been of great concern to me. My decision to pursue a Master of Environment degree was rooted in my desire to focus my education on learning about strategies to conserve aquatic habitats in hopes that it may lead to a career in conservation biology.

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## 1. INTRODUCTION

This chapter provides the background and rationale relating to the purpose and problem statement of the thesis; outlines the research objectives to be addressed; and describes the scope of the thesis. Research is based on the former habitat provisions of the *Fisheries Act*, specifically section 35, the 1986 federal Policy for the Management of Fish Habitat (here after, the Habitat Policy) and the associated standard operational policy, the Practitioners Guide to Habitat Compensation (2003 version 1.1).

The *Fisheries Act* was amended on June 29, 2012 and sets a higher threshold for harm (i.e., serious harm to fish is less stringent than previous harmful alteration, disruption or destruction of fish habitat) and the application of the new s.35 prohibition is much narrower. It remains to be seen how habitat banking will be applied within a new regulatory and policy framework.

### 1.1 Background and Rationale

Since its enactment the *Fisheries Act* has undergone several amendments including a significant revision which occurred in 1976 when Parliament ratified the habitat protection provisions of the *Act*. Operationally, the Fish Habitat Management Program (HMP), a key federal regulatory program, became responsible for administration and enforcement of the habitat protection provisions. A specific priority of the HMP and the main habitat protection provision of the *Act* is section 35(1) which prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat (DFO 1986). Any activity that may result in a HADD is prohibited unless authorized by the Minister of Fisheries and Oceans through Section 35(2) of the *Act*. Approved projects must comply with specific terms and conditions authorized by the Minister of Fisheries and Oceans (The House of Commons 1985).

As a result of improvements made to the HMP the federal department of Fisheries and Oceans Canada (DFO) implemented the 1986 Policy for the Management of

Fish Habitat (herein referred to as “the Habitat Policy”, DFO 1986) to provide a new policy framework for administering and enforcing the habitat provisions of the *Act*. The Habitat Policy applies to all works and undertakings that have the potential to harm fish habitat. The overall objective of the Habitat Policy is to achieve a net gain in the productive capacity of fish habitat. The strategy for achieving this objective is to conserve the current productive capacity of habitats, restore damaged habitats, and develop new habitats (DFO 1986). The Habitat Policy strives to maintain the current productive capacity of fish habitats by applying No Net Loss (NNL) as a guiding principle (DFO 1986). To date the Habitat Policy remains the foundation document for the HMP.

DFO’s HMP practitioners review each development proposal and assess its potential to cause a HADD of fish habitat (DFO 1986, 2002). In order to demonstrate that NNL is achieved, every authorization includes the condition to develop compensatory habitat to offset the loss of habitat being authorized. DFO’s hierarchy of preferred options for compensation (DFO 2002) is as follows:

1. Create or restore like habitat at or near the development site;
2. Create or restore unlike habitat at or near the development site;
3. Create or restore habitat off-site; and,
4. Measures of last resort include: artificial production techniques to maintain a stock of fish, deferred compensation or restoration of chemically contaminated sites.

The hierarchy of preferences acts as a guide for the creation or restoration of compensatory habitat (DFO 2002). Proponents are responsible for providing a compensation plan outlining the conditions such as time, location, and methods (DFO 2002).

Habitat banking is an off-site compensation option that may help to ensure that there is no net loss of fish habitat. It is appropriate to use habitat banking as a compensation option when creating or restoring habitat at the development site is not possible (DFO 2002). Fisheries and Oceans Canada defines habitat banking as



“The planned creation or improvement of fish habitat, in order to provide compensation for a future development project(s)” (DFO 2007a). The fundamental principle of habitat banking is the completion of compensation prior to the alteration, disruption or destruction of fish habitat (DFO 2007a). The creation of a habitat bank does not involve monies. The proponent creates or improves fish habitat for future use as compensation. Before a habitat bank can be used as compensation it is evaluated to ensure that it is ecologically successful and to determine the value of the bank.

Currently there is a lack of knowledge and understanding of roles and responsibilities for setting fishery management objectives, assessing habitat requirements and determining priorities for habitat development and restoration. Manitoba Hydro has suggested to DFO that since they are required to compensate for fish habitat losses they want the compensation to be as meaningful and productive as possible. This thesis investigates the feasibility of using habitat banking as a compensation tool in for Manitoba Hydro power generation projects and also provides the necessary basis for governments and industry to explore this evolving compensation tool.

## **1.2 Problem Statement**

Hydroelectric generation is a significant industry in Manitoba. Although hydro power is considered a sustainable energy resource, there are potentially adverse impacts to fish and fish habitat. Industry must develop or restore habitat as compensation for a HADD of fish habitat to achieve NNL. However, it is often the case that few compensation options exist at the site and for similar habitat. Furthermore, monitoring to assess the effectiveness of habitat compensation is sometimes insufficient. Consequently, compensation projects completed in accordance with the conditions of a *Fisheries Act* Authorization that do not achieve NNL of fish habitat would require changes to the satisfaction of DFO. This can result in significant regulatory uncertainty to Manitoba Hydro, DFO and Manitoba Water Stewardship.

Manitoba Hydro has identified habitat banking as a potential solution to help achieve DFO's NNL of fish habitat policy and therefore regulatory certainty for their hydro facilities. Habitat banks may be a way to enable both conservation and development by providing a means for development to occur in a more responsible and ethical manner.

Fish habitat restoration, rehabilitation and creation requires time to develop and mature and is most successful when integrated as part of a broader ecosystem plan. Piecemeal small compensation projects that do not address identified priorities for conserving and protecting fish habitat are not very effective at achieving NNL because they often fail to produce productive fish habitat (Quigley and Harper 2006). Habitat banking, on the other hand, is being considered as an alternative compensation option because large scale fish habitat is created or restored on a planned priority basis prior to development impacts. Habitat banking also has potential to achieve a net gain of fish habitat by addressing ecosystem bottlenecks like habitat fragmentation and can be further enhanced through integrated watershed planning and management.

Both Manitoba Conservation and Water Stewardship Department and DFO's Fish Habitat Management Program (Winnipeg) have expressed their interest in exploring, along with Manitoba Hydro, the potential of habitat banking. This expression of interest builds on existing partnership agreements between DFO and the Province of Manitoba and the Canadian Electrical Association (DFO 2003a). These partnership agreements were developed to facilitate communication between levels of government and industry and encourage development of work plans to achieve mutually beneficial objectives such as improved regulatory review process and fisheries resources by exploring available options such as habitat banking (DFO 2003a). It is anticipated that this research will benefit not only Manitoba Hydro, but also other industries such as Forestry, Mining, Oil & Gas, and other government departments with development mandates such Manitoba Infrastructure and Transport, Agriculture, and Parks.

### **1.3 Research Purpose and Objectives**

The purpose of this thesis is to investigate the feasibility of using habitat banking as a compensation tool for Manitoba Hydro power generation projects.

The research objectives include:

- First, document the application of habitat banking in Canada and the United States and assess the regulatory framework to determine whether habitat banking is being used under legislation elsewhere in Canada and the United States to meet needs similar to those of Manitoba Hydro and DFO.
- Second, determine the opportunities and challenges associated with habitat banking.
- Third, identify an effective habitat banking system(s) (compensation before impact) that would best serve Manitoba Hydro, Manitoba Conservation and Water Stewardship, and DFO regulatory requirements.
- Fourth, determine how Manitoba Hydro and DFO might begin to implement such a system if it was mutually agreeable to both.

### **1.4 Scope**

It is important to clarify that this thesis is focused exclusively on section 35(1) of the *Fisheries Act* which states that “no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat” (The House of Commons 1985). Also relevant to this thesis is section 35(2) which states “no person contravenes subsection (1) by causing the alteration, disruption or destruction of fish habitat by any means or under any conditions authorized by the Minister or under regulations made by the Governor in Council under this Act (The House of Commons 1985).

The following is a summary of the other Habitat Protection and Pollution Provisions that will not be considered as part of this thesis:

*Section 20*, which deals with fish passage around obstructions;

*Section 22*, which addresses the provision of minimum water flows over spillways or obstructions and below obstructions;

*Section 30*, which addresses the need for fish guards or screens over water intakes and certain waterways constructed for irrigation, manufacturing or power generation;

*Section 32*, which prohibits the killing of fish by means other than fishing, unless authorized by the Minister of Fisheries and Oceans Canada; and

*Section 36*, prohibits the deposit of any substances in water that makes the water deleterious to fish and fish habitat. Section 36 is administered by Environment Canada.

On June 29, 2012, when the *Fisheries Act* was amended, sections 20, 22, and 30 were repealed and combined into a single new section 20. Section 32 was amended and will eventually be repealed (i.e., combined into a single prohibition) with the coming into force of the new section 35.

## **2. METHODOLOGY**

### **2.1 Research Design**

The research design is based on qualitative methodology. This thesis involved a case study approach and was informed through triangulation of various data collection methods in order to test for consistency across methods and data sources. Creswell (2003) describes case studies as an approach which allows the researcher to thoroughly explore a program, event, activity, process, or one or more individuals. The case studies approach is the most appropriate strategy of inquiry for this research because the research being undertaken involves investigation of current habitat banking projects in North America. The research design was also extensive in that it involved communication with diverse participants from several regions of Canada and the United States.

### **2.2 Data Collection**

#### **2.2.1 Literature and Document Review**

The first phase of data collection began with a thorough review of the literature related to habitat banking as well as general compensation strategies for aquatic habitat. Literature and document review are an appropriate method of data collection for this thesis because in order to identify a suitable habitat banking system, it is necessary to comprehend the development of activities and policies related to fish habitat compensation. Knowledge of the regulatory framework for habitat banking systems in Canada and the United States was gained by reviewing legislation and government documents, peer-reviewed journal articles, and books.

Undertaking the literature and document review of habitat banking proved to be a challenging endeavor due to a lack of published data on the subject. In particular, there was a lack of published data on DFO requirements and preferences for HADD compensation, as well as details regarding banking projects in Canada and the United States. Since much of the information on banking projects exists in the form of grey literature, it was necessary to contact DFO offices in several provinces by

phone and email. Thus, some of the collected information is in the form of personal communication.

### **2.2.2 Open-Ended Semi-Structured Interviews**

The second phase of data collection involved open-ended semi-structured interviews. Open-ended semi-structured interviews are directed by an interview guide which is a list of questions used by the interviewer to investigate the research topics (Russell and Harshbarger 2003). The rationale for selecting this method is that it allows for a flexible and effective interview process (Russell and Harshbarger 2003). Open-ended semi-structured interviews permit the interviewer flexibility in terms of deciding which questions to ask from the interview guide (Russell and Harshbarger 2003). Generally, the interviewee's responses help the interviewer decide which question to ask next. Moreover, this method of data collection is effective because it fosters discussion that enables the interviewer to better understand the interviewee's position and reasoning (Russell and Harshbarger 2003).

The snowball technique, a form of non-probability sampling was used to select interview participants. Non-probability sampling does not involve a random sample in which all individuals in the population have an equal probability of being selected (Creswell 2003). According to Babbie (1998), "snowball sampling is appropriate when the members of a special population are difficult to locate." In snowball sampling each located subject identifies additional key informants and the process of collecting interview participants continues (Babbie 1998).

In this case, primary individuals from regulatory agencies were identified and contacted. They were asked for information on habitat banking projects in Canada and the United States. The information collected was then used to directly contact the key stakeholders involved in various banking projects. The site visits represented a diverse cross-section and were all based on the habitat banking concept of compensation prior to development impact. In total, 11 habitat banks were visited - three were located in California, two banks in each of British

Columbia, Quebec and Nova Scotia, and one bank located in each of Alberta and Manitoba. A total of 15 interviews were conducted at the banking projects. Interviewees included regulatory agency representatives, consultants, and proponents. Since the majority of data on habitat banking projects is unpublished, the interviews were used to document the application of habitat banking in Canada and the United States and to assess the regulatory framework.

### **2.2.3 Modified Delphi Approach Workshop**

The third phase of data collection included a modified Delphi approach (MDA) workshop. The goal of the MDA workshop was to determine whether habitat banking is a viable option for Manitoba and if so, what is required so that proponents can use habitat banking as a mitigation tool. The traditional Delphi Technique can be defined as a systematic tool for harnessing group knowledge (Dalkey 1969). It is a method used to solicit expert opinion anonymously through written communication (Delbecq et al. 1975). The technique relies on an iterative process where participants respond to a series of questionnaires on a specific topic. All responses are summarized then returned to participants giving them the opportunity to review the opinions of others and revise their own opinions. The objective is to reveal differing viewpoints and reach an unbiased consensus (Delbecq et al. 1975).

The traditional Delphi Technique has two shortcomings that made it an unsuitable tool for data collection in this thesis. First, the traditional Delphi's reliance on written communication through a series of questionnaires can make it slow and time consuming (Strauss & Zeigler 1975). Second, preventing verbal interaction can result in interpretation challenges and may reduce collective understanding and the ability of participants to question each other (Delbecq et al. 1975).

The traditional Delphi technique was modified in order to collect data more efficiently and provide participants with the opportunity to clarify and discuss responses. This approach was appropriate because the goal was not to reach a consensus, as with the traditional Delphi Technique, but instead to acquire

knowledge from multiple fisheries habitat experts. A literature review of habitat banking as well as the data collected during the site visits provided the basis for the four workshop questions. The questions were presented separately and participants were asked to write their responses on paper provided to them. Participants then engaged in a facilitator led discussion while their responses were recorded on a flipchart displayed for the purpose of discussion.

Information collected during the workshop was summarized and returned to participants so that they had the opportunity to provide additional feedback. Revisions were highlighted allowing participants to easily identify edits and provide their comments. This process was repeated three times until participants had nothing further to add, and were satisfied with the workshop summary.

Participants of the MDA workshop were asked the following four questions:

Question # 1) From your knowledge as an agency or a proponent, what are the main reasons or drivers leading to establishing a habitat bank, what steps would be taken and who would be involved?

Question #2) Describe a method for determining habitat bank withdrawal amounts when there are differences in habitat quality between the banked credits and the newly destroyed habitat.

Question #3) What are the barriers and opportunities associated with creating a standard for monitoring or measuring the habitat quality and success of a habitat bank?

Question #4) What opportunities exist for habitat banking relative to meeting resource management goals such as fisheries management objectives and/or watershed management plans?



#### **2.2.4 Interview Guide**

The interview guide (Appendix A) consisted of a list of open-ended questions used to guide the interviewer through the research topics. The interview guide used for this practicum was developed in collaboration with key representatives from DFO. Questions in the interview guide were influenced by the *Policy for the Management of Fish Habitat* which includes the following eight Implementation Strategies (DFO 1986):

1. Protection and Compliance
2. Integrated Resource Planning
3. Scientific Research
4. Public Consultation
5. Public Information and Education
6. Cooperative Action
7. Habitat Improvement
8. Habitat Monitoring

Some of these concepts were included in the interview guide (Appendix A) in order to evaluate whether or not proponents were building these concepts into their habitat bank projects. The interview guide was organized according to the logical process that might be applied to develop a habitat bank and manage its implementation, i.e. *Initiation of Habitat Bank, Construction of Habitat Bank, Withdrawals from Habitat Bank, Maintenance of Habitat Bank*. The interview guide was evaluated to ensure that it could be used to meet the objectives of this thesis.

#### **2.3 Data Analysis**

Data were analyzed as they were collected. Each interview was documented with an audio recorder and was transcribed and thoroughly read prior to conducting the proceeding interview. Once all interviews were transcribed they were re-read to gain a general sense of the data and begin recognizing patterns and gaps in the

data. Emerging themes were identified manually using matrix tables to record recurrences of each theme. Variations and inconsistencies were also tracked.

The data were organized into case studies which allowed further assessment of respective approaches to habitat banking. In order to determine whether habitat banking is feasible, one must be aware of all conditions or circumstances that may affect its success. Thus, data were analyzed to reveal challenges and opportunities associated with habitat banking experienced by proponents, consultants, and regulatory agencies.

According to Creswell (2003) triangulation is a strategy which can be used to ensure internal validity and provide justification for themes. Triangulation is often used by researchers to test the strength of their interpretations (Patton 2002). As indicated by Patton (2002) triangulation in data analysis provides diverse ways of viewing the same experience and adds credibility by strengthening confidence in the conclusions. Triangulation of various data collection methods was used for this thesis in order to test for consistency across data sources. Data sources included literature and documents, interviews, and a modified Delphi approach workshop. Triangulation of data sources was employed to capture multiple perspectives. Having multiple perspectives was particularly helpful when creating the Fish Habitat Compensation Model because the model must accurately account for DFO regulatory requirements while being user-friendly for proponents.

### **3. APPROACHES TO HABITAT BANKING**

Various approaches to habitat banking exist both in Canada and the United States. This thesis focuses on habitat banking as defined by DFO in that the compensation is completed prior to the development impact. In the United States, mitigation banking and conservation banking both emerged as most comparable to habitat banking in that they are constructed and functioning in advance of development impacts.

In the United States habitat banking is used as a regulatory method to create, restore, enhance, and preserve both aquatic and terrestrial habitat. In Canada, habitat banking also is used as a way to create, restore, enhance both aquatic and terrestrial habitat; however, it cannot be used to preserve an area already protected under other legislation. In the United States, mitigation banking can be profitable when credits are created and sold by entrepreneurs to developers. Market forces such as supply and demand help to establish the financial value of those credits and thus, ecosystems are granted financial value. In Canada, the creation of a habitat bank does not involve monies because the system to profit from habitat banking has not been established. The proponent creates or improves fish habitat for future use as compensation according to regulatory requirements.

In both Canada and the United States the availability of habitat banking as a compensation option has allowed the proponent to move from a project-by-project compensation approach to a long-term thinking approach. This is due to the fact that a habitat bank must be constructed before it is needed. Habitat banking allows for coherent conservation planning where compensation is integrated as part of a broader ecosystem plan, e.g. basin or watershed level. Integrated resource planning and management is critical to ensure that individual objectives are achievable and sustainable into the future.

### **3.1 Canadian Approach to Habitat Banking**

Habitat banking in the Canadian context is an off-site compensation option that may help to ensure that there is no net loss of fish habitat. Fisheries and Oceans Canada defines habitat banking as “The planned creation or improvement of fish habitat, in order to provide compensation for a future development project(s)” (DFO 2003). The fundamental principle of habitat banking is the completion of compensation prior to the alteration, disruption or destruction of fish habitat (DFO 2007a). The proponent creates or improves fish habitat for future use as compensation.

In Canada, Habitat Policy emerged as a response to the decline of fisheries due in large part to destruction and other impacts to fish habitat. Habitat banking was developed as a management option to adhere the NNL guiding principle in the policy and applied as a condition of Authorization under s.35(2) the *Fisheries Act*. The use of a habitat bank cannot be considered until the proponent has followed the Hierarchy of Compensation Options to determine whether compensation can be completed at or near the development site (DFO 2003). It is appropriate to use habitat banking as a compensation option when creating or restoring habitat at the development site is not possible (DFO 2003). It is important to note that the existence of a habitat bank does not guarantee authorization of any future HADD(s) (DFO 2003).

### **3.2 Regulatory Framework**

Since this thesis deals with Manitoba Hydro, whose operations can potentially result in negative impacts to fish habitat and the fisheries in Manitoba, it is essential as an initial step to review the development of policies related to fish habitat. This section presents an overview of the regulatory framework for habitat banking.

### **3.2.1 Federal Authority for Fish Habitat Protection in Canada**

According to Section 91(12) of the *Constitution Act* (1867) the federal government has exclusive legislative authority to make laws respecting “Sea Coast and Inland Fisheries”. Judicial interpretation describes this to mean that only the federal government has authority to make laws regarding the conservation and preservation of fisheries. In 1868 Canada’s Parliament passed legislation for the *Fisheries Act* giving the Minister of Fisheries and Oceans responsibility for the management, conservation and development of the fishery on behalf of Canadians. Regulations under the *Fisheries Act* are administered by the federal Department of Fisheries and Oceans (DFO), Environment Canada, as well as individual provinces and territories. The *Fisheries Act* is intended to regulate the protection and operation of inland and coastal fisheries on public, private and aboriginal lands, thus ensuring sustainable fisheries for all Canadians (The House of Commons 1985).

Since its enactment The *Fisheries Act* has undergone several amendments including a significant revision which occurred in 1976 when Parliament ratified the habitat protection and pollution prevention provisions of the *Act*. Operationally, the Fish Habitat Management Program (HMP), a key federal regulatory program, became responsible for administration and enforcement of the habitat protection provisions [and Environment Canada is responsible for the pollution prevention provisions]. A specific priority of the HMP and the main habitat protection provision of the *Act* is section 35(1) which prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat (DFO 1986). Any activity that may result in a HADD is prohibited unless authorized by the Minister through Section 35(2) of the *Fisheries Act*. Approved projects must comply with specific terms and conditions authorized by the Minister (The House of Commons 1985).

#### *3.2.1.1 DFO’s Habitat Management Program and Application of the Habitat Protection Provisions of the Fisheries Act – Policy, Program and Practices*

In an effort to improve the HMP, Fisheries and Oceans Canada (DFO) publicly released a discussion paper in 1983 and a proposed policy and procedures paper in

1985 (DFO 1986). Public engagement revealed that fish habitat management could be improved by applying integrated resource planning together with habitat and fisheries management objectives (DFO 1986). Consequently, the 1986 Habitat Policy was implemented to provide a new policy framework for administering and enforcing the habitat provisions of the *Fisheries Act*. The Habitat Policy applies to all works and undertakings that have the potential to harm fish habitat. The overall objective of the Habitat Policy is to achieve a net gain in the productive capacity of fish habitat. The Habitat Policy outlines three supporting goals for achieving this objective - first, through the conservation of fish habitat, second, by restoring fish habitat and third, through fish habitat development (DFO 1986).

The Habitat Policy includes eight implementation strategies which are designed to facilitate the net gain objective and three supporting goals. Of particular importance is strategy number two, Integrated Resource Planning because it is fundamental to achieving the net gain objective. Through consultation with sectors engaged in resource utilization, such as provincial, territorial and municipal governments, and other federal government agencies, DFO can resolve multiple resource use conflicts affecting the fisheries. As a result, it becomes possible to integrate fish habitat requirements with fisheries management objectives. The Habitat Policy strives to maintain the current productive capacity of fish habitats by applying No Net Loss (NNL) as a guiding principle (DFO 1986). To date the Habitat Policy remains the foundation document for the HMP.

Regulating fish habitat is federal jurisdiction. DFO seeks continuous improvement for efficient, consistent, and predictable decision making on proposed developments. All projects with the potential to affect fish habitat are evaluated according to a science-based Risk Management Framework (RMF). The RMF is designed to evaluate development proposals and categorize the risks to fish and fish habitat. Central to the RMF is risk communication.

DFO has streamlined its management of low-risk activities by creating Operational Statements which outline mitigation measures needed to avoid a HADD. Proponents

are expected to comply with the conditions and complete the Measures to Protect Fish and Fish Habitat listed in the applicable operational statement. According to the habitat protection provisions of the *Fisheries Act* proponents are not obligated to request an Operational Statement, or an Authorization from DFO. Furthermore, proponents are not required to submit notification forms to DFO after they have been issued an operational statement. However, proponents who do not voluntarily submit their development proposals to DFO and subsequently alter, disrupt or destroy fish habitat may be prosecuted under the *Fisheries Act* (DFO 2008a).

In practice, DFO's HMP practitioners review each development proposal they receive to assess its potential to cause a HADD of fish habitat (DFO 1986, 2002). The referral process enables HMP staff to advise proponents on how to proceed with their project while complying with the *Fisheries Act* (DFO 2008a). For example, if the development project may result in a HADD, HMP staff will first suggest that the project be redesigned or relocated to avoid the HADD. When avoidance is unfeasible the proponent is required to apply appropriate on-site mitigation measures to balance the impacts on fish habitat. If the HADD cannot be avoided or mitigated, DFO will not issue an authorization under subsection 35(2) of the *Fisheries Act* unless NNL can be achieved through the development of compensatory fish habitat (i.e. newly created and/or restored fish habitat (DFO 2008a)).

When a HADD is authorized the proponent is required to provide habitat compensation to off-set the loss of fish habitat according to DFO's Habitat Policy and hierarchy of preferences to achieve NNL of productive capacity (DFO 1986, 2002). The hierarchy of preferred options for compensation (DFO 2002) is as follows:

1. Create or restore like habitat at or near the development site;
2. Create or restore unlike habitat at or near the development site;
3. Create or restore habitat off-site; and,

4. Measures of last resort include: artificial production techniques to maintain a stock of fish, deferred compensation or restoration of chemically contaminated sites.

The hierarchy of preferences acts as a guide for the creation or restoration of compensatory habitat (DFO 2002). The specific activities that would be acceptable as compensation are not included in the hierarchy of preferences (Madsen *et al.*, 2010). Proponents are responsible for providing a compensation plan outlining the conditions such as time, location, and methods (DFO 2002). Approval of the compensation plan is a prerequisite to ministerial authorization being granted by DFO; however, an audit by Canada's Auditor General in 2009 found instances where projects were issued ministerial authorizations even though compensation plans were absent or inadequate (OAG 2009).

It is preferable that compensation be completed at or near the development site before moving off-site (DFO 1986, 2002). According to the hierarchy of preferences, proponents must first investigate all on-site compensation options prior to using a habitat bank. It is appropriate to use habitat banking as a compensation option when creating or restoring habitat at the development site is not possible (DFO 2002). In this case the proponent may request that an existing habitat bank be used as compensation. DFO will consider such requests on a case-by-case basis. Essentially, habitat banking means that compensation is completed before an impact occurs. Therefore, a habitat bank cannot be used as compensation unless it is completed prior to a HADD being issued. The proponent will initiate the process of building a habitat bank and will communicate with the appropriate regulatory agency representatives to relay their intentions of creating a habitat bank. If the location and design of the habitat bank are approved by the regulatory agency, then the proponent will proceed with construction of the bank. The Habitat Policy has adopted a "polluter pays" principle in that the proponent is responsible for all compensation related costs (DFO 1986, 2002). It is important to note that DFO does not accept cash in-lieu of compensation (DFO 1986, 2002).



Achieving NNL of fish habitat through monitoring is the proponent's responsibility. In 2005, DFO launched the Habitat Compliance Modernization (HCM) initiative which is the sixth and final element of the Environmental Process Modernization Plan. The HCM initiative clarifies compliance requirements and improves the HMP's ability to monitor a development project's compliance with the habitat protection provisions of *The Fisheries Act* (DFO 2007a). For example, if physical structures are a requirement of the Authorization, then DFO would apply compliance monitoring to ensure that the proponent builds the structures according to the compensation plan (DFO 2002). Effectiveness monitoring is also required to measure the condition of the new habitat and to ensure that the habitat is functioning as agreed at the end of the monitoring period (DFO 2002). The period of monitoring depends on the complexity of the project (DFO 2002). DFO recommends that monitoring be conducted on practical intervals such as every second year.

### *3.2.1.2 Manitoba Regulatory Framework for Aquatic Ecosystem Protection*

When the Province of Manitoba entered Confederation in 1870 it did not have jurisdiction over Crown lands and natural resources. Manitoba was finally granted jurisdiction over its Crown lands and natural resources on July 10, 1930 when the Parliament of Canada passed *The Manitoba Natural Resources Transfer Agreement* under *British North America Act, 1867* and consolidated in *Constitution Act, 1982*. According to this agreement the federal government retains exclusive legislative authority over "seacoast and inland fisheries" including responsibility over conserving and protecting fish habitat while the Province of Manitoba's Department of Natural Resources has the authority to make laws relating to the use and allocation of fish in Crown waters. Basically, fish on Crown property became a provincial resource after the coming into force of the *Manitoba Natural Resources Transfer Agreement*. Matters relating to fish harvest including provisions for freshwater fish marketing, licensing, quota entitlements, and enforcement are governed by the *Fisheries Act* and regulations to that *Act*. In general, watershed management focuses on land-use planning and management which are under

provincial jurisdiction while regulating fish habitat in Canadian fisheries waters remains under federal jurisdiction.

Over time DFO recognized that more successful fish habitat management could be achieved through collaboration with provinces, industry, Aboriginal groups, non-government organizations, and municipalities (DFO 1986). As a result, the Habitat Policy of 1986 was implemented to outline the department's new approach to fish habitat management. The Habitat Policy was set-up to enable the provincial Minister of Conservation and Water Stewardship and to administer certain aspects of federal fisheries legislation, although the federal government retains ultimate regulatory authority to make laws for the conservation of fish habitat and responsible for application of the act (DFO 1986).

### *3.2.1.3 Shared Responsibility and Accountability for Sustainable Fisheries and Fish Habitat*

In 2002 DFO formally acknowledged that effective protection of fish and fish habitat could not be accomplished alone through its regulatory program and developed a partnering strategy to guide the development of agreements that recognize shared responsibility and shared accountability for effective conservation and protection of fisheries resources. One of the first partnering agreements with an aggregated group of stakeholders to be signed was a Memorandum of Understanding (MOU) with The Canadian Electricity Association (CEA) (DFO 2007b) representing the major power generating companies in Canada. The focus of the MOU is to help new and existing hydro electricity generating stations comply with the habitat protection provisions of *The Fisheries Act*. This partnership agreement was developed to facilitate communication between levels of government and industry. The partnership agreement encouraged the development of work plans to achieve mutually beneficial objectives such as improved regulatory review processes and fisheries resources by exploring available options such as habitat banking.

Since then a number of formal agreements or arrangements to foster communications, consultations and collaboration have been developed in recent

years with a number of other key stakeholder aggregates. This includes formal agreements between DFO and a coalition of seven National Resource Industry Associations, a coalition of nine Conservation Non-Government Organizations, and Environmental Non-Government Organizations. Collaboration continues with other partners such as the Federation of Canadian Municipalities, Aboriginal groups and conservation groups. These partnerships and consultations are strengthening understandings of our respective interests and meaningfully advancing our common objectives.

Inter-jurisdictional cooperation increased in 2003 when the federal government and the Province of Manitoba publicly announced their commitment to conserve and protect fish habitat in Manitoba by signing an MOU on Fish Habitat Management. The MOU instructs Manitoba to use the 1986 Habitat Policy for guidance on the management of fish habitat conservation, restoration and enhancement (DFO 2003). To be clear, the MOU does not give Manitoba legislative responsibility for the management of fish habitat. However, Manitoba's Ministry of Conservation and Water Stewardship is granted authority to make laws regarding fish habitat thorough overarching federal legislation. Fish habitat is defined broadly in *The Fisheries Act*, to include "areas on which fish depend directly or indirectly to carry out their life processes" (DFO 1986). The terrestrial limit of fish habitat overlaps with provincial jurisdiction over Crown lands and wildlife. It is often the case that the greatest threats to fish habitat and the fishery resource come from land use activities and urban development. Therefore, Manitoba plays an important role in regulating land use activities in an effort to protect fish habitat and the productivity of the fishery resource.

The transitional zone that exists between water and land is the riparian area. Riparian areas maintain high levels of biodiversity because they provide habitat and travel corridors for fish, wildlife, invertebrates and plants (Manitoba Habitat Heritage Corporation 2004). Research has established that riparian areas are part of the habitat upon which fish depend (Cox 2006, Manitoba Habitat Heritage Corporation 2004, Fitch and O'Shaughnessy 2003). Therefore, it can be argued that

protecting riparian areas contributes significantly to the overall health of fish habitat. Manitoba regulates land use activities that pose a threat to riparian areas through the implementation of provincial legislation, regulations and policies. Legislation includes federal and provincial acts and regulations which are administered by various government departments and agencies. Impacts to riparian areas are numerous and vary in their magnitude of severity. In Manitoba the following three land use practices have the greatest impact on riparian areas and thus fish habitat: agriculture and livestock, forestry, and hydroelectricity.

### **Agriculture and Livestock**

The encroachment of agricultural and livestock operations onto riparian areas often results in the deterioration of riparian ecological functions. When livestock are permitted to overuse riparian areas the native vegetation is destroyed allowing non-native species such as Kentucky blue grass and sow thistle to flourish (Manitoba Riparian Health Council 2006). Accelerated bank erosion is an additional negative effect of livestock overuse of riparian areas (Manitoba Riparian Health Council 2006). Bank erosion increases the amount of sediment in the water which can impair flow and increase the likelihood of flooding as well as destroy fish habitat and spawning areas (Manitoba Riparian Health Council 2006). Both livestock and agricultural operations can contribute to excessive amounts of nitrogen and phosphorous entering the water in riparian areas. Too much of these nutrients is damaging to aquatic life because they stimulate algae blooms which in turn depletes the oxygen levels that fish require to live (Fitch and O'Shaughnessy 2003).

In 1985, motivated by the deterioration and loss of fish and wildlife habitat, the Manitoba government created the Manitoba Habitat Heritage Program (Manitoba Habitat Heritage Corporation 2010). The program aims to protect or enhance habitat through acquisition, leases and improvement projects (Manitoba Habitat Heritage Corporation 2010). Announcement of *The Manitoba Habitat Heritage Act* in February 1986 brought with it the establishment of the Manitoba Habitat Heritage Corporation (MHHC). MHHC is a non-profit Crown Corporation mandated to "conserve, restore and enhance fish and wildlife habitat" in Manitoba (Manitoba

Habitat Heritage Corporation 2010). Accountable to the Minister of Water Conservation and Water Stewardship, MHHC accomplishes its mandate by focusing on the agricultural regions of Manitoba and working in cooperation with private landowners, farm organizations, corporations, conservation groups and government agencies to promote sustainable land use practices (Manitoba Habitat Heritage Corporation 2010). In 2008/09 MHHC began to formulate partnerships with Manitoba Conservation Districts (CD) with the intention to promote Riparian Conservation Agreements in conjunction with the CD's integrated watershed management plans (Manitoba Habitat Heritage Corporation 2009).

Manitoba has created the *Riparian Property Tax Reduction Regulation* to encourage farm owners to protect the riparian habitat adjacent to their property (Government of Manitoba 2010a). Farmers and livestock producers are eligible for a Riparian Tax Credit in exchange for a 5-year commitment to improve riparian management practices. Manitoba provincial legislation regarding agricultural and livestock operations also includes *The Public Health Act*, *The Environment Act*, and *The Water Protection Act*.

There are a number of regulatory requirements which affect agricultural and livestock operations in relation to aquatic habitats. For instance, *The Public Health Act* contains *The Protection of Water Sources Regulation*. Regulations of *The Public Health Act* are the responsibility of Manitoba Health, the Public Health Branch – Environmental Health Unit. The Environmental Health Unit acts in response to chemical, microbiological and public health matters. *The Protection of Water Sources Regulation* outlines activities that are prohibited due to their negative impact on water (Government of Manitoba 2010b). Section 2(1) outlines prohibited activities while Section 4 describes Manitoba Health's authority to react to a violation of Section 2(1). In summary, Section 2(1) states that it is prohibited to .... "deposit or discharge into, or on to the bank of, any river, stream, lake, creek, spring, coulee, reservoir, pond, or dugout, or on the ice thereof, any manure, excreta, filth, or refuse of any nature, or permit the fouling or contamination of ice or water on any such body of water by the congregating or watering of stock at any

water hole or place" (Government of Manitoba 2010b). *The Environment Act* contains *The Livestock Manure and Mortalities Management Regulation*. Manitoba Conservation and specifically the Environmental Livestock Program are responsible for regulations pertaining to livestock manure and mortalities management. The following regulations apply to the potential impact of manure on surface water and groundwater: Sections 4, 7(2), 8, 11, 12(2), 13, 14(8), 16(1), 16(3) (Government of Manitoba 2010c). Regulations of *The Water Protection Act* are the responsibility of Conservation and Water Stewardship. The *Act* is intended to provide protection and stewardship of Manitoba's water resources and aquatic ecosystems. Section 39(1) states that the Lieutenant Governor in Council may make a regulation "governing, regulating or prohibiting the access of livestock to water bodies or areas adjacent to water bodies" (Government of Manitoba 2010d).

## **Forestry**

Research indicates that riparian areas can be negatively impacted by forest harvest practices (Manitoba Conservation 2008, Decker 2003, McEachern 2003). Negative impacts can include, but are not limited to, increased sedimentation and water temperatures; alteration of hydrological regimes, channel structures, and floodplain processes; reduction in the amount of litter fall and woody debris; and decline in biodiversity (Manitoba Conservation and Water Stewardship 2008, Decker 2003, McEachern 2003). Fortunately, government and forest companies are aware of these negative impacts and are developing forest management practices that mitigate the effects of forest management activities on riparian areas, fish, and fish habitat.

Led by the Forestry Branch, Manitoba Conservation and Water Stewardship's Forest Practices Initiative includes forest practices guidebooks for resource managers, timber operators, natural resource officers, and auditors. Each guidebook contains provincial guidelines, forest management plans, annual operating plans and standard operating procedures which were developed by co-operating with forest product companies. In particular, the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat was created for those involved in the design,

construction, and maintenance of stream crossings. The guidelines summarize the impacts that stream crossing can have on fish and fish habitat and provide mitigation measures to eliminate or reduce those impacts (Manitoba Conservation 1996). Ultimately, the proponent or owner of a stream crossing is responsible for consulting with Regional Fisheries Managers to ensure that their project adheres to applicable regulations and the intent of the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat (Manitoba Conservation 1996).

Manitoba Conservation and Water Stewardship also developed the Forest Management Guidelines for Riparian Management Areas guidebook to assist regional Integrated Resource Management Teams and forest industry planners in choosing the most sustainable best management practices for harvesting forests adjacent to riparian areas (Manitoba Conservation 2008). According to the Forest Management Guidelines for Riparian Management Areas guidebook, the riparian management area (RMA) is defined as “the forested area adjacent to the riparian area (RA) where forest management activities can be approved” (Manitoba Conservation 2008). Forest activity is not permitted within the RA which is defined as “an area of land on the banks or in the vicinity of a waterbody...” and ends at the edge of the marketable forest (Manitoba Conservation 2008). Manitoba Conservation and Water Stewardship and the forest company undertake regular riparian management monitoring as part of an adaptive management plan to ensure that social, traditional/cultural, ecological, and economic qualities are preserved (Manitoba Conservation 2008).

Manitoba Conservation and Water Stewardship’s Forestry Branch administers *The Forest Act* which provides the regulation and administration of forests on Crown lands and provincial forests. *The Forest Use and Management Regulation* Section 4(b) under *The Forest Act* states that specific zones are restricted from being harvested without a supervising officer’s approval (Government of Manitoba 2010e). Specific to streams, rivers and lakeshores, the restricted zone includes a strip up to 150 meters wide on both sides. Furthermore, *The Environment Act* protects fish habitat by requiring that an environmental assessment be performed

for projects that have the potential to significantly affect the environment (Government of Manitoba 2010f). New developments must meet requirements established in the environmental assessment process. *The Classes of Development Regulation* under *The Environment Act* Section 3 recognizes several activities as Class 2 Developments including: stream crossings constructed or replaced for forestry activities (Government of Manitoba 2010f). Activities listed under Class 2 Developments require a license before proceeding (Government of Manitoba 2010f).

### ***Hydroelectricity***

Hydropower infrastructure and the operational activities of hydropower generation facilities causes substantial changes in fish habitat due to the creation of reservoirs, changes in flow rates, obstructions impeding the free passage of fish and the encroachment of structures (CHIF 2007). As a result, hydroelectric development can have significant impacts on fish and fish habitat. Hasler *et al.* (2009) suggest that the infrastructure and operation of hydropower generation facilities impacts fish and fish habitat in two important ways. First, by altering flow regime and second by creating barriers to fish movement, thus affecting connectivity of accessible habitats. In a recent synthesis Murchie *et al.* (2008) found that many aquatic ecologists agree that modifications to flow regimes in regulated rivers affect fish and fish habitat. Despite this consensus, Murchie *et al.* (2008) revealed that inconsistency and uncertainty still exists within the scientific community regarding the extent of the effects of flow modification on fish and fish habitat.

Habitat connectivity and fish passage for upstream and downstream movements are important so that fish can migrate between spawning, feeding and refuge habitats (CHIF 2007). The influence of barriers on fish and fish habitat has been researched extensively. Experts agree that both hydroelectric and flood control dams can act as a barrier to the migration and dispersal of fish (CHIF 2007, Schilt 2007, Sheer and Steel 2006, Nilsson *et al.* 2005). Over time these obstructions can negatively impact fish health and lead to loss of fish populations (Schilt 2007, Nilsson *et al.* 2005).



Manitoba Hydro recognizes that hydroelectric development can impact fish and fish habitat and as a result implemented a sustainable development policy in 1993 (Manitoba Hydro 2001). The policy's guiding principle is to protect and preserve the environment while providing reliable, affordable electricity to Manitobans (Manitoba Hydro 2001). Consideration for environmental protection begins in the planning stage of a project through environmental assessments and the development of guidelines for preventing or minimizing environmental impacts (Manitoba Hydro 2001). In 2001, Manitoba Hydro prepared its fourth edition of *Shorelines, Shorelands & Wetlands: A Guide to Riparian Ecosystem Protection at Manitoba Hydro Facilities*. In addition to providing general information on riparian ecosystems, this document outlines the environmental impacts of Manitoba Hydro activities and describes the guidelines developed to reduce the environmental impacts of those activities. The document clarifies that its contents apply to Manitoba Hydro activities such as the construction and maintenance of transmission and distribution lines, access roads, borrow pits, and maintenance yards (Manitoba Hydro 2001). The document does not apply to generating stations, the impoundments behind them, and the tailrace discharging from them (Manitoba Hydro 2001).

In an effort to mitigate the impacts of Manitoba Hydro activities and operations on riparian ecosystems, Manitoba Hydro has developed a system which classifies streams into three categories (Manitoba Hydro 2001). Rosgen's stream typing is a classification system used by Manitoba Hydro to categorize streams which have similar characteristics (Manitoba Hydro 2001). Rosgen's stream typing is conducted at the point where the stream is impacted (Manitoba Hydro 2001). Stream typing is an important first step in assessing the stream's sensitivity to potential impacts. The measurements taken to determine the stream type are also used to determine the widths of the riparian management area and buffer zone (Manitoba Hydro 2001). The information gathered is then used to develop management strategies and environmental protection plans which specify the types of activities that are

permitted in the riparian areas adjacent to each stream type (Manitoba Hydro 2001).

Manitoba Hydro adheres to general techniques for mitigating impacts in riparian areas such as using rip-rap, properly designed and installed culverts, and timing construction activities to minimize erosion and impacts to wildlife. Specific techniques are also employed when working around water bodies to mitigate the impacts in riparian areas. Specific techniques apply to methods for storage, re-use and disposal of topsoil and contaminated water, and methods of sedimentation control (Manitoba Hydro 2001). These techniques are recorded and monitored so that their effectiveness can be evaluated (Manitoba Hydro 2001).

Existing facilities are maintained according to the same environmental protection measures that are used for the construction of new projects (Manitoba Hydro 2001). Manitoba Hydro applies active and passive management approaches for existing and new facilities (Manitoba Hydro 2001). The decision of which management approach to apply depends on the degree of impact and remedial action required (Manitoba Hydro 2001). Active management is necessary when damage and remedial action is significant (Manitoba Hydro 2001). While passive management is chosen when impact is less severe and intervention is unnecessary (Manitoba Hydro 2001).

Manitoba owns the rights to water power and the Crown lands used to develop the resource. The infrastructure and operation of hydroelectric power stations must be in accordance with numerous regulatory requirements in order to avoid or minimize the impacts to fish and fish habitat. *The Water Power Act* is structured so that the province may grant water power licenses for a proposed hydro development (Government of Manitoba 2010h). The Department of Conservation and Manitoba Water Stewardship administers *The Water Power Act* and the Water Power Licensing program. Finally, *The Classes of Development Regulation* under *The Environment Act* Section 3 recognizes several activities as Class 2 Developments including: water development and control activities that involve alterations to

stream channels which affect fish mobility and fish habitat (Government of Manitoba 2010f). Activities listed under Class 2 Developments must meet requirements established in the environmental assessment process and require a license before proceeding (Government of Manitoba 2010f).

#### *3.2.1.4 Water Protection Act*

Manitoba has also created acts and regulations directly related to protecting fish habitat and the fishery resource. *The Water Protection Act*, introduced in 2005, signifies Manitoba's priority to provide protection and stewardship of the province's water resources and aquatic ecosystems. Regulations of *The Water Protection Act* are the responsibility of Manitoba Conservation and Water Stewardship. With specific reference to riparian areas, the *Act* recognizes, "the need to protect riparian areas and wetlands" (Government of Manitoba 2010d). Moreover, the *Act* gives the minister of Water Stewardship the authority to deny issuing a license for a development that may negatively affect an aquatic ecosystem.

*The Water Protection Act* includes the *Nutrient Management Regulation* which is aimed at protecting water quality by regulating how nitrogen and phosphorus are applied to land. Algal blooms, caused by adding excessive amounts of nitrogen and phosphorus to water systems, have been identified as a major factor affecting aquatic life habitat in Manitoba (Jones, G. and N. Armstrong. 2001, Government of Manitoba 2000). *The Nutrient Management Regulation* has acknowledged this by developing instructions for the management of nutrients in six Water Quality Management Zones to help prevent excess nutrients from entering surface and ground waters. Nutrients and pollutants can include fertilizers, animal manure, and municipal wastewater sludge.

Watershed Management Plans have been developed to, "identify issues relating to the protection, conservation or restoration of water, aquatic ecosystems and drinking water sources in the watershed" (Government of Manitoba 2010d). According to *The Water Protection Act*, a watershed management plan must contain

objectives, policies and recommendations which respect, “activities in water quality management zones, riparian areas, wetlands, flood areas, flood plains and reservoir areas” (Government of Manitoba 2010d). The declining health of Lake Winnipeg and all Manitoba waterways was addressed when *The Water Protection Act* was amended in 2008 to include *The Phosphorus Reduction Act*. The *Act’s* purpose is to control the phosphorus content in dishwashing detergents as well as develop regulations to restrict the phosphorus content in other cleaning products and chemical water conditioners.

### **3.3 United States Approach to Habitat Banking**

Two main national banking programs operate in the US. The first is wetland mitigation banking which focuses on aquatic resources such as wetlands, streams, and riparian areas. The second banking program is conservation banking which focuses on species listed as threatened or endangered under the Endangered Species Act of 1973, as amended. Both mitigation banks and conservation banks are created in advance of development impacts.

In both cases, entrepreneurs are able to create and sell environmental services for profit. This approach gives economic value to environmental services and a healthy ecosystem. For example, if a land owner wishes to generate income from their property, they can choose to establish a bank rather than develop it. As a result, there is an opportunity to generate income from what may have been considered a liability. This free-enterprise concept has the advantage of harnessing market forces to protect ecosystems. In this sense, protecting or maintaining the existing ecosystem can be profitable and therefore, there is incentive to do so.

Mitigation banking and conservation banking both involve layers of expertise, including participation by government agencies, biologists, lawyers, finance, real estate, construction, and specialized knowledge of local market conditions (Madsen *et al.*, 2010). Typically, banking projects are large scale and the collaboration of

private/public partnerships may allow participants to take advantage of economies of scale, including financial and scientific resources. Large scale banking projects also produce greater ecological benefits because they establish larger habitat reserves and improve habitat connectivity.

### **3.3.1 Wetland Mitigation Banking**

In the US it is illegal to damage a wetland without minimizing or mitigating that damage. Thus, mitigation banking serves as a compensation tool used by proponents to restore, establish, enhance, and in certain circumstances, preserve the function of that aquatic resource. Mitigation banking has been practiced in the US since the 1970's. A mitigation bank is defined as "a site, or suite of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved for the purpose of providing compensatory mitigation for impacts authorized by DA permits" (Federal Register 2008).

Regulatory requirements for mitigation banking fall under the 1972 Clean Water Act, Section 404 which regulates the "discharge of dredged or fill material into waters of the United States, including wetlands." (Clean Water Act §404). According to Section 404 the proponent must obtain a permit before proceeding to drain, fill, or dredge a wetland. It is the responsibility of the US Army Corps of Engineers, with direction from the US Environmental Protection Agency, to administer the regulations of the Clean Water Act, Section 404, as well as, enforce Section 404 provisions.

Prior to obtaining a permit the proponent is legally required to follow the "mitigation sequence" of "avoid, minimize and compensate" established by the Clean Water Act Section 404(b)(1) Guidelines (U.S. Environmental Protection Agency and U.S. Department of the Army 1990). Following the mitigation sequence the proponent must first demonstrate that effort has been made to avoid adverse impacts to aquatic resources. If impacts cannot be avoided, then the proponent must, to the extent possible, minimize impacts to aquatic resources. Providing compensatory mitigation is the third and final step in the mitigation sequence. Mechanisms for

providing compensatory mitigation include mitigation banking, along with permittee-responsible mitigation, and in-lieu fee mitigation. All compensatory mitigation must comply with the Clean Water Act (§404) and the national no net loss policy.

A mitigation bank is created by a bank sponsor such as a private entrepreneur, nonprofit organization, and state or local government agency. Through approval of the appropriate regulatory agencies, permittees can offset their unavoidable adverse impacts to wetlands, streams, and other aquatic resources by purchasing credits from a mitigation bank. Although credits are calculated by a variety of methods, they “are to be based on aquatic functions provided by resource restoration, establishment, enhancement, or preservation” (Federal Register 2008). The bank sponsor is responsible for managing all bank activities as well as assuring the mitigation bank’s success (Federal Guidance for the Establishment, Use and Operation of Mitigation Banks 1995 (Hereinafter Banking Guidance 1995)). The mitigation bank is protected in perpetuity through real estate arrangements such as conservation easements and transfer of title to a Federal or State resource agency or non-profit conservation organization (Banking Guidance 1995).

### **3.3.2 Conservation Banking**

Conservation banking was initiated in the State of California on April 7, 1995 (Wheeler and Strock 1995). On this date the California Resources Agency and the California Environmental Protection Agency issued their ‘Official policy on conservation banks’ (Wheeler and Strock 1995). California remains the leading state to practice conservation banking with increasing activity in the US Northwest and Southeast (Madsen *et al.*, 2010).

Conservation banks preserve, restore, or enhance habitat for species listed as threatened or endangered under the Endangered Species Act of 1973, as amended. The habitat within a conservation bank is conserved and managed in perpetuity through a conservation easement (U.S. Fish and Wildlife Service “Guidance for the Establishment, Use, and Operation of Conservation Banks”. Hereinafter Guidance on

Conservation Banks 2003). Conservation banks are intended to meet the conservation needs of listed species and are used when the impacts of a proposed project are unavoidable. Furthermore, conservation banks provide a mitigation option when on-site conservation is not feasible.

In 2003 the U.S. Fish and Wildlife Service published “Guidance for the Establishment, Use, and Operation of Conservation Banks” (Guidance on Conservation Banks 2003). Hence the name, this document provides national level guidance on the establishment, use, and operation of public conservation banks, privately sponsored conservation banks, and third party banks also known as entrepreneurial banks.

Conservation banking is rooted in wetland mitigation banking and shares some similarities. For instance, both mitigation banks and conservation banks are regulated by the two following federal agencies: US Fish and Wildlife Service (US FWS), and National Marine Fisheries Service (NMFS) (Madsen *et al.*, 2010). These federal agencies are responsible for permitting and approving any impact to an endangered species as in the case of conservation banking and any impact to an aquatic resource as in the case of wetland mitigation banking (Madsen *et al.*, 2010). In both cases, permittees must adhere to the mitigation hierarchy and offset their development impacts.

## 4. RESEARCH FINDINGS

### 4.1 Habitat Banking Case Study Analysis

Case studies are presented in the order in which they were interviewed.

In total, 11 habitat banks were visited. Of the 11 habitat banks, three were located in California, two banks were located in each British Columbia, Quebec and Nova Scotia, and one bank located in each Alberta and Manitoba. A total of 15 interviews were conducted. Interviewees included regulatory agency representatives, consultants, and proponents.

The US site visits focused on compensation banks, so although the terminology differs between Canada and the US, the common thread is that compensation takes place prior to development impacts occurring. In the US, habitat banking is guided by a regulatory framework and is a profitable business. In Canada, regulatory leverage exists to enable habitat banking and the potential to create and sell environmental services for profit and not been fully realized.

Approaches to habitat banking are being developed by proponents through their application of the habitat banking policy. The policy guidance on habitat banking is very basic, thus it is left to the proponent for interpretation. In contrast, the *Policy for the Management of Fish Habitat* is a thorough policy designed to achieve a Net Gain of habitat for Canada's fisheries resources. The *Policy for the Management of Fish Habitat* includes the following eight Implementation Strategies (DFO 1986):

1. Protection and Compliance
2. Integrated Resource Planning
3. Scientific Research
4. Public Consultation
5. Public Information and Education
6. Cooperative Action
7. Habitat Improvement
8. Habitat Monitoring



Some of these strategies were included in the interview guide (Appendix A) in order to evaluate whether or not proponents were building these strategies into their habitat bank projects. In turn, evaluating whether or not proponents are building these strategies into their habitat bank projects reveals the individual and creative approach that is possible when using habitat banking as a form of compensation. Proponents may wish to access the full potential of habitat banking by incorporating multiple objectives into the bank. Conversely, proponents may simply wish to focus on the regulatory requirement of NNL.

As noted, the policy guidance on habitat banking is basic and doesn't include the full range of Implementation Strategies included in the *Policy for the Management of Fish Habitat*. However, analysis of the case studies revealed that proponents were voluntarily building many of these strategies into their habitat bank projects. Moreover, proponents identified some of the same strategies as "opportunities" or "positive spinoffs" of habitat banking. For example, strategies such as integrated resource management, cooperative action, scientific research, and public education were integrated into habitat bank projects in British Columbia, Nova Scotia, Manitoba and Quebec.

The case studies demonstrate variation in the application of habitat banking policy from region to region in Canada. Evidently, some disagreement exists as to the level of flexibility which should be applied to the policy. Ideally, the habitat bank should be created independent of a *Fisheries Act* S.35(2) authorization. However, in Nova Scotia and Quebec, proponents were permitted to use a portion of their habitat banking credits for past project developments for which *Fisheries Act* S.35(2) authorizations were issued. The rationale for this apparent flexibility lies in the notion expressed by some regulatory agency representatives that "habitat banking is still an experiment" and that "habitat banking should accommodate the proponent". Equally important is the opinion of some regulatory agency representatives that habitat banks provide greater ecological benefits due to their large size and thus proponents should be given some incentive to create a habitat bank.

The case studies also reveal substantial variations in compensation ratios among regions. Since DFO National Headquarters does not provide national guidance on the application of compensation ratios, it is left up to the individual regions to determine the appropriate ratios. Manitoba applied the highest compensation ratio of 10:1, while on average, provinces applied a ratio of 1:1. The variation in ratios can be attributed, in part, to the challenges associated with measuring and quantifying the productive capacity of restored or created habitat as well as varying methodology used for determining the ratio. Furthermore, the case studies indicated that DFO had difficulty reconciling habitat quality when withdrawals are proposed from the habitat bank. The DFO will apply decision making discretion in these situations which may contribute to the variations in compensation ratios.

Inconsistencies from province to province also emerged in the area of monitoring and maintenance of the habitat bank. According to the Practitioners Guide to Habitat Compensation (DFO 2003), the proponent should provide DFO with adequate baseline habitat monitoring data prior to construction of the bank. According to the case studies, both banks in Nova Scotia and only one of two banks in Quebec complied with the policy. Regarding post construction monitoring, variations appeared in both the timelines and rigor of the monitoring program. For instance, Nova Scotia is going above and beyond what is required by incorporating adaptive management into their monitoring program while other provinces have not completed habitat bank monitoring. In terms of habitat bank maintenance, the case studies exposed some confusion as to whether or not a proponent must maintain the habitat bank in perpetuity. In British Columbia and Quebec this stipulation was included in their MOU. In other cases, proponents either reported that they were not responsible for the bank in perpetuity or they were not certain of their responsibility.

Evaluation of the case studies also revealed that all the habitat banks are providing habitat credit for reparation of impacts to fish and fish habitat that would otherwise constitute a contravention of the *Fisheries Act* or are otherwise legal activities that

have impacts on fish and fish habitat, i.e. cattle grazing of riparian areas, shoreline hardening that transfers erosion downstream, abandoned roads becoming barriers. It should be noted that these examples may give the impression that DFO is permitting a banking system which encourages impacts rather than encouraging the principle of prevention which is much more effective and less costly than restoration.

Finally, transparency and lack of communication between provinces is also an issue for habitat banking. In some instances, it was difficult to attain accurate data on how much monitoring was completed. Transparency regarding the rigorousness of the monitoring also made data collection a challenge. In contrast, the proponent in Nova Scotia posts all monitoring reports on its public website. Often, proponents were also reluctant to share information on projects costs. Habitat banking may be emerging more slowly as a compensation tool due to the lack of communication between provinces regarding habitat bank projects. Provinces have an opportunity to learn from one another which is not being utilized.

## **4.2 Case Studies: Canada**

Compensation Ratio =  $m^2$  habitat withdrawn from bank :  $m^2$  habitat lost (HADD)  
(area gained : area lost)

### **4.2.1 British Columbia**

#### Timberland Basin Habitat Bank

Location: Vancouver, British Columbia

Date constructed: Late 1980's

Size: Undetermined

Compensation ratio: 1:1 for like habitat

In the 1980's, preceding policy guidance on habitat banking, Port Metro Vancouver submitted a habitat bank proposal to DFO. DFO accepted the proposal and cooperated with Port Metro Vancouver to create the Timberland Basin Habitat Bank.

Port Metro Vancouver worked with Mark Adams of Envirowest, Environmental Resource Professionals to determine the habitat type, location and size of the habitat bank. Initially, a rock berm was constructed on the perimeter of the habitat bank. The rock berm was installed at too low an elevation resulting in unvegetated intertidal sand/mudflat and a small amount of intertidal marsh. The rock berm was elevated to create additional intertidal marsh. Several years later, Port Metro Vancouver developed riparian fish habitat in the habitat bank. Juvenile salmon can utilize the unvegetated intertidal sand/mudflat, intertidal marsh, and riparian fish habitat. Providing habitat for salmon is consistent with Provincial fisheries management objectives.

The habitat bank is not governed by a formal agreement or MOU; however, the MOU for the North Arm Habitat Bank was used to guide the terms of use. In 1995, an assessment was conducted to determine the growth and survival rate of the riparian vegetation and intertidal marsh. DFO declared that the habitat was stable and viable. Habitat banking credits became salable following the successful assessment. The compensation ratio of 1:1 for like habitat is applied. Habitat banking credits are used for approved waterfront dependent projects and can be purchased from Port Metro Vancouver by waterfront developers at a price set by the Port. The price is based on the costs incurred to develop the habitat. Generally, the cost is \$125.00 per m<sup>2</sup>. Port Metro Vancouver has also used a portion of their habitat banking credits as compensation to fulfill the requirements of *Fisheries Act* S.35(2) authorizations. Use of habitat banking credits is limited to developments within the same reach as the habitat bank. This distance is approximately 5 km.

The habitat bank is owned and administered by Port Metro Vancouver. Administration includes bank maintenance, tracking credit transactions and maintaining transaction records. DFO requires that the quality of the habitat in the bank be maintained in perpetuity. When habitat banking credit withdrawals are proposed, DFO performs a visual inspection to ensure that the habitat is viable and stable. In 2009, roughly 95% of the habitat banking credits had been purchased.

## North Fraser Harbour Habitat Compensation Bank

Location: Vancouver, British Columbia

Date constructed: May 1993

Size: 5,506 m<sup>2</sup>

Compensation ratio: 1:1 for like habitat

On September 7, 1988, DFO and Port Metro Vancouver completed the North Fraser Harbour Environmental Management Plan. The plan called for the development of a habitat compensation bank owned and administered by Port Metro Vancouver. Port Metro Vancouver hired Gary Williams of GL Williams & Associates Ltd., Shoreline Management Consulting to develop site selection criteria and undertake habitat bank site investigation and negotiations.

DFO cooperated with Port Metro Vancouver to develop the North Fraser Harbour Habitat Compensation Bank, located at the Fraser Lands Riverfront Park in Vancouver. A Memorandum of Understanding concerning procedures for operation of the North Fraser Harbour Habitat Compensation Bank between Port Metro Vancouver and DFO was created on October 15, 1993.

The compensation bank includes two separate, but adjacent banks - Gladstone Park Marsh Habitat Bank and Kerr Street Pier Marsh Habitat Bank. The Gladstone Bank was characterized by eroded unvegetated intertidal marsh. The Kerr Street Bank was characterized by a broad intertidal flat and a narrow band of fringe marsh. Development of the Gladstone and Kerr Street Banks included relocating a sewer, transplanting sedge, and constructing a rock berm to protect the intertidal and natural fringe marsh.

The determination of habitat banking credits for the Gladstone and Kerr Street banks is based on a formula which deducts m<sup>2</sup> of habitat for construction impacts and existing natural habitat. The Gladstone habitat banking area amounted to 5,205 m<sup>2</sup>. After calculations, DFO provided Port Metro Vancouver with 4,025 m<sup>2</sup> of habitat banking credits. The Kerr habitat banking area amounted to 3,620 m<sup>2</sup>. After

calculations, DFO provided Port Metro Vancouver with 1,481 m<sup>2</sup> of habitat banking credits.

Habitat banking credits may be used as compensation as soon as DFO deems the habitat stable and viable. Criteria for credit use includes following DFO's Hierarchy of Preferred Compensation Options and applying those compensation options with a greater preference within the hierarchy prior to withdrawing credits from the habitat bank. The predetermined compensation ratio of 1:1 for like habitat is applied. Compensation ratios for unlike habitat may be applied according to the discretion of DFO. Habitat banking credits can be purchased from Port Metro Vancouver by waterfront developers at a price set by the Port. The price is based on the costs incurred to develop the habitat. Generally, the cost is \$100.00 per m<sup>2</sup>. Use of habitat banking credits is limited to developments within the same habitat management unit.

The habitat bank is owned and administered by Port Metro Vancouver. Administration includes bank maintenance, tracking credit transactions and maintaining transaction records. Port Metro Vancouver is responsible for monitoring the habitat bank for up to five years and must submit annual reports to DFO and the Fraser River Estuary Management Program Environmental Review Committee. Following the required monitoring period, Port Metro Vancouver will perform annual inspections to ensure that the habitat bank remains viable. Remedial work is the responsibility of Port Metro Vancouver or the developer who purchased habitat banking credits.

#### **4.2.2 Alberta**

##### Yarrow Creek Habitat Bank

Location: Lethbridge, Alberta

Date constructed: 2004

Size: 198 m<sup>2</sup>

Compensation ratio: Undetermined until proponent requests use of the habitat banking credits

DFO and Alberta Sustainable Resource Development, Fish and Wildlife Division (ASRD) cooperated with Shell Canada Limited to create the Yarrow Creek Habitat Bank in Lethbridge, Alberta. An agreement outlining the terms of compensation banking and credit use was signed by DFO on May 17, 2005. Shell Canada Limited hired a consultant to assist with the removal of two culverts in Yarrow Creek in Southwestern Alberta that were perched and thus obstructed fish passage. Providing fish passage at Yarrow Creek is consistent with Provincial fisheries management objectives. The culverts were replaced by a single span bridge in August of 2004. Two v-weirs were also installed in Yarrow Creek to maintain the scour pool downstream. The access road and culvert crossing are owned by Shell Canada Limited.

DFO provided Shell Canada Limited with habitat banking credits in the amount of 198 m<sup>2</sup> which is equal to the footprint of the existing crossing structure. To date, the effectiveness of the fish barrier removal and the value of the restored fish habitat have not been determined. The compensation ratio remains undetermined until Shell Canada Limited requests use of the habitat credits. The banked credits are to be used within the area of responsibility of the DFO Lethbridge District office. Using the banked credits elsewhere in Alberta is dependent upon the discretion of the region's DFO Habitat Manager. Both Shell Canada Limited and The DFO Lethbridge District office administer banked credits by recording banked credit transactions and maintaining transaction records.

Baseline habitat information was not gathered prior to removal of the culverts; however, the Alberta Government reports that Yarrow Creek contains mountain whitefish, numerous species of trout and is high quality spawning and rearing habitat. Overwintering fish habitat may be provided by a nearby beaver pond. When withdrawals are proposed, the habitat bank will be evaluated immediately prior to its use as compensation to determine habitat quality and establish the habitat bank's value. Accordingly, the quality of the habitat harmfully altered, disrupted or destroyed is evaluated. DFO will apply decision making discretion to reconcile any differences in quality between the habitat bank and the habitat harmfully altered, disrupted or destroyed. Monitoring by DFO will be conducted as work plans, funds and time allows.

#### **4.2.3 Manitoba**

##### Pipestone Creek Habitat Bank

Location: Rural Municipality of Sifton, Manitoba

Date constructed: 2006

Size: 2,904 m<sup>2</sup>

Compensation ratio: 10:1

DFO approached the West Souris River Conservation District (WSRCD) to inform them of habitat banking as a compensation option. DFO, Manitoba Crown Lands and Manitoba Water Stewardship, Fisheries Branch cooperated with the proponent and local landowners to create Pipestone Creek Habitat Bank in the RM of Sifton, Manitoba. An agreement outlining the terms of compensation banking and credit use was signed by DFO on October 30, 2006. The habitat bank was developed by installing a fence along Pipestone Creek to prevent approximately 400 head of cattle from accessing the creek. Infrequent access will occur according to an approved low intensity grazing management plan. A little over 7 acres of land has been protected from the cattle. As a result, the habitat bank fulfills the WSRCD mandate for riparian restoration projects.



The proponent supervised the project, hired contractors and purchased materials. Local landowners provided in-kind labour by constructing the fence. Four landowners were affected by the development of the habitat bank. In one case, the landowner owned the land adjacent to Pipestone Creek. In exchange for cooperation and approval of the fence, the landowner requested that an off-site watering system be installed on his property. The proponent accessed funding for the watering system through the Rural Municipality of Sifton and the Manitoba Water Stewardship Fish Enhancement Fund. Total project costs were just above \$20,000.

DFO provided the proponent with 2,904 m<sup>2</sup> of habitat to be banked. The area between the fencing and the waters edge is equivalent to the footprint of the area protected by the fencing. This distance was calculated as 29,040 m<sup>2</sup>. The proponent did not receive 29,040 m<sup>2</sup> of habitat because the effectiveness of the riparian restoration and the value of the restored fish habitat have not been determined. Until those values are determined, DFO will apply a conservative ratio of 10:1 for the restored riparian habitat. The banked credits are to be used within the area of responsibility of the WSRCD. The DFO MB District, Dauphin office provides administration of the banked credits by recording banked credit transactions and maintaining transaction records. The proponent may also track banked credit transactions.

Baseline habitat information was not gathered prior to installing the fence; however, DFO considers this reach of Pipestone Creek to be high quality spawning and rearing habitat for certain species. Several sport fish species including Northern pike, Yellow perch, and some Walleye are present in this vicinity of Pipestone Creek. When withdrawals are proposed the habitat bank will be evaluated immediately prior to its use as compensation to determine habitat quality and establish the habitat bank's value. Accordingly, the quality of the habitat harmfully altered, disrupted or destroyed is evaluated. DFO will apply decision making discretion to reconcile any differences in quality between the habitat bank and the habitat harmfully altered, disrupted or destroyed. Habitat credits have been

withdrawn to compensate for a HADD caused by a municipal bridge replacement. The compensation ratio of 10:1 was applied. In May of 2009 less than 20% of the habitat bank had been used. Monitoring is carried out informally by DFO.

#### **4.2.4 Quebec**

##### La Graise River Habitat Bank

Location: Municipality of Les Cèdres, Quebec

Date constructed: 2001

Size: 4,386 m<sup>2</sup>

Compensation ratio: 1:1

In September 2000, the Ministère de Transports du Québec (MTQ) approached DFO with the suggestion of creating a Memorandum of Agreement (MOA) to guide the development of a habitat compensation bank. DFO cooperated with the MTQ and signed an MOU in August 2001. This was the first of 11 habitat banks established by the MTQ. The La Graise River Habitat Bank is located in the Municipality of Les Cèdres on the outskirts of the former Canal de Soulanges hydroelectric power plant. An outlet channel runs from the power plant and empties into the La Graise River. The MTQ owned the majority of the land with the exception of one privately owned section. A transfer of ownership was negotiated with the property owner so that the habitat bank would be constructed on land owned by the MTQ.

The site was characterized by lowlands and aquatic vegetation used as spawning substrate by fish that breed in slow-moving waters. Comprehensive baseline habitat information was not gathered prior to construction. Development of the habitat bank included enhancing the lowlands by constructing 11 ditches and a pond to provide stillwater spawning for mainly brown bullhead and northern pike. In an effort to incorporate an educational component into the habitat bank, the MTQ formed a partnership with a college so that future biological technicians assisted by biologists could conduct all the species inventories. The majority of stillwater spawning grounds in this area have been destroyed and so establishing the spawning grounds is consistent with regional resource management objectives.

In June 2002, DFO completed an evaluation of the habitat bank and concluded that the habitat was not viable as spawning habitat for the targeted species, but was being used by a large number of other species. Additional inventories revealed that spawning had occurred and that the habitat was functional. As a result, DFO accepted that extension could be done. The MTQ completed the extension works and received 4,386 m<sup>2</sup> of total habitat banking credits. DFO took a portion of the habitat banking credits from the MTQ to compensate for losses associated with a past unauthorized HADD of fish habitat. For each proposed withdrawal of the remaining habitat banking credits, DFO will analyze the quality of the habitat harmfully altered, disrupted or destroyed and determine the compensation ratio on a case by case bases. Use of the habitat banking credits is limited to projects along the Soulanges Canal as well as water bodies which join the St. Lawrence River between Coteau-du-Lac and Pointe-Cascades. Habitat banking credits cannot be applied to a HADD on critical habitat.

The proponent was required to monitor the habitat bank for five years from spring 2003 to spring 2007 and submit annual reports to DFO. If monitoring reports reveal that the habitat bank is not functioning as intended, then the habitat banking credits are not permitted for use until the habitat is proven stable and viable. Therefore some remedial works may have to be undertaken by MTQ to meet the initial objectives of the habitat bank.

#### Ouareau River Habitat Bank

Location: Ouareau River, Quebec (Crabtree Municipality, 2km downriver from the Kruger dam)

Date constructed: 2007

Size: 7,000 m<sup>2</sup>

Compensation ratio: 1:1

In 1998, the following three organizations; Société de la faune et des parcs – since integrated into the ministère des Ressources Naturelles et de la Faune (MRNF), Corporation de L'Aménagement de la Rivière L'Assomption (CARA) and Ministère du

Développement Durable, de l'Environnement et des Parcs (MDDEP) initiated a study on sturgeon spawning grounds within the L'Assomption watershed. From 1998 to 2002, they researched potential problems within the watershed and identified three main factors affecting the quality of the sturgeon spawning grounds: landslides, dam operations, and untreated sewage. In an effort to improve the quality of lake sturgeon habitat in the L'Assomption and Ouareau Rivers a joint CARA-MRNF task force was formed. The task force developed an action plan for restoring and expanding sturgeon spawning grounds for the St. Lawrence River lake sturgeon population. The original 1998 - 2002 study was used as a pre-feasibility study for the sturgeon spawning ground restoration project.

Accomplishing the habitat restoration was estimated to cost a minimum of \$500,000. The Ministère des Transports du Québec (MTQ) was approached initially to assist with funding the restoration project. The MTQ and CARA proposed that the initiative be set up as a habitat bank. Thus, habitat banking credits would be available to MTQ to compensate for future HADD's. The MTQ agreed to participate and submitted the habitat bank proposal to DFO for approval. An agreement between DFO and the MTQ dictated the conditions for the creation and use of the habitat bank. An additional agreement was signed between the MTQ and CARA. Municipal support was essential as a Municipal Certificate was required to confirm that the project is in agreement with municipal regulations. Arrangements were also made with two local farmers to gain access to the Ouareau River through private property for machinery and materials.

Other developments intended to improve the quality of the sturgeon spawning grounds, but not directly linked to the habitat bank included:

- construction of two water sewage treatment stations for the main municipalities above each sturgeon spawning bed. In the case of L'Assomption, the outlet pipe was lengthened by 1 km to locate the outlet below (downriver) the spawningbeds;
- shore stabilization at the L'Assomption River landslide site;
- waste removal at the L'Assomption River site;

- agreements with one of the dam authorities (Kruger Inc.) regarding water flow changes; and
- an educational component was also incorporated which includes a pavilion for education on watershed issues and future plans for nature trails with interpretive signage.

The MTQ agreed to provide engineering expertise and paid CARA \$800,000 to restore the lake sturgeon habitat plus \$100,000 for maintenance and five years of monitoring. Ultimately, the monitoring and maintenance costs did not amount to \$900,000 and so CARA returned an undisclosed amount of money to MTQ. The restoration project involved modifying the stream bank which was authorized by MDDEP. The MRNF and CARA jointly conduct the monitoring program. MRNF pays for 50% of the monitoring costs, totaling \$40,000 per year, including field work, data analyses and drafting their annual report.

Extensive baseline habitat data was collected prior to construction of the habitat bank. Remedial works began in 2005 and were completed in 2007. The size of the existing spawning ground was approximately 3,000 m<sup>2</sup>. Restoration and expansion of that spawning ground was expected to provide an additional 7,000 m<sup>2</sup> for a total of 10,000 m<sup>2</sup> of lake sturgeon spawning habitat. Of the 7,000 m<sup>2</sup> DFO kept 1,500 m<sup>2</sup> to ensure compliance with the requirements of past *Fisheries Act* S.35(2) authorizations. The MTQ may use the remaining 5,500 m<sup>2</sup> of habitat banking credits within the same territory as the habitat bank.

CARA agreed to perform monitoring of the habitat bank until 2011 at which time the bank will be evaluated by DFO to ensure its success. The habitat bank will also be assessed prior to its use as compensation. If the habitat bank is not functioning as intended, then the habitat banking credits are not permitted for use until the habitat is proven stable. Once the habitat bank has been used as compensation, the MTQ will not receive additional habitat credits for any increase in the productive capacity of the habitat bank. Both DFO and the MTQ administer banked credits by

recording banked credit transactions and maintaining transaction records. The MTQ assumes all legal responsibility for the habitat bank.

#### **4.2.5 Nova Scotia**

##### Cheverie Creek Habitat Bank

Location: Hants County, Nova Scotia

Date constructed: November 2005 (finished Dec. 2005)

Size: 430,400 m<sup>2</sup>

Compensation ratio: 0-12 months post establishment = 1.0:0.75

12-60 months post establishment = 1.0:1.0

After 60 months post establishment = 1.0:1.5

In 2004, Transportation & Infrastructure Renewal (NSTIR) required three hectares of offsite compensation for an existing HADD as there were no opportunities on-site or in the immediate area. NSTIR approached DFO for permission to develop a habitat bank at Cheverie Creek, a tidal river and salt marsh located in Hants County, NS, on the Minas Basin of the Bay of Fundy. This compensation project would restore more than 25 ha of high-value salt marsh. NSTIR had previously learned about tidal restoration opportunities along the Bay of Fundy coast from a presentation and series of reports by the Ecology Action Centre (EAC), a non-governmental organization. Over the next two years, NSTIR and its partner – Fisheries and Oceans Canada-Small Craft Harbours Branch (DFO-SCH) developed a Memorandum of Agreement (MOA) and then an MOU with DFO – Oceans and Habitat Branch to finance the Cheverie Creek Salt Marsh Restoration Project and share the “habitat credits” arising from the project.

Development of the habitat bank was estimated to cost \$1,452,300.00 including both the construction and long-term (5+ years) monitoring costs. A cost sharing partnership was established between NSTIR and DFO-SCH at a rate of 25% and 75% respectively. After three years of post-construction monitoring, the restored area was re-defined as 430,400 m<sup>2</sup> and the resulting 380,400 m<sup>2</sup> of habitat credits were apportioned between NSTIR and DFO-SCH in a formal amendment to the

MOU. This habitat banking project and five others developed by NSTIR was recognized by the Transportation Association of Canada (TAC) and awarded its 2006 Environmental Achievement Award.

The Cheverie Creek Restoration Project and habitat bank would not have been realized without the vision of the EAC. As part of their mandate, the EAC had established broad (local, regional and international) support for salt marsh restoration through education and awareness building. Due to the EAC's community outreach efforts, the Cheverie Creek project received support from the municipality as well as the local community and school. Prior to construction in November-December 2004, EAC staff held numerous public meetings and presentations to government agencies about the project in an attempt to create new partnerships and maximize the environmental, economic and community project benefits. A local elementary school created a salt marsh within their school and produced a salt marsh video. In 2006, the Gulf of Maine Council on the Marine Environment (GOMC) recognized the EAC Salt Marsh Restoration Team with its Visionary Award (<http://www.gulfofmaine.org/times/summer2006/visionary.html>).

After construction, EAC and the local community continued to collaborate with local government and businesses, academic institutions, and various other government agencies. Students and staff of the Faculty of Architecture and Planning at Dalhousie University led an effort to develop a community-based concept for a salt marsh interpretive centre. The local business community subsequently formed the Cheverie Crossway Salt Marsh Society to further advance the development of trails, boardwalks and the interpretive centre on property adjacent to the Cheverie Creek habitat bank.

The EAC collected extensive baseline habitat data on the restoration site from 2002 to 2004. Two of the EAC principal investigators subsequently formed an environmental consulting company, CB Wetlands & Environmental Specialists Inc. (CBWES), to focus on salt marsh research and monitoring. NSTIR hired CBWES to continue the monitoring program in 2005 through 2011.

Construction on Cheverie Creek Habitat Bank began in November 2005. NSTIR administered the contract, supervised the construction work, and applied to the NS Department of Environment for a water crossing alteration permit. Development of the habitat bank included replacing a tidally-restrictive, wooden double box culvert with an aluminum, 5 meter high and 9 meter wide, elliptical-shaped culvert. The enlarged culvert increased tidal flow upstream and improved fish passage to the Cheverie Creek salt marsh and tidal river system. Restoring salt marsh habitat in Nova Scotia is consistent with regional resource management objectives.

Both DFO-SCH and NSTIR had past project developments for which Fisheries Act S.35(2) authorizations were issued. Consequently, they applied a portion of their habitat banking credits as compensation to fulfill the requirements of those past F.A. S.35(2) authorizations. DFO-SCH and NSTIR will use the remaining credits as compensation for future projects for which a F.A. S.35(2) authorization is required. The geographic limitations of withdrawals differ for DFO-SCH and NSTIR. For DFO-SCH, the habitat banking credits are to be used for projects which occur in Canadian waters of the Gulf of Maine. In NSTIR's case, the credits may be applied toward projects throughout Nova Scotia, with priority given to those located in Nova Scotian waters of the Gulf of Maine.

Criteria for credit use includes following DFO's Hierarchy of Preferred Compensation Options and applying those compensation options with a greater preference within the hierarchy prior to withdrawing credits from the habitat bank. The habitat ratios are related to the maturity of the salt marsh restoration and are as follows: the habitat ratio of 1.0:0.75 is applied to credits withdrawn in the first 12 months post establishment, the habitat ratio of 1.0:1.0 is applied to credits withdrawn between 12 and 60 months post establishment, and the habitat ratio of 1.0:1.5 is applied to credits withdrawn after 60 months post establishment. DFO reserved the right to adjust these ratios according to monitoring results. DFO's standard ratio of 3:1 compensation may still be applied as a baseline ratio. Both NSTIR and DFO-SCH administer their banked credits by recording banked credit transactions and maintaining transaction records.



The monitoring program was developed and conducted by CBWES at a cost of approximately \$350,000. Pre-construction monitoring began in 2005 followed by post-restoration monitoring in years 2006, 2007, 2008, 2010 and 2012 (plus limited reconnaissance in 2009 and 2011). The monitoring program documented a series of ecological variables (indicators) within the categories of hydrology, soils and sediments, vegetation, nekton, and benthic and other aquatic invertebrates. As one of the Cheverie landowners, Ducks Unlimited Canada (DUC) also carries out annual waterfowl monitoring. Adaptive management is integrated into the monitoring program and is applied to the management of the habitat bank. Monitoring results to date indicate that restoration efforts are successful. The improved hydrological regime has increased the extent of the salt marsh habitat as well as enhanced wetland conditions (Bowron et al., 2009). NSTIR submits monitoring reports in addition to a summary of credit withdrawal and remaining balances to DFO on an annual basis, and posts the monitoring reports to its public website: <http://www.gov.ns.ca/tran/enviroservices/enviroSaltMarsh.asp>.

#### Walton River Habitat Bank

Location: Hants County, Nova Scotia

Date constructed: September 2005

Size: 97,200 m<sup>2</sup>

Compensation ratio: 0-12 months post establishment = 1.0:0.75

12-60 months post establishment = 1.0:1.0

After 60 months post establishment = 1.0:1.5

The Walton River is a tidal river located on the southern shore of the Minas Basin, in the upper Bay of Fundy. In 1990, Ducks Unlimited Canada (DUC) attempted to create a freshwater pond for waterfowl and wildlife by constructing a dyke on a 12 hectare (ha) portion of the Walton River salt marsh. The pond was frequently infiltrated by saltwater from Fundy tides and consequently, the site was not successful as a freshwater pond for waterfowl and wildlife. NSTIR approached DFO in a May 2005 HADD compensation proposal for permission to develop a habitat bank by breaching the dike to restore tidal flow to the former salt marsh. DFO

agreed and authorized three HADDs in nearby watersheds. An MOU for the restoration of the Walton River salt marsh was developed later and signed-off by both parties on July 30 and 31, 2009.

NSTIR secured permission to modify the site from the property owner, the Nova Scotia Department of Natural Resources. Development of the Walton River Salt Marsh compensation bank involved removing the water control structure and sections of the dyke at five locations as well as reconstructing a secondary tidal channel along the south side of the marsh. NSTIR contracted DUC to carry-out the work between 29 August 2005 and 9 September 2005. Prior to construction, NSTIR obtained a watercourse alteration approval from the Nova Scotia Department of Environment.

As noted earlier, NSTIR had past project developments for which *Fisheries Act* S.35(2) authorizations were issued. Consequently, they applied 8,550 m<sup>2</sup> of their habitat banking credits as compensation to fulfill the HADD requirements of those past *Fisheries Act* S.35(2) authorizations. NSTIR intends use the remaining credits as compensation for future projects for which a *Fisheries Act* S.35(2) authorization is required. DFO has stipulated geographic limitations for the withdrawal of habitat banking credits. The habitat banking credits are to be used for projects occurring throughout Nova Scotia with priority given to those located in Nova Scotian waters of the Gulf of Maine.

Criteria for credit use includes following DFO's Hierarchy of Preferred Compensation Options and applying those compensation options with a greater preference within the hierarchy prior to withdrawing credits from the habitat bank. The habitat ratios are related to the maturity of the salt marsh restoration and are as follows: the habitat ratio of 1.0:0.75 is applied to credits withdrawn in the first 12 months post establishment, the habitat ratio of 1.0:1.0 is applied to credits withdrawn between 12 and 60 months post establishment, and the habitat ratio of 1.0:1.5 is applied to credits withdrawn after 60 months post establishment. DFO reserved the right to adjust these ratios according to monitoring results. DFO's standard ratio of 3:1

compensation may still be applied as a baseline ratio. NSTIR administer their banked credits by recording banked credit transactions and maintaining transaction records.

The tidal wetland restoration monitoring program was developed and conducted by CBWES between 2005 and 2010. The monitoring program included an extensive pre-construction baseline study of the restoration site and an adjacent unrestricted salt marsh in addition to an immediate post-construction assessment. The monitoring program documented a series of ecological variables (indicators) within the categories of hydrology, soils and sediments, vegetation, nekton, and benthic and other aquatic invertebrates.

Adaptive management is integrated into the monitoring program and is applied to the management of the habitat bank. Monitoring results to date indicate that restoration efforts are successful. Rapid re-colonization by salt marsh vegetation has resulted in a completely vegetated area (van Proosdij et al., 2010). NSTIR submits monitoring reports in addition to a summary of credit withdrawal and remaining balances to DFO on an annual basis, and posts the monitoring reports to its public website: <http://www.gov.ns.ca/tran/enviroservices/enviroSaltMarsh.asp>.

### **4.3 Case Studies: United States**

#### **4.3.1 California**

##### Gilsizer Slough Complex

Active (credits are available)

Location: Sutter County, California

Date constructed: 2003 - 2009

Size: 611.66 Acres

Mitigation available: Giant Garter Snake

The Gilsizer Slough Complex is owned and operated by Wildlands. The complex mitigates for giant garter snake (GGS) habitat loss. The GGS is a native California

reptile listed as threatened under the Federal Endangered Species Act. Gilsizer Slough complex consists of the following four projects: the Gilsizer Slough Preserve (162 acres), Gilsizer Slough South Conservation Bank (288 acres), Gilsizer Slough South Conservation Bank Phase II (91.4 acres), and Gilsizer Slough North Preserve (79.4 acres).

The first site, Gilsizer Slough Preserve, was constructed in 2003. Phase I of the Gilsizer Slough South Conservation Bank was approved by U.S. Fish and Wildlife Service (USFWS) in 2007. The number of credits released for Phase I was equivalent to the acreage and those credits are sold out. In 2009 construction took place at Phase II of the Gilsizer Slough South Conservation Bank. Phase II was approved in September 2008 and has had 82.26 credits released. Of the 82.26 credits that have been released only 1.59 remain available for sale. In 2009, construction took place at the Gilsizer Slough North Preserve. In terms of connectivity, the first Preserve and Phase I & II of the bank are adjacent, the Gilsizer North preserve is along Gilsizer Slough less than a mile north of the other projects.

The habitats within the Gilsizer Slough Complex feature restored GGS habitat built according to guidelines listed in the *Draft Recovery Plan for the Giant Garter Snake* (US Fish and Wildlife Service 1999). Habitat features include constructed perennial and seasonal marsh areas and upland grassland habitats to provide aquatic and upland basking habitats for the GGS. All constructed habitats are either well established or are progressing towards meeting their prescribed establishment criteria. To date, all performance goals have been met. In 2012, year three performance standards will be evaluated and a final release of credits will then be scheduled. According to its management plan, the habitats with the Gilsizer Slough Complex are maintained in perpetuity.

The Federal Endangered Species Act requires compensatory mitigation to offset project impacts to GGS habitat. Sale of bank credits is limited to a service area which includes portions of the following counties: Placer, Tehama, Sacramento,

Colusa, Glenn, Sutter, Butte, and Yuba. Public works agencies and the development community purchased credits from the Gilsizer Slough Complex when their projects impacted GGS habitat. The majority of the Credits have been sold to mitigate for impacts of public infrastructure projects; however, the project can mitigate for both public and private sector projects within the approved service area.

#### Pope Ranch Conservation Bank

Sold Out (credits are not available)

Location: Yolo County, California

Date constructed: 2001

Size: 391 Acres

Mitigation available: Giant Garter Snake

The Pope Ranch Conservation Bank is owned and operated by Wildlands. The bank is located within the 800 acre preserve in the Yolo Bypass in the Sacramento Valley of California. The bank was constructed and approved for use in 2001. The project involved the construction of approximately 35 acres of open water and channels, 100 acres of perennial marsh, 147 acres of seasonal marsh, and 109 acres of upland basking habitat for the benefit of the giant garter snake (GGS).

In 1997 the Sacramento Valley experienced flooding which caused extensive damage. Following the flood, the US Army Corps of Engineers (USACE) and the California Department of Water Resources began repairing flood-control systems. The repair work caused unavoidable impacts to GGS habitat as well as various wetland and riparian habitats.

The Pope Ranch Conservation Bank was intended to mitigate for those infrastructure repair impacts by providing aquatic and upland habitat for the GGS. Credits were also sold to private sector clients. The habitats on the Bank are fully established and all Credits have been sold.

### Toad Hill Ranch Mitigation Bank

Active (credits are available)

Location: Placer County, California

Date constructed: 2010

Size: 1,600 Acres

Mitigation in progress: Vernal pool preservation, vernal pool creation/restoration, seasonal wetland creation, Swainson's hawk foraging habitat preservation

The Toad Ranch Mitigation Bank is owned and operated by Wildlands. Approval for the mitigation bank was granted in April 2010 by the US Army Corps of Engineers (USACE), US Environmental Protection Agency (USEPA), and US Fish and Wildlife Service (USFWS). The Bank is approved to mitigate for impacts to 404 jurisdictional waters - vernal pools and seasonal wetlands, and to vernal pool species such as vernal pool fairy shrimp. The bank also provides mitigation for impacts to Swainson's hawk foraging habitat.

The bank is 1600 acres in size and consists of both restoration of vernal pools and seasonal wetlands as well as preservation of existing vernal pools. Phases III and IV were actually constructed first with construction being completed in the summer of 2010 and consisted of the restoration of over 30 acres of vernal pool habitat. The Bank is expected to provide credits to both private development and public infrastructure projects within the approved Service Area. Sale of bank credits for each habitat is limited to specific service areas. Vernal pool preservation proposed service area includes portions of Placer County. Seasonal wetland creation and vernal pool creation/restoration proposed service area includes portions of Sutter, Placer, Sacramento, and El Dorado. Swainson's hawk foraging habitat proposed service area is limited to Placer County.

#### **4.4 Challenges and Opportunities for Habitat Banking**

Determining the feasibility of habitat banking requires an exploration of the associated challenges and opportunities. In order to determine whether habitat banking is feasible one must be aware of all conditions or circumstances that may affect its success. Thus, the case studies were analyzed to determine both the challenges and opportunities experienced by proponents, consultants, and regulatory agencies. The following section lists the identified challenges and opportunities and provides excerpts from the interviews for a more in-depth understanding of the interviewee's perspective.

Analysis of each interview with the proponents and consultants revealed that the main challenges include:

- Learning curve / Permit process
- Locating potential habitat banks
- Institutional issues
- Cost
- Multi-stakeholders
- Compensation Ratios and Conservation Credits

Analysis of each interview with the proponents and consultants revealed that the main opportunities include:

- Proactive rather than reactive
- Advantages of scale
- Partnership opportunities: Cost sharing, Scientific research, public education
- Streamline development projects

Analysis of each interview with the regulatory agencies revealed that the main opportunities include:

- Withdrawals and administration
- Monitoring

Analysis of each interview with the regulatory agencies revealed that the main challenges include:

- Proactive rather than reactive
- Net gain of habitat

#### 4.4.1 Challenges and Opportunities for Proponents and Consultants

Challenges and opportunities associated with habitat banking according to proponents and consultants are presented in Table 4.1.

Table 4.1. Challenges and opportunities associated with habitat banking according to proponents and consultants

Challenges	Opportunities
Learning curve / Permit process	Proactive rather than reactive
Locating potential habitat banks	Advantages of scale
Institutional issues	Partnership opportunities: Cost sharing, Scientific research, public education
Cost	Streamline development projects
Multi-stakeholders	
Compensation Ratios and Conservation Credits	

##### 4.4.1.1 Challenges for Proponents and Consultants

#### Learning Curve

The learning curve associated with habitat banking was often presented as a challenge by both proponents and consultants. The comment, “Knowing where to start was a big challenge” was frequently expressed. In addition to determining how to initiate a habitat bank, there is a learning curve throughout the project. “We learned as we went and there was just some trial and error.” There was consensus that the learning curve diminished with each completed habitat bank project. However, since each bank is unique, there can be unexpected issues which arise. “Each time a project happens it has something new around it, like [project A] was a big learning curve and as we worked through that it made projects like [project B]



happen a lot easier.” Proponents and consultants indicated that habitat banking projects are site specific and therefore each bank needs to be handled on a case by case basis.

The learning curve also applies to the permit process. This process includes learning which permits are required, from whom and the length of time for approval. Initially, that learning curve can be time consuming as noted by one proponent, “It’s just making sure that I’ve got all my permits in line. Some permits take longer than others, with the provincial ones depending on the ownership aspects. It took me a year to get approval from one by just one of many people doing it.” This proponent also suggested that learning the length of time required to secure some permits is important for knowing how far in advance to apply for the permit.

Proponents agreed that while initially the permit process was a challenge, with experience the process became easier. “As far as how do we know, just through experience, I can’t even imagine just going out cold just like a landowner perspective and knowing nothing about any of this and just making it through the process.” Taken together, these statements reflect the challenges associated with learning the process for habitat banking. Equally important, they demonstrate that it is possible to maneuver through the process with success.

### **Locating Potential Habitat Banks**

Locating potential habitat banks can be a challenge in both Canada and the US, but for different reasons. Conservation banking in the US compensates for habitat loss of specific species. It is sometimes the case where the proponent knows exactly what type of compensation is required, but just cannot locate it:

And they really want us to find a bank down in [a local County] for giant garter snake, we’re still searching, it’s hard to find sometimes the right property. And then other times it’s because a client has a large need. They’re building a highway through a certain area and they know they’re going to need 1,000 acres of

kit fox habitat, so we got to look for something specific for that client. So it can be the market or agency driven.

In Canada, the dilemma can sometimes lie in the uncertainty surrounding the regulatory agencies' requirements and preferences for compensation. According to DFO, "it is the proponent's responsibility to find their own compensation". Some proponents admitted that it is difficult to locate a potential habitat bank without knowing what is acceptable to DFO.

### **Institutional Issues**

Gaining the support and cooperation of DFO was frequently stated as an initial challenge for proponents. As expressed by one proponent, "First of all, DFO wasn't really supportive. It took three proposals to get [their representative] on side. Once [that representative] was [he/she] became a real champion. [He/she] was super dedicated, a great resource. That was the first hurdle, was to get DFO onside." Reaching an agreement with the regulatory agency regarding the potential bank can involve many revisions and thus be very time consuming.

Proponents also acknowledged variability in the application of the habitat banking policy. Proponents in both Canada and the U.S. cited the uncertainty surrounding regulatory agencies' requirements and preferences for compensation. This uncertainty can lead to a "back and forth" exchange between the proponent and the regulatory agency:

Yeah, the regulatory agencies are the reviewers. We pretty much do the work and then other people look at it and criticize. Yeah and then they go, it's not good enough. We go, okay. Yeah, sometimes it's that way and we go back and forth, but really the burden falls on us and the agencies pretty much strictly serve us as reviewers and ultimately they have to sign off on it.

This reality caused some proponents to remark that initiating a habitat bank is time consuming. Compounding the problem is inconsistency in opinions among biologists within the regulatory agencies. Proponents felt that their chances of having a

successful habitat bank proposal were dependent on the individual regulatory agency representative.

In some instances, the regulatory agency representative handling a habitat bank project moved into another position and the new representative did not share the same judgment. As a consequence, proponents were required to “start over” according to the discretion of the new representative. This was also an issue for proponents during the monitoring stage of the habitat bank, as described by one consultant, “The knowledge gets lost with change of staff. They move onto other projects and everything is lost.”

Moreover, proponents identified other institutional challenges related to monitoring. For example, the time that it takes the regulatory agency to approve a monitoring report can be lengthily. In cases where the monitoring report isn’t approved, proponents said that there was at times insufficient feedback on the report. Proponents expressed frustration with institutional issues such as these and noted that all of these inefficiencies are discouraging and time consuming for the proponent.

### **Cost**

Although proponents reported that habitat banking is an expensive form of compensation, many of them were also quick to point out that the benefits associated with using a habitat bank can make up for the cost. “So, if you’re able to create a bank and draw from that, it makes those projects and the expenditures around them a lot easier to absorb and justify from a proponent’s standpoint.” Nonetheless, the expense of habitat banking can be an issue for some proponents depending on their circumstances.

Cost also can be a challenge in cases where the habitat restoration or creation is not as successful as anticipated and therefore additional costs are incurred to complete remedial works. Furthermore, the success of the habitat bank determines the number of habitat banking credits received by the proponent. As such, “if only a

part of the habitat area is deemed effective, only this portion may be banked as a habitat credit". Proponents reported that it is important to thoroughly evaluate the potential habitat bank site to ensure that it is a good candidate for success.

Furthermore, it is equally important to ensure that the bank is well constructed which should help to avoid costly remedial works. However, nature is generally unpredictable and therefore the development of restoration can be very uncertain.

### **Multi-stakeholders**

It is often the case that habitat banking involves many stakeholders. Stakeholders can include, but are not limited to, provincial, territorial and municipal governments, First Nations, community groups, non-governmental organizations, and landowners. Inter-governmental cooperation and consultation is an essential first step in initiating the habitat bank and can contribute to the success of the habitat bank. Stakeholders must be willing to cooperate with one another in order to for the entire habitat bank process to be effective and efficient.

Working with multiple stakeholders was often presented as a challenge by both proponents and consultants. Review of the case studies revealed that the greatest challenge was in gaining the support of the public and/or individual landowners for the habitat bank and also in the amount of time required for effective public consultation. The following two quotations from different proponents reflect the challenges associated with garnering public support for a potential habitat bank:

Now the other thing we had to do with the citizens is I went and tried to explain what we're trying to do and the ecology of the river, like we're sitting in their living rooms trying to explain, which is not a very amicable setting and then you get this war zone.

Yeah, and building support for that project. The municipality was involved, so we had approached everyone from the local property owners, broader community, schools, the municipality and the key provincial and federal departments. A lot of that networking and those connections had been established long before it had ever

actually been decided that yes the project is going to happen. So, a lot of that groundwork and those connections and awareness at multiple levels were in place. When the decision was made it was a much easier decision to make and a lot of that stuff had already been done.

The first quotation demonstrates how, in some situations, the public is unsupportive of the potential habitat bank. If public acceptance is a prerequisite to establishing the bank, then the proponent is forced to engage in public consultation to gain acceptance. The second quotation notes the various stakeholders who needed to be consulted in order to proceed with the habitat bank.

In addition to public acceptance there can also be issues related to land ownership. For example, in one case, arrangements were also made with two local farmers to gain access to the River through private property for machinery and materials. In another case, some of the land where the potential habitat bank was to be located was privately owned and a transfer of ownership needed to be negotiated.

### **Compensation Ratios and Conservation Credits**

A commonality shared by Canada and the US is that measuring and quantifying the productive capacity of restored or created habitat is an inexact science. Proponents and consultants often made reference to the discretionary approach applied to the evaluation of habitat. This approach translates into inconsistencies in ratio and credit calculation across regions as well as uncertainty for proponents, "One concern is the evaluation of the habitat and assignment of a ratio of the area preserved or improved to what is determined as the final bank account."

In Canada, DFO National Headquarters (NHQ) does not provide national guidance on the application of compensation ratios. Some provinces, like Nova Scotia, apply a standard ratio that is used as a starting point; however, the ratio can still vary depending on the habitat bank and the methodology used for determining the ratio. Consequently, ratios are ultimately determined on a case by case, region by region basis.

In the US, there is also variation in the methods used to calculate conservation credits. Credit calculation is not based on a measurement of productive capacity or translating m<sup>2</sup> of habitat into a ratio as done in Canada. When asked whether or not productive capacity is measured, one proponent replied, "It's moved beyond because that is so theoretical, it's moved to things that are actually measurable" Instead, conservation credits are determined by the size and/or biological value of the bank as described by one proponent,

...the credit, you know, we have some banks that it's an acre of habitat for a credit and then we have others that maybe there was some kind of assessment done on the habitat and you're given credits based on that. So that's all established and you have to meet your performance standards to get to those releases of credits so they know it's the quality that we all agreed upon.

Again, an "assessment" of the habitat is required to calculate the value of the conservation credits. The case studies showed that a certain degree of discretion by the regulatory agencies is applied in evaluating a habitat bank. This in combination with the differentiation in methodology can create a great deal uncertainty for proponents.

#### *4.4.1.2 Opportunities for Proponents and Consultants*

##### **Proactive Rather Than Reactive**

Proponents and consultants reported that the proactive nature of habitat banking makes a range of opportunities achievable. For example, an established habitat bank may act as a solution when the proponent is having difficulty finding adequate on-site compensation. In some cases, the proponent must compensate for several small HADDs, and few compensation options exist at the development site. An established habitat bank presents an opportunity for the proponent to combine several small HADDs and withdraw from one bank. Proponents advocated this approach stating that it is more cost and time effective. This approach may also produce ecological benefits because large scale established habitat restoration or creation is used as compensation rather than a series of small piecemeal compensation projects.

## **Advantages of Scale**

The case studies demonstrate that habitat banking presents several advantages of scale. First, the proponent can benefit economically by developing large scale compensation projects opposed to several small compensation projects. Developing and monitoring several small compensation projects can be expensive compared to one large compensation project.

Proponents also reasoned that large scale compensation projects were more likely to produce a net gain of habitat. The advantages of scale are summed up by a proponent who stated, "It also offers advantages of scale where larger habitat areas are created, compared with a series of small projects that are more costly and provide fewer ecological benefits." This statement was echoed by proponents and consultants who felt that habitat banking allowed them to use an ecosystem based approach.

## **Partnership Opportunities**

Partnerships, both formal and informal can present many opportunities for the proponent. The case studies reveal that creating partnerships through habitat banking offers opportunities for cost sharing, scientific research, and public education. Taking advantage of partnership opportunities allows for multiple objectives to be achieved through the creation of a habitat bank.

Habitat banking can be an expensive form of compensation and so it is advantageous for proponents to seek cost sharing opportunities, as stated here, "And also along the same lines are the partnership opportunities that can also come along. You can partner with another agency like [regulatory agency] to share the costs so that it's a little cheaper for both of us." Another proponent remarked, "Win, win, win – cost sharing between the city, [proponent], and DFO." The case studies show that cost sharing can be realized through various levels of government, non-governmental organizations, and landowners.

Much scientific research can be accomplished through partnerships. Several proponents and consultants have produced scientific peer reviewed papers based on the habitat banks with which they were involved. In one case, the question as to whether salt marshes are fish habitat spurred a wide range of scientific investigation. The initiation of the potential habitat bank depended on DFO's decision to enforce the Fisheries Act to protect and restore salt marshes. DFO concluded that salt marshes are in fact fish habitat and thus the project moved forward.

As indicated in the following quotation, partnerships with educational institutions can contribute to the scientific research on specific habitats and even improve the habitat bank monitoring program:

Through that we have a strong partnership with [a local university]. That's where a lot of the over and above the bare monitoring, the mandatory monitoring that we're doing, there's some science happening over and above that and answering some of those bigger scientific questions that we're not necessarily able to get at within the confines of the monitoring program. But by bringing [the local university] and some of the other Universities in on these projects, we are getting at some of those bigger questions which ultimately will be feeding into our overall knowledge of these systems and our abilities to do these types of projects in the future.

This example highlights the learning opportunities available if the proponent is willing to explore them. These partnerships produce a mutually beneficial relationship where both parties contribute to and benefit from the scientific research.

Public education partnerships emerged as another opportunity which can be realized through habitat banking. Proponents in Quebec and Nova Scotia both incorporated an educational component into their habitat bank projects. For instance, one proponent formed a partnership with a college so that future biological technicians assisted by biologists could conduct all the species



inventories. Perhaps the most outstanding example took place in Nova Scotia where the proponent worked with a local non-governmental organization to maximize the environmental, economic and community project benefits. The public education spin-offs included a local elementary school creating a salt marsh within their school and producing a salt marsh video. After the habitat bank was constructed, the non-governmental organization and the local community worked with other stakeholders to develop a community-based concept for a salt marsh interpretive centre. Plans are underway for the interpretive centre to be constructed on property adjacent to the habitat bank.

### **Streamline Development Projects**

According to the Practitioners Guide to Habitat Compensation (DFO 2002), the existence of a habitat bank does not “Pre-approve” any future HADDs. Proponents agreed, but cited that the existence of a habitat bank did allow them to streamline development projects. Since the compensation is completed upfront there is a lower degree of risk for the regulators. This can result in greater efficiency and shorter timelines in gaining HADD authorizations from DFO.

Proponents also described the long regulatory process involved in compensating for small development projects. As a result, development projects were sometimes delayed while the proponent fulfilled the necessary regulatory requirements. An established habitat bank may serve to avoid having to compensate for individual small development projects. As expressed by one proponent, “It’s [the habitat bank] been successful in that it has simplified the process of designing a compensation project for each site as well as the approval of those compensation plans.” This simplified approach can streamline development projects because the proponent is able to combine several small HADDs and withdraw from one bank.

#### 4.4.2 Challenges and Opportunities for Regulatory Authorities

Challenges and opportunities associated with habitat banking according to regulatory authorities are presented in Table 4.2.

Table 4.2. Challenges and opportunities associated with habitat banking according to regulatory authorities

Challenges	Opportunities
Withdrawals and Administration Monitoring	Proactive Rather Than Reactive Net Gain of Habitat

##### 4.4.2.1 Challenges for Regulatory Authorities

#### Withdrawals and Administration

The case studies revealed a number of challenges associated with withdrawals and administration of the habitat bank. For example, prior to withdrawals DFO and the proponent must agree on a compensation ratio. Further complicating the determination of the ratio is the challenge of reconciling habitat quality when withdrawals are proposed from the bank. Lastly, administering the habitat bank in terms of tracking the remaining habitat credits can be challenging.

As noted earlier, measuring and quantifying the productive capacity of restored or created habitat is an inexact science. Since DFO National Headquarters (NHQ) does not provide national guidance on the application of compensation ratios, the determination of a ratio is left up to the individual regions. The case studies showed that individual DFO biologists sometimes have different opinions about the assignment of ratios. Furthermore, disagreements between DFO and the proponent are not uncommon. Taken together, the follow two quotations from separate representatives illustrate how the inexact science of quantifying the productive capacity of restored or created habitat creates a challenge when attempting to determine the ratio:

You need a number. It must relate to the fisheries management plan. Ratios are stupid. How do you judge a ratio? We use ratios

because we don't know how to calculate productive capacity.

Well, [the proponent] wants a 1:1 ratio because that will benefit them, whereas [the regulatory authority] want a 3:1 ratio because that will benefit the habitat. So, that's where it gets difficult....We need to look at 3:1 to try to offset the time lag, offset the habitat lost and try to get the net gain, at least a little bit. We are ensuring that way that there should be a no net loss.

The case studies show that the most commonly assigned ratio was 1:1. In fact, none of the provinces assigned a 3:1 ratio. It is evident that quantifying the amount of habitat credits awarded to proponents is a stumbling block for regulatory authorities. The challenge lies first in measuring productive capacity and lastly in negotiating with the proponent.

Reconciling habitat quality when withdrawals are proposed from the bank is another challenge faced by regulatory authorities. According to DFO policy, when withdrawals are proposed, the habitat bank is evaluated immediately prior to its use as compensation to determine habitat quality and establish the habitat bank's value. Accordingly, the quality of the habitat harmfully altered, disrupted or destroyed is evaluated. The DFO will apply decision making discretion to reconcile any differences in quality between the habitat bank and the habitat harmfully altered, disrupted or destroyed. When asked how habitat quality is reconciled when withdrawals are proposed from the bank, one representative answered:

Reconciling habitat quality when withdrawals are proposed is always a difficult task. Good professional judgment is often used. Proponents will do their own calculations and may disagree with DFO. The proponent and DFO must work together to reach a consensus. Often when a natural habitat is destroyed the recreated habitat is not as productive. Formulas are used as a helpful tool, but they are not the only thing to consider and are not the final answer.

Through reviewing the case studies, it became apparent that many inconsistencies exist in how habitat quality is reconciled which may be due to differences in discretion.

Keeping track of the remaining habitat credits for each bank was often described as challenging and time consuming. One regulatory authority representative commented that “Keeping track of the bank is just a bloody nightmare”. The DFO prefers that the entire bank be used at one time. However, according to the case studies, proponents withdrew portions of habitat credits for various development projects and so it is necessary to continually update how much of the bank is still available for use as future compensation.

### **Monitoring**

Effective monitoring by the regulatory agency is essential for ensuring legal compliance by the proponent. As noted earlier, proponents reported that the time it takes the regulatory agency to approve a monitoring report can be lengthily. The case studies revealed that several regulatory authority representatives concur with the proponent’s opinion on monitoring. Some regulatory authority representatives referred to the difficulties surrounding monitoring as an “institutional issue” and cited “limited agency resources to monitor banks” as the problem.

Further complicating the issue is the fact that DFO lacks a standard for monitoring habitat banks. As expressed by one regulatory authority representative, “Sometimes the rules on how to measure and monitor the performance of the habitat bank are conflicting. DFO says one thing and the proponent says another.” Recognizing this challenge, some effort has been made to develop a standardized approach to monitoring.

#### *4.4.2.2 Opportunities for Regulatory Authorities*

##### **Proactive Rather than Reactive**

The proactive rather than reactive nature of habitat banking was described as an opportunity by proponents, consultants, and regulatory authority representatives alike. One regulatory authority representative commented that “habitat banks are a

proactive and successful approach to compensation". Another representative stated that "the habitat compensation bank is deemed useful because a viable compensatory habitat is created before future projects are implemented."

The case studies revealed that the regulatory agencies favored the proactive aspect of habitat banking for different reasons than the proponents and consultants. For example, regulatory agencies value the security provided by an established habitat bank as expresses here, "it is better to work with a habitat bank because it is like insurance meaning that the [regulatory agency] doesn't allow withdrawal of credits if the habitat bank isn't successful." Since compensation is done upfront and perhaps well ahead of known future projects, there is a lower degree of risk for the regulators. According to the case studies, regulatory agencies also, in some cases, held back habitat credits to ensure the compliance of the authorizations already issued under the *Fisheries Act*.

### **Net Gain of Habitat**

The case studies revealed that regulatory authority representatives agree that habitat banking is the best opportunity to achieve the long-term objective of the Habitat Policy – a net gain in fish habitat. Representatives explained that during the time between a habitat bank's creation and its use as compensation there is potential for a net gain of productive capacity because fish are benefiting from the newly created habitat. This is noted by one representative who said, "there is a net gain in fish habitat when the habitat bank is created and functioning prior to HADD." This statement was echoed by other representatives who stated:

And DFO gets a little bit of a win there too because what's happening you have the habitat functioning until they take it out for the HADD that's being created later. So the environment gets the net benefit of having it there, they get the interest.

Regulatory authority representatives did caution that accomplishing a net gain is not guaranteed and is dependent upon the details of the project as indicated in the following quote:

Whether or not you get a net gain, well it all depends on the project. If you open up a barrier maybe you do. If you're just recreating habitat you're probably not going to because by the time the habitat comes in and starts working it could take years before it starts functioning the way it should.

Furthermore, when asked one what kinds of projects are most likely to produce a net gain one representative answered:

Yeah, you'll get a net gain because you are doing a large scale project that will have definite benefits to the ecosystem and at the same time with DFO if you're applying ratios such as the 3:1 which is used here quite often, that allows you to get that net gain.... so, we need to look at 3:1 to try to offset the time lag, offset the habitat lost and try to get the net gain, at least a little bit. We are ensuring that way that there should be a no net loss.

Taken together, the opinions expressed by these regulatory authority representatives show that a habitat bank will not produce a net gain simply because the habitat is functioning in advance of a HADD. Instead, the opportunity for a net gain increases according to the scale of the project, whether the project creates habitat as opposed to restoring habitat, and finally the assigned ratio.

## **5. DETERMINING EXPERT OPINION ON HABITAT BANKING**

### **5.1 The Delphi Technique**

The traditional Delphi Technique can be defined as a systematic tool for harnessing group knowledge (Dalkey 1969). It is a method used to solicit expert opinion anonymously through written communication (Delbecq et al. 1975). The technique relies on an iterative process where participants respond to a series of questionnaires on a specific topic. All responses are summarized then returned to participants giving them the opportunity to review the opinions of others and revise their own opinions. The objective is to reveal differing viewpoints and reach an unbiased consensus (Delbecq et al. 1975).

The traditional Delphi Technique has two shortcomings which made it an unsuitable tool for (this situation) determining expert opinion on habitat banking. First, the traditional Delphi's reliance on written communication through a series of questionnaires can make it slow and time consuming (Strauss & Zeigler 1975). Second, preventing verbal interaction can result in interpretation challenges and may reduce collective understanding and the ability of participants to question each other (Delbecq et al. 1975).

#### **5.1.1 Modified Delphi Approach Workshop**

Due to the information gaps in the site visits and literature sources, it was determined that the collective judgement of fisheries habitat experts was necessary to determine whether habitat banking is a viable option for Manitoba and if so, what is required so that proponents can use habitat banking as a compensation tool. In order to fully explore the potential of habitat banking, representatives from both regulatory agencies and industry were invited to participate in a one-day facilitated workshop using a modified Delphi approach (MDA). In total, 11 people attended the modified Delphi workshop. The objective of the MDA workshop was to determine the feasibility of applying habitat banking in Manitoba.

The traditional Delphi technique was modified in order to collect data more efficiently and provide participants with the opportunity to clarify and discuss responses. This approach was appropriate because the goal was not to reach a consensus, as with the traditional Delphi Technique, but instead to acquire knowledge from multiple fisheries habitat experts. A literature review of habitat banking as well as the data collected during the site visits provided the basis for the four workshop questions. The questions were presented separately and participants were asked to write their responses on paper provided to them. Participants then engaged in a facilitator led discussion while their responses were recorded on a flipchart displayed for the purpose of discussion.

Information collected during the workshop was summarized and returned to participants so that they had the opportunity to provide additional feedback. Revisions were highlighted allowing participants to easily identify edits and provide their comments. This process was repeated three times until at which time participants had nothing further to add and were satisfied with the workshop summary.

## **5.2 Workshop Proceedings**

### **5.2.1 Establishing a Habitat Bank**

Question #1) From your knowledge as an agency or a proponent, what are the main reasons or drivers leading to establishing a habitat bank, what steps would be taken and who would be involved?

Nineteen reasons or drivers leading to establishing a habitat bank were identified.

The following is a summary of the key points:

- Habitat banking is an option when there is difficulty finding adequate compensation at project locations or compensation for the HADD not feasible at the project site.



- Habitat banking is a management action that can address multiple objectives and help the proponent to meet mandate objectives.
- Habitat banking offers real potential to achieve a net gain in fish habitat.
- Habitat banking offers advantages of scale such as:
  - Opportunity for the proponent to develop one large bank to compensate for multiple HADD's;
  - Opportunity to plan compensation that is integrated as part of a broader ecosystem plan, i.e. basin or watershed level, which may result in enhanced benefits to fish; and
  - Potential for increased financial support.
- The proponent may save time because an established habitat bank can streamline the regulatory process by reducing negotiating time on habitat compensation agreements.

Twenty-four process steps for establishing a habitat bank were identified. The following is a summary of the key points:

- Proponents must determine their work plan for the entire geographic area they may impact, as well as, review future work plans and determine where they will cause HADD's in 5-10-20 years.
- Determine where future operations are likely to impact fish and fish habitat so that any creation of a habitat bank can occur within same watershed or ecological region.
- Identify potential threats that could impede the success of a proposed habitat bank.
- Proponents may communicate with various groups for assistance in locating habitat banks. For example, Conservation Districts, Manitoba Fisheries Branch, non-governmental organizations.

- Proponent must communicate with the appropriate regulatory agencies early in the process and throughout the development of the habitat bank.
- DFO can provide recommendation and a hierarchy of actions required to compensate for a HADD.
- The objective for the bank must be clearly defined, i.e. why is the bank being established in a particular location and what are the associated losses and gains.
- Create a framework for setting objectives and align habitat bank objectives with fisheries / resource management objectives for the type of fishery affected.
- The framework for setting objectives should consider socially driven objectives as well as ecologically driven objectives. For example, a landowner may object if habitat is destroyed in their area and then habitat is created or restored elsewhere.
- Identify stakeholders and a process for engagement.
- Secure project funding.
- Determine reviews and permits required to proceed and work with regulator throughout the process.
- All on-site compensation options must be explored before using an existing habitat bank (avoidance and minimization of loss should be higher priority than using habitat bank credits).

Regarding who to involve in creating a habitat bank, multiple stakeholders were identified and are presented according to their role.

Regulatory Agency

Fisheries and Oceans Canada

Navigable Waters

Manitoba Fisheries Branch

### Consultative

Regional Biologists

Manitoba Habitat Heritage Corporation

### Round table stakeholder

Conservation Districts

Municipalities

Non Governmental Organizations and Fish Enhancement Groups

First Nations

Affected communities

### **5.2.2 Withdrawals from Habitat Bank**

Question #2) Describe a method for determining habitat bank withdrawal amounts when there are differences in habitat quality between the banked credits and the newly destroyed habitat.

Seventeen tools were identified for determining withdrawals when differences in habitat quality exist. The following is a summary of the key points:

- DFO lacks a standard, user-friendly tool for measuring the productive capacity of fish habitats. However, DFO does have a standard approach for determining HADD's and measuring habitat. DFO employs more complex approaches when dealing with large HADD's by using Habitat Suitability Indices and quality measures.
- Coordinate between proponents, DFO, and Manitoba Fisheries Branch to create an industry standard for consistency.
- Scientific research is needed to determine methodology and specific habitat quality parameters. In the absence of scientific research, a great deal of flexibility, judgment and creativity must be applied.
- Consistent standard needed, but how to determine the 'value' of the habitat – perhaps better to simply use a ratio.

- Use a simple multiplication factor of 2 to 1 or 1.5 to 1 to account for variances in habitat quality.
- Decide on habitat gain as the outcome to accommodate for differences in habitat quality between the banked credits and the newly destroyed habitat.
- Keep the description of quality simple – perhaps focus on a species approach, with ‘important’ species getting priority.
- It is critical to understand what has been gained and/or lost and the implications to the overall productivity and/or fish population.
- Value of the fishery must be considered, perhaps simply ranked as High, Medium, Low, with ongoing monitoring required.

There was consensus among participants that a standard for measuring habitat quality and the success of a habitat bank is needed. The elements of the standard must be defined, for example, the elements could be qualitative, reflect the value of the resource, improve fisheries, and meet fisheries management objectives. Participants mentioned that a standard for measuring habitat quality is being developed through research by the academic community and DFO with support from industry. Ideally, the same standard should be applied nationally for consistency.

### **5.2.3 Valuation and Quantification of Impacts to Fish Habitat**

Question #3) What are the barriers and opportunities associated with creating a standard for monitoring or measuring the habitat quality and success of a habitat bank?

Sixteen barriers to creating a standard for monitoring or measuring the habitat quality and success of a habitat bank were identified. The following is a summary of the key points:

- Time-consuming and costly to develop and implement.

- Limited resources are available for development and delivery of a standard for measuring habitat quality.
- Difficulty in gaining consensus on proposed scientific methodology from proponents and regulators.
- Valuation of habitat is subjective and difficult to prove.
- Difficulty in establishing different values for different areas.
- Lack of science and understanding of productive capacity and how it is applied.
- Becoming bound to standard may result in less flexibility for monitoring.
- Limited knowledge base of habitat quality standards.
- Stakeholders may not truthfully provide 'true impact' of the alteration.

Ten opportunities for creating a standard for monitoring or measuring the habitat quality and success of a habitat bank were identified. The following is a summary of the key points:

- Explore simplified methods for implementing measures such as fish production or catch rates.
- Graduate students can conduct research on standards.
- Modify and improve existing standards from other jurisdictions.
- Once established, assist in consistent decision-making with broader applicability across the province.
- Reduced process time for regulators and proponents.
- Can help to refine / define objectives for compensation.
- Opportunity for cooperation between DFO/Province/academia.
- Access to corporate knowledge and experience.

Participants were asked to rank-order their responses on cards for question #3. The ranking scores are as follows:

- Nine participants agreed that it would be too time consuming and costly to develop a standard for monitoring or measuring the habitat quality and success of a habitat bank.
- Seven participants agreed that valuation of habitat is subjective and difficult to prove. Therefore, the valuation of habitat is a barrier to creating a standard for monitoring or measuring the habitat quality and success of a habitat bank.
- Six participants agreed that difficulty in gaining consensus on proposed scientific methodology from proponents and regulators is a barrier to creating a standard for monitoring or measuring the habitat quality and success of a habitat bank.
- Six participants agreed that difficulty in establishing different values for different areas is a barrier to creating a standard for monitoring or measuring the habitat quality and success of a habitat bank.
- Six participants agreed that exploring simplified methods for implementing measures such as fish production or catch rates is an opportunity for creating a standard for monitoring or measuring the habitat quality and success of a habitat bank.
- Five participants agreed that modifying and improving existing standards from other jurisdictions is an opportunity for creating a standard for monitoring or measuring the habitat quality and success of a habitat bank.

#### **5.2.4 Achieving Fisheries Management Objectives**

Question #4) What opportunities exist for habitat banking relative to meeting resource management goals such as fisheries management objectives and/or watershed management plans?

Nine opportunities for habitat banking relative to resource management goals such as fisheries management objectives and/or watershed management plans were identified. The following is a summary of the key points:

- Opportunities depend on whether the bank is managed regionally or locally and administrative area-specific or project specific.
- The opportunity in Manitoba is in integrated watershed planning and management.
- Community and stakeholder buy-in is essential to fully realize opportunities.
- Opportunity to buy and sell credits to give flexibility.
- Larger context for objectives of habitat banks:
  - Focus on achieving more effective compensation by addressing ecosystem bottlenecks to productivity like habitat fragmentation. For example, removal of an orphaned barrier would result in credit for the footprint and the HADD's that draw from the habitat bank are a series of small infills.

## 6. CASE STUDY AND WORKSHOP COMPARATIVE ANALYSIS

### 6.1 Comparative Analysis

Challenges and opportunities for proponents, consultants, and regulatory authorities were derived from the case studies. Upon further analysis of the challenges and opportunities, it was determined that some of the issues required additional exploration. As a result, representatives from both regulatory agencies and industry were invited to participate in a one-day facilitated workshop using a modified Delphi approach (MDA).

Review of the case studies confirmed that proponents experienced difficulty in understanding the process involved for developing a habitat bank. Moreover, working with multi-stakeholders and identifying key stakeholders was a challenge for proponents. Thus, Question #1 of the MDA workshop was developed to gather additional information on the process used to create habitat banks.

*Question #1) From your knowledge as an agency or a proponent, what are the main reasons or drivers leading to establishing a habitat bank, what steps would be taken and who would be involved?*

In response to Question #1, participants at the MDA workshop stressed the importance of long-term planning as a key component for habitat bank development success. In particular, the process for developing a habitat bank must include a work plan for the entire geographic area which may be impacted, as well as, a review of future work plans to determine the locations of HADD's in 5-10-20 years. Furthermore, determining the scale of the project was noted as an important factor in planning as the planning effort will reflect the scale of the project.

New information that emerged from the MDA workshop in response to Question #1 also included identifying potential threats that could impede the success of a proposed habitat bank. Defining and setting objectives for the habitat bank also emerged as vital to the development of a habitat bank. Participants at the MDA workshop advised that proponents create a framework for setting objectives and



align habitat bank objectives with fisheries / resource management objectives for the type of fishery affected. In establishing the framework for setting objectives, proponents should be thorough by considering socially driven objectives as well as ecologically driven objectives. In terms of ecologically driven objectives, focusing on achieving a net gain in fish habitat was recommended.

The case studies revealed a number of challenges associated with withdrawals and administration of the habitat bank. These challenges included agreement between the proponent and DFO on an accurate compensation ratio. Further complicating the determination of the ratio is the challenge of reconciling habitat quality when withdrawals are proposed from the bank.

Through reviewing the case studies, it became apparent that many inconsistencies exist in how habitat quality is reconciled which may be due to differences in discretion across the provinces. For example, Manitoba applied the highest compensation ratio of 10:1, while on average, provinces applied a ratio of 1:1. Thus, Question #2 of the MDA workshop was developed to explore alternative methods, such as creating a standard for determining habitat bank withdrawal amounts when there are differences in habitat quality between the banked credits and the newly destroyed habitat.

*Question #2) Describe a method for determining habitat bank withdrawal amounts when there are differences in habitat quality between the banked credits and the newly destroyed habitat.*

In response to Question #2, participants at the MDA workshop agreed that DFO requires a standard user-friendly tool for measuring the productive capacity of fish habitats. It was suggested that efforts towards developing a consistent industry standard should include using scientific research to determine the methodology and specific habitat parameters as well as coordination between proponents, DFO, and the Manitoba Fisheries Branch.

Evaluation of the habitat prior to withdrawals was identified as a critical part of habitat banking. Assigning a 10:1 ratio (habitat lost: habitat gained) in place of an evaluation should not be a recommended practice. In order to determine withdrawals when there are differences in habitat quality the value of the fishery must be considered and perhaps ranked as high, medium, low, with ongoing monitoring required. Finally, MDA workshop participants recommended that the objective should be to achieve a net gain in fish habitat in order to account for differences in habitat quality between the banked credits and the newly destroyed habitat.

Analysis of the case studies confirmed that many habitat banks receive inadequate evaluation and monitoring. Regulatory agencies admitted that sometimes the rules on how to measure and monitor the performance of the habitat bank are conflicting. Question #3 of the MDA workshop was intended to investigate the barriers and opportunities associated with creating a standard for monitoring or measuring the habitat quality and success of a habitat bank.

*Question #3) What are the barriers and opportunities associated with creating a standard for monitoring or measuring the habitat quality and success of a habitat bank?*

In response to Question #3, participants at the MDA workshop acknowledged that many compensation projects receive inadequate evaluation and monitoring. However, the majority of MDA workshop participants claimed that that it would be too time consuming and costly to develop a standard for monitoring or measuring the habitat quality and success of a habitat bank. The rationale for this opinion being that the valuation of habitat is subjective. Moreover, it would be difficult to gain consensus on proposed scientific methodology from proponents and regulators.

Participants proposed that a standard for monitoring or measuring the habitat quality and success of a habitat bank may be created by modifying and improving existing standards from other jurisdictions and also by exploring simplified methods

for implementing measures such as fish production or catch rates. Lastly, it was suggested that adaptive resource management may be the answer to creating a standard for measuring habitat quality. However, in order for adaptive resource management to be effective it must include a monitoring component so that management decisions can be evaluated and continually improved.

## **6.2 Fish Habitat Compensation Model for Proponents**

The data collected during the MDA workshop in combination with the site visit data contributed to the development of a Fish Habitat Compensation Model for proponents who wish to develop a habitat bank according to DFO regulatory requirements. As previously mentioned, analysis of both the case studies and the MDA workshop confirmed that proponents experienced difficulty in understanding the process involved for developing a habitat bank. Thus, the Fish Habitat Compensation Model is intended to help guide the proponent through the process of building a habitat bank.

### **6.2.1 Fish Habitat Compensation Model**

#### **Initiation of Habitat Bank**

1. Hire or assign a project manager to coordinate habitat bank projects.
2. Review and/or create future work plan for company (organization) operations to identify geographic area where impacts to fish and fish habitat are likely to occur.
3. Have conversation with DFO staff to relay intentions of creating a habitat bank.
4. Evaluate fish habitat compensation requirements to satisfy conditions of Fisheries Act Authorizations to achieve DFO's Habitat Policy goal of>NNL.
5. Determine where future operations are likely to impact fish and fish habitat so that any creation of a habitat bank can occur within same watershed or ecological region. (Do this with input from MB. Fisheries Branch, DFO, etc.).

6. Identify threats at the watershed scale that would impede success of a proposed habitat bank and manage the risks (scale of impact and probability of occurrence) accordingly.
7. Begin Environmental Assessment Process and develop an Environmental Impact Statement.
8. Identify stakeholders – may also assist in locating potential banks.
9. Begin talking with stakeholders which can include First Nations. This effort is dependent on size and effort going into creating a habitat bank. Little effort and contact is likely needed to create a small bank (a spawning riffle) and greater effort may be required if larger scale projects are being considered.
10. Establish habitat bank objectives - net gain of habitat, self sustaining habitat, address ecosystem bottlenecks and/or improving on limiting factors for fish production for target species.
11. Align compensation banking objectives with fisheries/resource management objectives.
12. Determine specifications of habitat bank and create design with appropriate professionals.
13. Determine required reviews, permits and licenses.
14. Secure project funding.
15. Submit project proposal to DFO and make necessary revisions.
16. Establish formal agreement or memorandum of understanding that includes measurable deliverables of what constitutes success for the habitat bank (clearly identify the deliverables).
17. Included in the MOU, the proponent is to ensure that the habitat bank is protected and maintained as required in perpetuity (e.g., legal ownership of bank is secured by conservation easement, maintenance agreement with conservation group, etc.)

### **Construction and Monitoring of Habitat Bank**

1. Obtain necessary permits.
2. Complete baseline monitoring and submit to DFO.
3. Construct habitat bank.

4. Complete post-construction assessment to determine habitat quality and establish the habitat bank's value - DFO will determine compensation ratios (DFO requires that the bank be evaluated immediately prior to its use as compensation).
5. Both compliance and effectiveness monitoring must be undertaken every second year. DFO will assist where possible; however, it is the responsibility of the proponent to provide monitoring information showing the state of function of the habitat bank. The habitat bank must be achieving set goals prior to withdrawals.

### **Withdrawals from Habitat Bank**

1. No withdrawals can occur until the deliverables of the habitat banking agreement are met.
2. Before a withdrawal on a habitat bank will be accepted, the proponent is to provide a review of compensation options according to the NNL hierarchy of options as justification of the impracticality of on-site compensation and the request for withdrawal from the habitat bank (as detailed in the habitat banking agreement).
3. Document withdrawals - it is preferable that the entire habitat bank be used at one time.
4. Obtain written documentation from DFO relating to withdrawals.

### **Maintenance and Administration of Habitat Bank**

1. Ensure that the agreed objectives of the habitat bank are met and the quality and effectiveness are maintained by conducting regular monitoring and maintenance.
2. Apply adaptive resource management so that management decisions can be evaluated and improved.
3. Ensure that the habitat bank continues to meet fisheries/resource management objectives.
4. Submit reports to DFO detailing the habitat bank's condition. Report on effectiveness of achieving agreed objectives or outcomes.
5. Ensure that habitat bank meets the MOU objectives and is functioning as agreed at end of monitoring period by receiving and verifying that monitoring and compliance reports meet the conditions of the Fisheries Act Authorization.

6. Once all credits have been withdrawn for HADD the proponent is responsible for managing the bank in perpetuity as a condition of the Authorization.

### **6.2.2 General Process Model**

The data collected during the MDA workshop in combination with the site visit data contributed to the development of a General Process Model for proponents. The General Process Model is intended for proponents who wish to develop a habitat bank to compensation for future impacts to terrestrial habitats. Industries such as Forestry, Mining, Oil & Gas, and other government departments with development mandates such Manitoba Infrastructure and Transport, Agriculture, and Parks are legally required to compensate for habitat loss caused by development projects. Thus, the General Process Model was created to help guide the proponent through the process of building a habitat bank.

#### **Initiation of Habitat Bank**

1. Hire or assign a project manager to coordinate habitat bank projects.
2. Review and/or create future work plan for company (organization) operations to identify geographic area where project impacts are likely to occur.
3. Investigate habitat compensation requirements for the resource to be impacted.
4. Have conversation with appropriate regulatory agency representatives to relay intentions of creating a habitat bank.
5. Conduct a feasibility study of potential habitat banking sites both within and outside of same watershed or ecological region and assess ability of each to meet habitat compensation requirements.
6. Establish habitat bank objectives and align objectives with resource management objectives.
7. Decide on habitat bank location.
8. Identify stakeholders and begin dialogue.
9. Determine specifications of the habitat bank and create a design with appropriate professionals.
10. Determine required reviews, permits and licenses.

11. Secure project funding.
12. Submit project proposal make necessary revisions.
13. Establish formal agreement or memorandum of understanding that identifies deliverables and processes including monitoring, assessment, withdrawals, maintenance and administration.

### **Construction and Monitoring of Habitat Bank**

1. Obtain necessary permits.
2. Complete baseline monitoring and submit to appropriate regulatory agency.
3. Construct habitat bank.
4. Complete post-construction assessment to determine habitat quality and establish the habitat bank's value.
5. Conduct monitoring according to requirements under the formal agreement or memorandum of understanding.

### **Withdrawals from Habitat Bank**

1. Explore on-site compensation options before using the habitat bank.
2. Submit project to appropriate regulatory agency.
3. Withdrawals will occur according to the formal agreement or memorandum of understanding.
4. Document withdrawals and update appropriate regulatory agency.

### **Maintenance and Administration of Habitat Bank**

1. Ensure that the MOU objectives of the habitat bank are met and the quality and effectiveness are maintained by conducting regular monitoring and maintenance.
2. Ensure that the habitat bank continues to meet resource management objectives.
3. Submit reports to appropriate regulatory agency detailing the habitat bank's condition.
4. Ensure that the habitat bank is functioning as agreed at end of monitoring period.
5. Once all "environmental capital" has been withdrawn from the bank, ensure long-term administration according to the MOU.

## **7. FINAL DISCUSSION**

This chapter first summarizes the purpose and research objectives and analysis of the results. It concludes with general implications and recommendations for habitat banking.

### **7.1 Objectives Reviewed**

The primary objective of this practicum was to investigate the feasibility of using habitat banking as a compensation tool for Manitoba Hydro power generation projects. To achieve this goal, specific research objectives were to:

- First, document the application of habitat banking in Canada and the United States and assess the regulatory framework to determine whether habitat banking is being used under legislation elsewhere in Canada and the United States to meet needs similar to those of Manitoba Hydro and DFO.
- Second, determine the opportunities and challenges associated with habitat banking.
- Third, identify an effective habitat banking system(s) (compensation before impact) that would best serve Manitoba Hydro, Manitoba Conservation and Water Stewardship, and DFO regulatory requirements.
- Fourth, determine how Manitoba Hydro and DFO might begin to implement such a system if it was mutually agreeable to both.

#### **7.1.1 Documentation of habitat banking application in Canada and the United States**

Site visits and semi-structured interviews using an Interview Guide (Appendix A) provided documentation of habitat banking application in Canada and the United States. The same interview guide was used for each site visit so that an assessment could be made of their respective approaches. A total of 15 interviews were conducted. Interviewees included regulatory agencies, consultants, and proponents. Regulatory agency representatives were present at each site visit to discuss the



regulatory framework for habitat banking. This information was critical in determining whether respective approaches could be applied in Manitoba.

All information collected during the site visits were compiled into case studies which were then analyzed. The case studies revealed that there is variation in the application of habitat banking policy from region to region in Canada. Moreover, approaches to habitat banking are being developed by proponents through their application of the habitat banking policy. The case studies also revealed substantial variations in compensation ratios among regions. Manitoba applied the highest compensation ratio of 10:1, while on average, provinces applied a ratio of 1:1. Furthermore, the case studies indicated that DFO had difficulty reconciling habitat quality when withdrawals are proposed from the habitat bank. The DFO will apply decision making discretion in these situations which may contribute to the variations in compensation ratios.

Inconsistencies from province to province also emerged in the area of monitoring and maintenance of the habitat bank. Regarding post construction monitoring, variations appeared in both the timelines and rigor of the monitoring program. In terms of habitat bank maintenance, the case studies exposed some confusion as to whether or not a proponent must maintain the habitat bank in perpetuity. Finally, transparency and lack of communication between provinces is also an issue for habitat banking.

Two main differences between Canada and the United States emerged from the case studies. First, In the United States habitat banking is used as a method to create, restore, enhance, and preserve both aquatic and terrestrial habitat. In Canada, habitat banking is used as a way to create, restore, enhance both aquatic and terrestrial habitat; however, it cannot be used to preserve an area already protected under other legislation. Second, In the United States, mitigation banking can be profitable when credits are created and sold by entrepreneurs. Market forces such as supply and demand help to establish the financial value of those credits and thus, ecosystems are granted financial value. In Canada, the creation of a habitat

bank does not involve monies because the system to profit from habitat banking hasn't been established. The proponent creates or improves fish habitat for future use as compensation according to regulatory requirements.

### **7.1.2 Challenges and opportunities derived from the case studies**

Determining the feasibility of habitat banking requires an exploration of the associated challenges and opportunities. In order to determine whether habitat banking is feasible one must be aware of all conditions or circumstances that may affect its success. Thus, the case studies were analyzed to determine both the challenges and opportunities experienced by proponents, consultants, and regulatory agencies.

In interpreting the significance of the data, it is apparent that habitat banking is certainly feasible in Manitoba. Habitat banking can act as a solution to help proponents achieve DFO's NNL of fish habitat policy. Moreover, due to the nature of habitat banking, there is real potential to achieve a net gain in fish habitat. This is especially attainable when habitat banks are built to address ecosystem bottlenecks like habitat fragmentation and can be further enhanced through integrated watershed planning and management.

However, there are challenges associated with its implementation. The most frequently cited challenge amongst proponents and consultants was difficulty in understanding the process involved for developing a habitat bank. This is a significant challenge since the initial complexity of habitat banking may deter some proponents from using this form of compensation.

Another challenge which must be addressed in order for habitat banking to be fully feasible in Manitoba is the development of an appropriate and consistent methodology for determining accurate compensation ratios when withdrawals are proposed from the bank. Manitoba applied the highest compensation ratio of 10:1, while on average, provinces applied a ratio of 1:1. Further complicating the determination of the ratio is the challenge of reconciling habitat quality when

withdrawals are proposed from the bank. Since DFO National Headquarters does not provide national guidance on the application of compensation ratios, it is left up to the individual regions to determine the appropriate ratios.

In regards to opportunities for habitat banking the proactive rather than reactive nature of habitat banking was described as an opportunity by proponents, consultants, and regulatory authority representatives alike. The case studies revealed that the regulatory agencies favored the proactive aspect of habitat banking for different reasons than the proponents and consultants. Regulatory agencies value the security provided by an established habitat bank. Since compensation is done upfront and perhaps well ahead of known future projects, there is a lower degree of risk for the regulators.

Proponents and consultants reported that the proactive nature of habitat banking makes a wide range of opportunities achievable. An established habitat bank may act as a solution when the proponent is having difficulty finding adequate on-site compensation. An established habitat bank presents an opportunity for the proponent to combine several small HADDs and withdraw from one bank. Proponents advocated this approach stating that it is more cost and time effective and may also produce ecological benefits because large scale established habitat restoration or creation is used as compensation rather than a series of small piecemeal compensation projects.

Finally, the potential for achieving a net gain in fish habitat is an important opportunity for habitat banking. With habitat banking, there is the option to restore or create large scale fish habitat on a planned priority basis prior to development impacts. Habitat banking also has potential to achieve a net gain of fish habitat by addressing ecosystem bottlenecks like habitat fragmentation and can be further enhanced through integrated watershed planning and management.

### **7.1.3 Identification of an effective habitat banking system**

In addition to the case studies the collective judgement of fisheries habitat experts was used to determine whether habitat banking is a viable option for Manitoba and if so, what is required so that proponents can use habitat banking as a compensation tool. In order to fully explore the potential of habitat banking, representatives from both regulatory agencies and industry were invited to participate in a one-day facilitated workshop using a modified Delphi approach (MDA). In total, 11 people attended the modified Delphi workshop. The objective of the MDA workshop was to determine the feasibility of applying habitat banking in Manitoba.

Participants of the MDA workshop were asked the following four questions:

Question # 1) From your knowledge as an agency or a proponent, what are the main reasons or drivers leading to establishing a habitat bank, what steps would be taken and who would be involved?

Question #2) Describe a method for determining habitat bank withdrawal amounts when there are differences in habitat quality between the banked credits and the newly destroyed habitat.

Question #3) What are the barriers and opportunities associated with creating a standard for monitoring or measuring the habitat quality and success of a habitat bank?

Question #4) What opportunities exist for habitat banking relative to meeting resource management goals such as fisheries management objectives and/or watershed management plans?

In response to Question #1, participants at the MDA workshop stressed the importance of long-term planning as a key component for habitat bank development success as well as identifying potential threats that could impede the success of a proposed habitat bank. The process for developing a habitat bank must include a work plan for the entire geographic area which may be impacted, as well as, a review of future work plans to determine the locations of HADD's in 5-10-20 years. Furthermore, determining the scale of the project was noted as an important factor in planning as the planning effort will reflect the scale of the project.

Defining and setting objectives for the habitat bank also emerged as vital to the development of a habitat bank. Participants at the MDA workshop advised that proponents create a framework for setting objectives and align habitat bank objectives with fisheries / resource management objectives for the type of fishery affected. In establishing the framework for setting objectives, proponents should be thorough by considering socially driven objectives as well as ecologically driven objectives. In terms of ecologically driven objectives, focusing on achieving a net gain in fish habitat was recommended.

In response to Question #2, participants at the MDA workshop agreed that DFO requires a standard user-friendly tool for measuring the productive capacity of fish habitats. It was suggested that efforts towards developing a consistent industry standard should include using scientific research to determine the methodology and specific habitat parameters as well as coordination between proponents, DFO, and the Manitoba Fisheries Branch.

Evaluation of the habitat prior to withdrawals was identified as a critical part of habitat banking. Assigning a 10:1 ratio (habitat lost: habitat gained) in place of an evaluation should not be a recommended practice. In order to determine withdrawals when there are differences in habitat quality the value of the fishery must be considered and perhaps ranked as high, medium, low, with ongoing monitoring required. Finally, MDA workshop participants recommended that the objective should be to achieve a net gain in fish habitat in order to account for differences in habitat quality between the banked credits and the newly destroyed habitat.

In response to Question #3, participants at the MDA workshop acknowledged that many compensation projects receive inadequate evaluation and monitoring. However, the majority of MDA workshop participants claimed that that it would be too time consuming and costly to develop a standard for monitoring or measuring the habitat quality and success of a habitat bank. The rationale for this opinion being that the valuation of habitat is subjective. Moreover, it would be difficult to

gain consensus on proposed scientific methodology from proponents and regulators.

Participants proposed that a standard for monitoring or measuring the habitat quality and success of a habitat bank may be created by modifying and improving existing standards from other jurisdictions and also by exploring simplified methods for implementing measures such as fish production or catch rates. Lastly, it was suggested that adaptive resource management may be the answer to creating a standard for measuring habitat quality. However, in order for adaptive resource management to be effective it must include a monitoring component so that management decisions can be evaluated and continually improved.

In response to Question #4, participants at the MDA workshop stated that the opportunity for habitat banking relative to meeting resource management goals in Manitoba is in integrated watershed planning and management. The objective should be to restore or create large scale fish habitat. MDA workshop participants suggested that proponents focus on achieving more effective compensation by addressing ecosystem bottlenecks to productivity like habitat fragmentation. These objectives can be achieved more easily by gaining community and stakeholder buy-in and accessing funds with the help of local nongovernmental organizations and fish enhancement groups. Lastly, MDA participants indicated that the opportunity to buy and sell credits may also for additional flexibility in achieving objectives.

#### **7.1.4 Habitat banking implementation**

The data collected during the MDA workshop in combination with the site visit data contributed to the development of a Fish Habitat Compensation Model for proponents who wish to develop a habitat bank according to DFO regulatory requirements. The Fish Habitat Compensation Model is intended to help guide the proponent through the process of building a habitat bank.

The data collected during the MDA workshop in combination with the site visit data also contributed to the development of a General Process Model for proponents. The

General Process Model is intended for proponents who wish to develop a habitat bank to compensation for future impacts to terrestrial habitats. Industries such as Forestry, Mining, Oil & Gas, and other government departments with development mandates such Manitoba Infrastructure and Transport, Agriculture, and Parks are legally required to compensate for habitat loss caused by development projects. Thus, the General Process Model was created to help guide the proponent through the process of building a habitat bank.

## **7.2 Conclusion and Recommendations**

The overall objective of this thesis is to investigate the feasibility of using habitat banking as a compensation tool for Manitoba Hydro power generation projects. Results indicate that habitat banking is feasible in Manitoba and can be used as a compensation tool to help Manitoba Hydro and other proponents achieve DFO's NNL of fish habitat policy. However, the feasibility of habitat banking in northern Manitoba diminishes for several reasons. First, much of the land in northern Manitoba is owned by the Crown and therefore is unavailable for purchase. Second, review of the existing habitat banks in Canada reveals that habitat banking is a compensation tool used mainly in densely developed areas. Ideal sites for habitat banks are those which are degraded and have potential for successful restoration. The northern region of Manitoba is sparsely developed and therefore lacks a large selection of impacted sites. Habitat banking may not be an appropriate option for Manitoba Hydro since the majority of their operations take place in northern Manitoba and viable habitat banking sites are limited. However, it is recommended that Manitoba Hydro and DFO collaborate on locating a suitable site for a habitat bank and apply the Fish Habitat Compensation Model for proponents to develop a habitat bank according to DFO regulatory requirements.

Recommendations for habitat banking are divided under the same categories used for the Fish Habitat Compensation Model, which include: Initiation of Habitat Bank; Construction and Monitoring of Habitat Bank; Withdrawals from Habitat Bank; Maintenance and Administration of Habitat Bank.

### **7.2.1 Initiation of Habitat Bank**

#### Inventory of Restoration Database

Proponents and consultants indicated that it is challenging to locate potential habitat banks and that the dilemma can sometimes lie in the uncertainty surrounding the regulatory agencies' requirements and preferences for compensation. It is recommended that a coordinated approach be taken for identifying habitat with high restoration potential. Being national in scope, an inventory of impacted sites should be created by regulators in consultation with land managers who are best suited to provide information on habitat restoration opportunities. Ultimately, DFO must work with provincial, territorial, municipal and other federal agencies, as well as land managers to improve their existing Inventory of Restoration Database so that it provides proponents with potential habitat bank sites.

#### Integrated Resource Planning

It is recommended that habitat banking be applied through integrated resource planning because it is fundamental to achieving the net gain objective. Integration of fish habitat requirements with fisheries management objectives is accomplished through coordinated consultation with sectors engaged in resource utilization, such as provincial, territorial and municipal governments, and other federal government agencies. This form of consultation enables DFO to resolve multiple resource use conflicts affecting the fisheries. The premise of habitat banking is coherent conservation planning where compensation is integrated as part of a broader ecosystem plan, e.g. basin or watershed level. Applying habitat banking through integrated resource planning and management is critical to ensure that individual objectives are achievable and sustainable into the future.



### Achieving Multiple Objectives

Rather than view habitat banking as a way to create, restore or enhance habitat, proponents should take advantage of the individual and creative approach that is possible when using habitat banking as a form of compensation. Habitat banking can be a vehicle for maximizing economic, environmental and community benefits when partnership opportunities are realized and stakeholders collaborate.

Multiple objectives can be incorporated into a building the habitat bank during the initiation stage. In addition to achieving the regulatory requirement of NNL, proponents should aim to access the full potential of habitat banking by incorporating multiple objectives into the bank, such as:

- Public education
- Scientific research
- Cost sharing

Finally, in order to maximize the ecological benefits, proponents should align habitat bank objectives with fisheries management objectives and/or watershed management plans. For example:

- Address ecosystems bottlenecks like habitat fragmentation
- Correct past disruptions and destructions
- Remove orphaned barriers
- Plan compensation that is integrated as part of a broader ecosystem plan, like at the basin or watershed level

### Net Gain of Fish Habitat

Achieving a net gain of fish habitat may be accomplished by retaining 10%, or an agreed upon percentage, of the habitat bank credits at the onset of the project. The rationale is that generally compensation habitat is less effective than natural habitat and its long-term success is uncertain. Therefore, retaining a percentage of the habitat bank credits ensures a net gain of fish habitat. For example, if a proponent created a 1000 square meter habitat bank, 100 square meters of credits would remain in the bank indefinitely as a net gain of fish habitat. Even though the

proponent cannot withdraw 10% of the credits, habitat banking still offers financial benefits to the proponent, including:

- An established bank negates the need to hire a consultant to locate suitable compensation and write a report. Thus, saving potentially significant consultant costs.
- An established bank mitigates timelines which in turn creates an economic benefit.
- Support for a net gain of fish habitat demonstrates environmentally responsible corporate behaviour. This can be emphasized in public relation campaigns to influence public opinion.

#### Canada Wide Consistency

The case studies revealed variation in the application of habitat banking policy from region to region in Canada. Evidently, some disagreement exists as to the level of flexibility which should be applied to the policy. Many inconsistencies exist in how habitat quality is reconciled leading to substantial variations in compensation ratios among regions. Since DFO National Headquarters does not provide national guidance on the application of compensation ratios, it is left up to the individual regions to determine the appropriate ratios.

It is recommended that DFO strive for Canada wide consistency. In order to accomplish this goal, National Head Quarters must become more prescriptive. Regulatory agencies should revise their policies and focus on strengthening communication and cooperation with proponents. Habitat banking may become a more viable option if regulatory agencies were transparent regarding their requirements and preferences for compensation. DFO should apply the same implementation strategies that are part of their *Policy for the Management of Fish Habitat* to the development of revised policy guidance for habitat banking. For instance, strategy number eight "Cooperative Action" may help DFO focus on strengthening communication and cooperation with proponents.

### Overarching Memorandum of Understanding

Creating a formal Memorandum of Understanding (MOU) for each habitat bank is ineffective in terms of cost and time for both DFO and the proponent. It is recommended that an overarching MOU be created by DFO when a proponent has multiple HADD's and habitat banks. An umbrella MOU would specify the applicable rules and guidelines for the proponent to follow. A spreadsheet would identify individual zones where potential banks may be established. Each time a compensation project is completed, it is recorded as a credit. Alternatively, each time a HADD takes place in an individual zone it is recorded as a debit. This way compensation and HADD's can be added and subtracted within the same spreadsheet.

## **7.2.2 Construction and Monitoring of Habitat Bank**

### Baseline Habitat Monitoring

According to the Practitioners Guide to Habitat Compensation (DFO 2002), the proponent should provide DFO with adequate baseline habitat monitoring data prior to construction of the bank. According to the case studies, the minority of proponents operating habitat banks have complied with the policy. Prior to habitat bank construction, it is essential that baseline information be collected as standard practice. It is important to have a thorough description of the habitat prior to construction activities so that biologists can accurately monitor the habitat and understand how the site is responding from an ecological perspective. Regional differences in the approach to baseline habitat monitoring are a problem. DFO must strengthen their habitat banking policy guidance so that inconsistencies are minimized.

## **7.2.3 Withdrawals from Habitat Bank**

### National Guidance on Ratios

The case studies revealed one of the challenges with withdrawals lies in agreement between the proponent and DFO on an accurate compensation ratio. Since DFO

National Headquarters does not provide national guidance on the application of compensation ratios, the determination of a ratio is left up to the individual regions. Further complicating the determination of the ratio is the challenge of reconciling habitat quality when there are differences between the banked credits and the newly destroyed habitat. Due to differences in discretion across the provinces, there are many inconsistencies in how habitat quality is reconciled.

It is recommended that DFO develop a standard user-friendly tool for measuring the productive capacity of fish habitats. Both the habitat gained and lost must be measured to ensure that the NNL policy is achieved. Consequently, metrics are necessary to accurately calculate both the debit and credit. Efforts towards developing a consistent industry standard should include using scientific research to determine the methodology and specific habitat parameters as well as coordination between proponents, DFO, and the Manitoba Fisheries Branch. Finally, it is recommended that the objective should be to achieve a net gain in fish habitat in order to account for differences in habitat quality between the banked credits and the newly destroyed habitat.

#### Standardized Approach for Monitoring

The case studies confirmed that many habitat banks receive inadequate evaluation and monitoring. Regarding post construction monitoring, variations appeared in both the timelines and rigor of the monitoring program. Regulatory agencies admitted that sometimes the rules on how to measure and monitor the performance of the habitat bank are conflicting.

During the MDA workshop participants discuss the barriers and opportunities associated with creating a standard for monitoring or measuring the habitat quality and success of a habitat bank. MDA workshop participants claimed that that it would be too time consuming and costly to develop a standard for monitoring or measuring the habitat quality and success of a habitat bank. The rationale for this opinion being that the valuation of habitat is subjective. Moreover, it would be

difficult to gain consensus on proposed scientific methodology from proponents and regulators.

Instead, it is recommended that a standard for monitoring or measuring the habitat quality and success of a habitat bank may be created by modifying and improving existing standards from other jurisdictions and also by exploring simplified methods for implementing measures such as fish production or catch rates. Both short and long term monitoring should be required as a way to ensure that the habitat is functioning as intended. Applying adaptive resource management may be the answer to creating a standard for measuring habitat quality. However, in order for adaptive resource management to be effective it must include a monitoring component so that management decisions can be evaluated and continually improved

#### **7.2.4 Maintenance and Administration of Habitat Bank**

##### Tracking, Reporting and Communication

It is recommended that proponents anticipate and prepare for transparency issues by dedicating a section of their website to informing the public about active habitat banks, i.e. number, location, ecological assessments/performance.

Proponents should create a registry to track bank and credit data. As well, it is recommended that regulatory agencies have a master tracking sheet for withdrawals in case there is dispute.

Habitat banking may be emerging more slowly as a compensation tool due to the lack of communication between provinces regarding habitat bank projects.

Provinces have an opportunity to learn from one another which is not being utilized.

It is recommended that greater transparency regarding the details of habitat banking projects be easily accessible by regulatory agencies across Canada. DFO National Headquarters should consider creating a searchable database so that each region can research habitat bank projects within Canada.

## APPENDIX A: INTERVIEW GUIDE

### ***Initiation of Habitat Bank***

1. Why did you consider starting a habitat bank?
2. What regulations, legislation or policy governed the establishment of the habitat bank?
3. Tell me about stakeholder development.
  - a) How were stakeholders identified?
  - b) What agencies did the stakeholders represent?
  - c) What role did each stakeholder play in creating the habitat bank?
  - d) Did the stakeholders change with time?
4. After you established your stakeholder list, how did you function as a group and make decisions?
5. Do you have any formal agreements or memorandums of understanding with anyone?
6. What process did you use to determine the habitat type, location and size of the habitat bank?
7. Were there any other issues, concerns or hurdles in the early phases of the habitat banking project?
8. How does the habitat bank relate to local or regional resource management objectives?

### ***Construction of Habitat Bank***

9. Tell me about the design and construction phases of the habitat bank.
  - a) Were permits required prior to construction of the habitat bank? If so, which permits and from whom?
  - b) Were there pitfalls during the design and construction phase of the habitat bank? If so, what pitfalls?
  - c) What costs were incurred during the design and construction phases of the habitat bank?
10. How did you determine that the new habitat bank was successful?
11. How long did it take to determine whether the project was successful and who was involved?

### ***Withdrawals from Habitat Bank***

12. How do you determine what types of projects are appropriate for consideration for use of the habitat bank?
  - a) Who needs to be involved in the withdrawal process?
  - b) What criteria must be met?
  - c) Are there geographic or ecological limitations to the withdrawals?
  - d) How does a proponent withdraw from the habitat bank?
  - e) How do you track bank withdrawals?
13. How do you reconcile habitat quality when withdrawals are proposed from the bank?
14. Were there any other issues, concerns or hurdles in using the habitat bank?

### ***Maintenance of Habitat Bank***

15. Describe the maintenance, monitoring and any follow-up of the habitat bank
  - a) How is performance of the habitat bank measured and monitored?
  - b) Who is responsible for the maintenance, monitoring and any follow-up of the habitat bank?
  - c) How rigorous is the maintenance, monitoring and any follow-up of the habitat bank?
16. Define the habitat bank's success relative to local or regional resource management objectives.
17. Is there any other information or advice that you'd like to provide?

## **APPENDIX B: INTRODUCTORY LETTER TO PARTICIPANTS**

Date

Name, Title  
Office Number  
Address  
City, Province  
Postal Code

**Subject: Request for your participation in a graduate research project concerning habitat banking.**

Dear participant:

You have been identified as a leading expert in the establishment of habitat banking and I would like to learn more about your experience. I am a graduate student at the University of Manitoba. The purpose of my research is to investigate habitat banking as a potential solution that may allow Manitoba Hydro's funds and efforts to effect more meaningful habitat creation or restoration. As part of the research study, I plan to visit at least five habitat banking projects in Canada and the United States to assess their respective approaches, determine their success, identify improvements that could be made, and generally determine their suitability in Manitoba.

I believe that your perspective is a vital component of this research project and I would like to have the opportunity to visit the XXX habitat bank to discuss your experience, opinions and concerns regarding habitat banking. The interview will take approximately 60 minutes. All of the information that you provide will be kept strictly confidential. Your name or job title will not be attached to any comments that you make. Your involvement in this project is voluntary and you may withdraw at any time, and/or refrain from answering specific questions without penalty. I have enclosed a copy of my questionnaire so that you may review the questions in advance. You may also find it reassuring to know that my research has been approved by the University of Manitoba, Fort Garry Campus, Joint-Faculty Ethics Review Board.



I hope that you will consider accepting this request, as your participation will be very helpful in the development of a suitable habitat banking system for Manitoba. If you are not available to meet, please suggest an alternate. I will contact you by January 29<sup>th</sup> to confirm a date for our meeting. Please don't hesitate to contact me earlier if you prefer. I can be reached by: telephone at (XXX) XXX-XXXX or email at XXXXX. Thank you kindly for your time and consideration.

Sincerely,

Kristine Koster  
Masters of Environment Candidate  
Department of Environment and Geography  
University of Manitoba

## APPENDIX C: INTERVIEW CONSENT LETTER

### Participant Consent Form

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Research Project: Feasibility of Habitat Banking in Manitoba

Researcher: Kristine Koster, University of Manitoba Graduate Student

Project Advisors: Dr. Richard Baydack and Merlin Shoesmith, University of Manitoba, Shelley Matkowski, Manitoba Hydro, Neil Fisher, Fisheries and Oceans Canada, Jeff Long, Water Stewardship, Brian Kotak, Manitoba Model Forest

Sponsors: Manitoba Hydro, Manitoba Water Stewardship, The Mathematics of Information Technology and Complex Systems Inc. (MITACS)

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This consent form, a copy of which will be left with you for your records and references, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

#### **Description and purpose of the research**

The purpose of this research is to investigate habitat banking as a solution that may allow Manitoba Hydro's funds and efforts to effect more meaningful habitat creation or restoration. Data will be collected by analyzing documents regarding the concept of habitat banking to investigate and compare policies, case studies, management plans, and legislation. I will also visit a minimum of three habitat banking projects in Canada and the United States. At each site a research participant, whom is directly involved with the site project, will be interviewed. The data collected will be compared and assessed to determine whether it meets Manitoba Hydro's requirements for a suitable habitat banking system and is acceptable to the Department of Fisheries and Oceans.

#### **How will you be involved?**

You will be involved as a research participant in a one-on-one semi-directed interview. You will be asked a series of open ended questions that identify your experience, opinions and concerns regarding habitat banking. The length of the interview will be approximately 60 minutes. Your involvement in this project is voluntary and you may withdraw at any time, and/or refrain from answering specific questions without penalty.

**Risks and Benefits**

There are no risks associated with your participation in this interview. By participating in this research you have the opportunity to assist in the development of a suitable habitat banking system(s) for Manitoba.

**How will I record what you say?**

I will take notes with a pen and paper. I will also record our interview with an audio recorder (Panasonic, RR-US470 IC Recorder). To ensure accuracy, I would like to document our interview using both methods. Should you wish not to be recorded, I will accommodate your concerns

**Confidentiality**

All of the information that you provide will be kept strictly confidential. Your name or job title will not be attached to any specific comments that you make. Information collected will be transcribed and saved on a USB Mass Storage Device. The USB Mass Storage Device will be stored in a lock box accessible only by the principal researchers on this project, for the duration of this project (2 years). All audio and originally written records will be destroyed after being transcribed.

**Feedback**

The information gathered during our interview will be used to generate a transcript of the proceedings. I will provide you with a copy of the transcript and confirm with you that my interpretation of the information collected during our interview is accurate. Any information which is not approved by you will be excluded from the thesis. If you wish, I will also provide you with a copy of my thesis.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

Researcher: Kristine Koster (Email)  
Researcher’s Advisor: Dr. Richard Baydack (Email)

This research has been approved by the Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact either of the above-named persons or the Human Ethics Secretariat at (204)474-7122. A copy of this consent form has been given to you to keep for your records and reference.

\_\_\_\_\_  
Participant’s Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Researcher’s Signature

\_\_\_\_\_  
Date

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