ENVIRONMENTAL GUIDE FOR FISHERIES:

FISH GUIDE

2025

Ministry of Transportation

MINISTRY OF TRANSPORTATION

Environmental Guide for Fisheries: Fish Guide

ISSUED BY:

ENVIRONMENTAL POLICY OFFICE

MINISTRY OF TRANSPORTATION

301 ST. PAUL STREET, 2nd FLOOR

ST. CATHARINES, ONTARIO, L2R 7R4

Ontario

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Abstract

This guide was developed to provide detailed guidance for protecting fish and fish habitat on provincial transportation undertakings. It outlines the steps of the Ministry of Transportation's (MTO) Fisheries Protocol process, including the use of best management practices, the requirements of a fisheries assessment, how and when to submit forms to Fisheries and Oceans Canada, and all MTO forms related to fisheries.

This guide is applicable to projects undertaken by, or on behalf of, the Ontario Ministry of Transportation.

Acknowledgements

The Environmental Policy Office (EPO) of the Ministry of Transportation would like to acknowledge the numerous contributors to the updating of this guide, including, members of the MTO Regional Fisheries Working Group and MTO Environmental Heads. Historical contributions to this guide also included Fisheries and Oceans Canada, and the Ministry of Natural Resources. This guide is intended to be a living document that will be reviewed and revised as necessary.

Comments and Suggestions

The Ministry of Transportation welcomes comments and suggestions on ways to improve the document with the objective of providing a practical and pragmatic approach to environmental management in the Province of Ontario. MTO anticipates that changes will be warranted to clarify, improve, and incorporate new information.

The format of the document is designed to accommodate such changes. Such revisions and amendments will be incorporated in later editions of this document. MTO will not formally respond to unsolicited comments submitted in response to the document.

VERSION HISTORY

VERSION #	DATE	DESCRIPTION OF MAJOR CHANGE
2.0	June 2009	Updated to reflect reordering of Sections 5 and 6 and title changes to Sections 6 and 7. Updated to reflect addition of APPENDIX B: Implementing the Protocol for Highway Maintenance Activities. Minor editorial changes.
3.0	April 2020	Updated to reflect changes to the *Fisheries Act* and Fisheries Protocol. Removed Risk Management Framework and associated Sections 6 and 7. Added Fish and Fish Habitat Impact Documentation section. Added Design Considerations Table. Removed APPENDIX B: Implementing the Protocol for Highway Maintenance Activities and created separate guide for maintenance activities.
4.0	January 2025	Amended to reflect the non-renewal of the MTO/DFO/MNR Fisheries Protocol and agreement with Fisheries and Oceans Canada and the Ontario Ministry of Natural Resources. Former Annex 2 stepwise process of Fisheries Protocol renamed to MTO Fisheries Protocol and procedures retained. Amended emergency situations/emergency work notification procedures. New Section added regarding amending, suspending, and cancelling *Fisheries Act* authorization and *Species at Risk Act* permits. New Section added to include RAQS qualification requirements and submission details.

		Addition of Impact Drawings description and requirements. Guidance on Indigenous engagement and MTO's duty to consult. Minor editorial changes.

Disclaimer

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1 OVERVIEW OF THE GUIDE

The primary purpose of the Environmental Guide for Fisheries (Fish Guide) is to provide direction, guidance, and documentation with respect to protecting fish and fish habitat on provincial transportation projects and undertakings. It guides MTO staff and its Service Providers through each step of the MTO Fisheries Protocol and ultimately, to determine whether a project is likely to result in the death of fish or harmful alteration, disruption, or destruction (HADD) of fish habitat. Fish and fish habitat is regulated through the *Fisheries Act* by Fisheries and Oceans Canada (DFO).

Fisheries Act

34.4 (1) No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish.

35 (1) No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption, or destruction of fish habitat.

This guide also provides direction on additional fisheries information required to be collected and documented to support MTO project needs (such as the Environmental Assessment process), provides information related to provincial and federal requirements for works impacting aquatic species at risk or their habitat, and what to do in emergency situations.

This version of the Fish Guide has been written for MTO staff and MTO Service Providers working on MTO transportation projects and reflects the non-renewal of the former agreement between MTO, DFO and the Ontario Ministry of Natural Resources (MNR) (termed the “MTO/DFO/MNR Fisheries Protocol”). The individual steps of the MTO Fisheries Protocol (Section 1.2) require an increasing level of technical knowledge and experience to complete. As such, practitioners using the Fish Guide are expected to possess a proficient understanding of fish and fish habitat and policies and laws pertaining to their protection. This is generally obtained through a combination of relevant formal education/training and practical related experience. Section 11 Fisheries Specialist Qualifications outlines the specific requirements for both the MTO fisheries assessment specialist and MTO fisheries contracts specialist qualifications.

1.1 INDIGENOUS ENGAGEMENT AND DUTY TO CONSULT

MTO projects that impact fish and fish habitat may cause adverse impacts to constitutionally protected Aboriginal and treaty rights and therefore trigger MTO's duty to consult. The duty to consult is the Crown’s legal obligation to consult an Indigenous community when it is contemplating conduct that may adversely affect the community’s established or credibly asserted Aboriginal or treaty rights (e.g., hunting, fishing,

trapping, gathering vegetation). The duty to consult may also include a duty to accommodate. Accommodation is taking measures to avoid, minimize, or mitigate adverse impacts of a proposed project on established or credibly asserted Aboriginal or treaty rights. Whether the duty to consult is triggered by a project and which communities should be consulted is assessed early in project planning through the completion of the Aboriginal Community Identification Template (ACIT) by the MTO Project Team in collaboration with the MTO Indigenous Liaison Specialist (ILS). Information known at that time about potential impacts of the project to fisheries should be provided to the ILS through the ACIT to support their completion of the assessment. The duty to consult assessment captured in the ACIT should be iterative and take into account any new information about potential impacts to fish and fish habitat of the project.

Where the duty to consult is triggered, MTO, in collaboration with MTO Service Providers as appropriate, should consult the identified Indigenous communities throughout the design process, including, for example, on existing fisheries information; potential harmful impacts of the project on fish and fish habitat; and options for mitigation and/or offsetting. MTO and/or the MTO Service Provider may need to provide information regarding: the planned field investigations; the type of fisheries assessment being undertaken; proposed in- and near-water work; permits or authorizations that may be required; and fisheries assessment reports such as Fisheries Memos; Fish and Fish Habitat Existing Conditions and Impact Assessment Reports, and/or Offsetting Plans. The goal of Indigenous consultation should be to gain community knowledge on fisheries, understand how impacts to fisheries may impact the rights of Indigenous communities, and to seek feedback on planned avoidance or mitigation measures. Any concerns shared by Indigenous communities regarding impacts to fish and fish habitat, as well as how MTO addressed those concerns, should be recorded in the overall record of consultation.

Note that Indigenous communities may request to have Community Field Liaisons (CFLs) present, or request other forms of participation, during field investigations, or during construction to participate in monitoring for impacts to fish and fish habitat. This request may be supported through MTO's Environmental CFL policy. MTO staff should reach out to the regional ILS for guidance if they receive a request for Environmental CFLs.

For MTO projects that are likely to result in harm to fish and fish habitat, regulatory authorities such as the DFO and the Ontario Ministry of Environment, Conservation and Parks (MECP) have their own duty to consult associated with their decision to issue the permit or authorization to MTO. In these cases, Indigenous consultation carried out by MTO will support the regulatory agencies in ensuring their own duty to consult is fulfilled, and a robust consultation process by MTO may support a quicker permitting/authorization process.

What is required during Indigenous consultation is determined on a project-by-project basis based on the potential impact of the project to Aboriginal and treaty rights and information from Indigenous communities regarding how they wish to be consulted. MTO staff should contact the regional ILS for project-specific advice regarding Indigenous consultation and the duty to consult. Any responsibilities on the part of the MTO Service Provider will be clearly communicated by MTO.

1.2 FISH GUIDE LAYOUT

This guide is structured to follow sequential steps in a process to assess, avoid, reduce, mitigate, and offset impacts to fish and fish habitat. Each section of this guide focuses on a given step of the MTO Fisheries Protocol process. Sections 1.2 and 1.3 provide a high-level overview of the Fish Guide process, with the details contained within the body of the guide. Forms and documentation requirements are contained in the Appendices.

1.2.1 CONSIDERATIONS FOR USERS OF THIS FISH GUIDE

The Fish Guide provides guidance in identifying how to address issues related to fish and fish habitat protection during the planning, design, and construction of highway projects.

To effectively determine effects on fish and fish habitat, the work must be completed in collaboration with an interdisciplinary team of relevant specialists. It is important that the fisheries assessment specialists work closely with designers to develop methods to avoid, mitigate, or offset effects on fish and fish habitat.

Specific related technical issues such as hydraulic, hydrologic, and geomorphic studies, engineering and design are beyond the scope of this guide. MTO has several technical documents, including the MTO Drainage Management Manual, Drainage Design Standards, and various Ontario Provincial Standard Specifications (OPSSs) for Construction and Materials that provide guidance and specify MTO requirements. See Section 12 Supporting Documents and References of this guide for a more comprehensive list.

In all cases, the acts and regulations covered within this guide will supersede the direction within this guide.

1.2.2 COMPANION DOCUMENTS

In addition to the Fish Guide, two other MTO Environmental Guides for Fisheries have been developed to be used in conjunction with each other, depending on the user (i.e., capital construction vs. maintenance) and scope of work. They can be accessed online

through the MTO Technical Publications website. To find these documents, search for the title or click the Environmental tab and browse to the specific document.

Other sources of information, such as other government publications are referred to throughout the guide. The reader should ensure they are accessing the most current information and versions of publications for non-MTO sourced information. The most up to date information shall supersede any older referenced material in this guide.

1.2.2.1 Environmental Guide for Fisheries – Best Management Practices

Step 3 of the MTO Fisheries Protocol identifies specific works that, when properly undertaken, pose minimal risk to fish and fish habitat. The MTO Environmental Guide for Fisheries – Best Management Practices (Fisheries BMPs) provides MTO and MTO Service Providers with the necessary procedures on how to undertake common activities in a manner that avoids harmful impacts to fish and/or fish habitat. It provides detailed requirements on the permissible scope of work, operational constraints, and mitigation measures that must be followed.

1.2.2.2 Environmental Guide for Fisheries – Maintenance Works

The MTO Environmental Guide for Fisheries – Maintenance Works (Fisheries Maintenance Guide) was developed for MTO and MTO maintenance Service Providers to provide an overview of the requirements for typical MTO maintenance projects. This guide outlines the tasks and decision points for Steps 1-3, 5, and 8 of the MTO Fisheries Protocol and provides general information on species at risk and emergency notification procedures.

1.3 OVERVIEW OF THE MTO FISHERIES PROTOCOL

The MTO Fisheries Protocol is intended to ensure processes, roles, and responsibilities for the provision of fish and fish habitat protection on MTO projects are clearly defined. It allows for project impacts to be understood, assessed, avoided, or mitigated and, where no alternatives to the proposed impacts are possible, to be offset.

The eight steps and associated tasks for implementing the MTO Fisheries Protocol are described in the following sections of the Fish Guide and are summarized by the flow chart in Figure 1-1.

There are four (4) key assessment and decision steps of the MTO Fisheries Protocol:

- **Step 1** – Initial assessment to determine if work/undertaking/activity needs further fish and fish habitat assessment(s).
- **Step 2 –** Determine relevant fisheries information and timing windows.

- **Step 3** – Determine whether an MTO Best Management Practice for Fisheries applies.
- **Step 4** – Self-assessment to determine if the work/undertaking/activity requires a DFO review.

There are three (3) key reporting requirements of the MTO Fisheries Protocol:

- **Step 5 –** Complete and submit an MTO Project Notification Form.
- **Step 6 –** Complete and submit a DFO Request for Review Form.
- **Step 7 –** Complete and submit an Offsetting Plan and Application Form for the Issuance of an Authorization under Paragraph 34.4 (2)(b) and 35(2)(b) of the *Fisheries Act* (Non-Emergency Situations) and/or an Application for Species at Risk Permit.

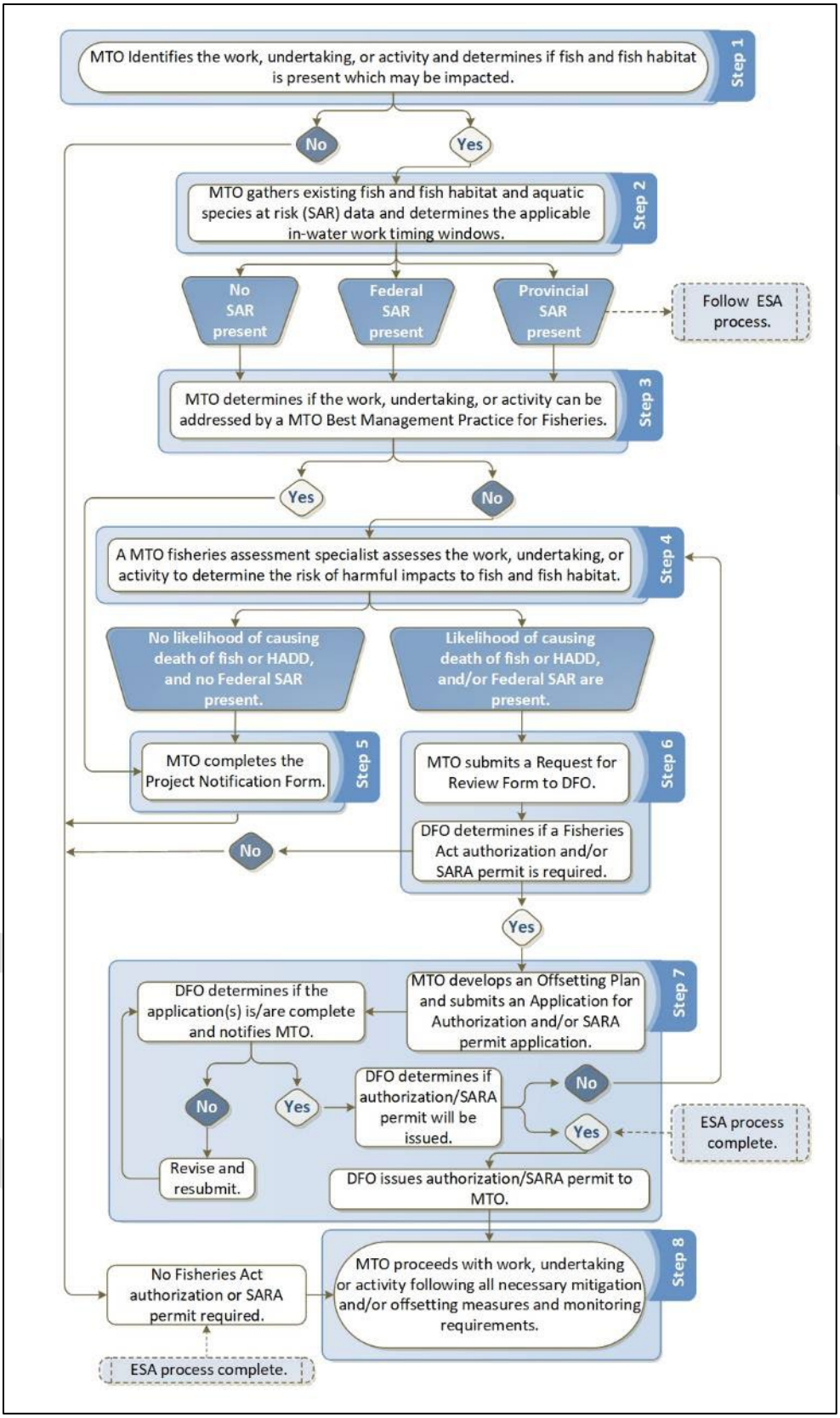

Figure 1-1. Flow Chart Summarizing the MTO Fisheries Protocol

1.4 SUMMARY OF MTO FISHERIES PROTOCOL

The following section describes the purpose, key tasks, decisions, and qualifications required to undertake each step in the MTO Fisheries Protocol. Each step is described in detail within the body of this guide.

1.4.1 STEP 1 – INITIAL WORK/UNDERTAKING/ACTIVITY ASSESSMENT

The purpose of Step 1 is to undertake an initial assessment of MTO work/undertaking/activity. Some projects, by their nature, will not result in harmful impacts to fish and fish habitat and do not require any additional assessment. For example, the activities identified as Routine MTO Works or those not taking place in a waterbody, are not likely to result in the death of fish or harmful alteration, disruption or destruction (HADD) of fish habitat provided the appropriate mitigation measures are followed.

QUALIFICATIONS TO COMPLETE THE DETERMINATION IN STEP 1

This step may be completed by MTO or MTO Service Providers. There are no specific qualification requirements for this initial step in the MTO Fisheries Protocol.

UNDERTAKE THE FOLLOWING TASKS:

1a	Determine if the work/undertaking/activity is occuring in an artificial waterbody that is not connected to a waterbody containing fish at any time of the year.
1b	Determine if the work/undertaking/activity is located beyond 30 m of the high water level of a waterbody and mitigation can prevent all impacts on the waterbody.
1c	Determine if the work/undertaking/activity is located within 30 m of the high water level of a waterbody and is a type of Routine MTO Works and all the necessary mitigation measures can be applied appropriately.

TASK 1a: Determine if the work/undertaking/activity is occurring in an artificial waterbody (e.g., stormwater management pond) that does not have a surface water connection to a waterbody containing fish at any time of the year.

Determine if the project area is in a waterbody by using the various MNR and Natural Resources Canada resources found in Section 2.1 Confirming Presence of a Waterbody.

TASK 1b: Work/undertaking/activity is located beyond 30 m of the high water level of a waterbody and mitigation can prevent any impacts on the waterbody.

- ✓ The same information for identifying waterbodies in Task 1a can be used.
- ✓ 30 m distance is measured from the high water level (see Figure 2-1).

TASK 1c: Work/undertaking/activity located within 30 m of the high water level of a waterbody and is a Routine MTO Work and all of the necessary mitigation measures identified in OPSS.PROV 182 General Specifications for Environmental Protection for Construction In and Around Waterbodies and on Waterbody Banks can be applied appropriately.

- ✓ 30 m distance is measured from the high water level (see Figure 2-1).
- ✓ Determine if the project is covered under the Routine MTO Works table in Section 2.2.
- ✓ Review all appropriate mitigation measures within OPSS.PROV 182 and determine if they can be implemented.

Ensure all mitigation measures, as required, are implemented to prevent debris or sediment from entering a waterbody. See MTO's Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects for further guidance.

MTO FISHERIES PROTOCOL DECISIONS

Assessment Results for Key Tasks at Step 1	Proceed to MTO Fisheries Protocol
If you responded "YES" to any of the above key tasks	**Step 8:** Project Implementation and Monitoring.
If you responded "NO" to all of the above key tasks	**Step 2:** Gathering of Existing Fisheries Information.
If the work/undertaking/activity is an emergency work	**Emergency Work** process as defined in the MTO Fisheries Protocol.

1.4.2 STEP 2 – GATHERING OF EXISTING FISHERIES INFORMATION

The purpose of Step 2 is to gather existing fisheries information for the project from MTO, MNR, DFO, the Ministry of Environment Conservation and Parks (MECP), and other supplementary data sources as available. This background data is obtained in order to confirm timing windows, the presence of aquatic species at risk and their critical habitat, significant fish habitat and any existing fisheries management objectives.

Background data should cover the defined study area (see Section 3.1 for identifying the study area).

QUALIFICATIONS TO GATHER EXISTING FISHERIES DATA IN STEP 2

Gathering of existing fisheries data may be completed by MTO or MTO Service Providers as there are no specific qualification requirements.

UNDERTAKE THE FOLLOWING TASKS:

2a	**(i)**	Determine if there is existing fisheries data/mapping available that has been collected within the last 10 years and contact MNR to ensure the information is still valid; or
	(ii)	Contact MNR to obtain relevant fisheries information and timing windows.
2b		Supplement background fisheries information from additional sources as necessary.
2c		Obtain aquatic species at risk (SAR) information using federal and provincial mapping tools/databases.

TASK 2a(i): Determine if there is existing fisheries data/mapping available that has been collected within the last 10 years and contact MNR to ensure the information is still valid.

- ✓ As a first step, contact MTO Environmental Delivery and/or refer to the Project Terms of Reference (TOR) to determine if existing reports are available.
- ✓ Determine if fisheries data/mapping from previous MTO surveys conducted within the past 10 years exists.
- ✓ Access the Geospatial Ontario (GEO) database and review available aquatic data for the location(s).
- ✓ Contact MNR to ensure data is valid using the form letter template available in APPENDIX A: Request for Information from MNR. The request should include:
  - Brief description of the work/undertaking/activity.
  - Location of work – GPS coordinates and map (Google Earth or NTS map).
  - Waterbody(ies) affected by the project.

When requesting MNR to confirm existing fisheries information, the template table should have all available data obtained from the existing fisheries information filled in prior to sending to MNR.

MNR will endeavour to review and determine the validity of this information within 30 working days.

TASK 2a(ii): Contact MNR to obtain relevant fish and fish habitat information and in-water work timing windows.

- ✓ Where MTO and GEOdata is not available, contact MNR to obtain relevant fisheries information and in-water work timing windows.
- ✓ Contact MNR to request all relevant fish and fish habitat information and in-water work timing windows using the process described in Step 2a(i).
- ✓ MNR will endeavour to provide available information within 30 working days. This will include (as available):
  - Fish community and habitat present; Waterbody type and applicable in-water work timing window(s); If aquatic invasive species are present or the potential to introduce new invasive species or expand the range of current invasive species; and,
  - If there are applicable fisheries management objectives.

TASK 2b: Supplement background fish and fish habitat information from additional sources as necessary

- ✓ Sources of information, including government, non-profit, and local sources can be found in APPENDIX B Supplemental Sources of Data.

The type of information needed will vary from project to project depending on the information available from MNR and the nature of the project.

TASK 2c: Obtain aquatic species at risk (SAR) information using federal and provincial mapping tools/databases.

Sources of information to support assessment:

- ✓ Federal aquatic SAR information can be obtained through DFO's Aquatic Species at Risk Maps and the federal Species at Risk Public Registry.

- ✓ A list of provincial aquatic species at risk can be found at Species at Risk in Ontario. Provincial aquatic SAR information can be obtained through Natural Heritage Information Centre (NHIC) The Make a Natural Heritage Area Map and GEO.

Provincial Aquatic Species at Risk

The scope of the MTO Fisheries Protocol excludes the provincial *Endangered Species Act* (ESA). If provincial aquatic SAR is/are present, ensure to follow all ESA requirements, including obtaining all necessary permits and licences. This should be undertaken concurrently with the MTO Fisheries Protocol process to minimize impacts to the project schedule. If provincial aquatic species at risk are identified in the project area, please contact the MTO Environmental Planner for the project to obtain additional guidance on next steps.

MTO FISHERIES PROTOCOL DECISIONS

Assessment Results for Key Task at Step 2	Proceed to MTO Fisheries Protocol
If a provincial aquatic species at risk is identified	Follow *Endangered Species Act* (ESA) process. **Step 3:** Applicability of MTO Best Management Practice for Fisheries.
If a federal aquatic species at risk is identified	**Step 3:** Applicability of MTO Best Management Practice for Fisheries.
If no federal or provincial aquatic species at risk is identified	**Step 3:** Applicability of MTO Best Management Practices for Fisheries.

1.4.3 STEP 3 – APPLICABILITY OF MTO BEST MANAGEMENT PRACTICES FOR FISHERIES (FISHERIES BMPs)

The purpose of Step 3 is to determine the applicability of Fisheries BMPs for addressing the work/undertaking/activity. The Fisheries BMPs have been developed to streamline the regulatory review process for common, low-risk activities in or near a waterbody by identifying the necessary mitigation measures needed to avoid causing the death of fish or HADD of fish habitat.

QUALIFICATIONS TO COMPLETE THE DETERMINATION IN STEP 3.

This step may be completed by MTO or MTO Service Providers as there are no specific qualification requirements.

UNDERTAKE THE FOLLOWING TASKS:

3a	Determine if the work/undertaking/activity can be addressed by a Fisheries BMP.
3b	Determine if all measures outlined in the Fisheries BMP can be followed and implemented.

Task 3a: Determine if the work/undertaking/activity can be addressed by a Fisheries BMP.

The list should be periodically reviewed to determine if a new Fisheries BMP may apply to an MTO work/undertaking/activity.

- ✓ A list of available Fisheries BMPs can be found in Section 4 Using MTO Best Management Practices for Fisheries.
- ✓ Review the Scope of Work described in the relevant Fisheries BMP to determine whether the Fisheries BMPs can be applied to the proposed work/undertaking/activity.
- ✓ When determining the applicability of a Fisheries BMP for the work/undertaking/activity, consider if a field investigation is required to obtain additional information to support the design.

Task 3b: Determine if all the operational constraints and protection measures outlined in the Fisheries BMP can be followed.

- ✓ Activities that are carried out in accordance with all the operational constraints, protection measures and submission requirements of each Fisheries BMP are considered to be in compliance with the *Fisheries Act* and the MTO Fisheries Protocol and may proceed without further review to Step 5 (Project Notification). If uncertain, proceed to Step 4 (Fisheries Assessment).
- ✓ The Fisheries BMPs outline the operational constraints and protection measures that must be in place, including timing windows and erosion and sediment control (ESC) measures.
- ✓ Activities following Fisheries BMPs must comply with the federal *Species at Risk Act* (SARA) and the provincial ESA as outlined in the MTO Fisheries Protocol.
- ✓ An MTO Project Notification Form shall be completed prior to the commencement of work. It shall be signed by the appropriate individual then submitted to and retained by the appropriate office.

PROTOCOL DECISIONS

Assessment Results for Key Task at Step 3	Proceed to MTO Fisheries Protocol
If all applicable operational constraints and protection measures outlined in the Fisheries BMP can be followed	**Step 5:** Complete the MTO Project Notification Form.
If all applicable operational constraints and protection measures outlined in the Fisheries BMP cannot be followed or if uncertain	**Step 4:** Fisheries Assessment Process.

1.4.4 STEP 4 – FISHERIES ASSESSMENT PROCESS

When it has been determined that a Fisheries BMP does not apply to the specific work/undertaking/activity (Step 3), additional data and assessment are required. In Step 4, field investigations are undertaken, and the work/undertaking/activity is assessed using Pathways of Effects (PoE) to determine if there are any residual effects after design and mitigation measures have been applied. Each residual effect is then reviewed to determine the potential for it to be a negative effect. At this point, the severity of all negative residual effects is reviewed to determine if death of fish or HADD of fish habitat is likely or not. The rationale for this decision is then provided in the Fish and Fish Habitat Impact Documentation (See Section 5.12 and APPENDIX D).

QUALIFICATIONS TO COMPLETE THE ASSESSMENT IN STEP 4

Field investigations shall be undertaken by an MTO fisheries assessment specialist, or by field staff knowledgeable about fisheries and who have a thorough understanding of the MTO Fisheries Protocol and MTO requirements for field investigations.

The fisheries impact assessment must be completed by a fisheries assessment specialist that is registered on the MTO Registry, Appraisal and Qualification System (RAQS).

UNDERTAKE THE FOLLOWING TASKS:

4a	A detailed review of all the existing fisheries data and conduct the appropriate field investigations.

4b	A review of the work/undertaking/activity to recommend modifications and appropriate mitigation measures.
4c	Examine the negative residual effects and determine the likelihood of a work/undertaking/activity resulting in the death of fish or harmful alteration, disruption, or destruction (HADD) of fish habitat.

TASK 4a: Undertake a detailed review of all the existing fisheries data and conduct the appropriate field investigations

- ✓ Review existing data provided from Steps 2a-2c to determine if the level of detail in the information is sufficient to accurately assess whether fish and fish habitat may be impacted by the work/undertaking/activity.

- ✓ Undertake field investigations to:
  - confirm whether site habitat characteristics identified in existing MTO reports have changed (site reconnaissance);
  - refine the identification of sensitive fish and fish habitat where existing information is not sufficient for determining appropriate design requirements or assessing work/undertaking/activity impacts;
  - obtain field information where no data exists, or where only outdated background fisheries information is available.
- ✓ Details on conducting the field investigations (including photographic records) of fish habitat and fish communities are provided in Section 5 Fisheries Assessment Process.

TASK 4b: Undertake a review of the work/undertaking/activity to recommend modifications and appropriate mitigation measures.

- ✓ Determine whether appropriate design considerations/modifications have been addressed. This should include reviewing with the design team options for redesign, relocation, or alternative design options to address the potential effect.
- ✓ Identify the applicable PoEs and complete an Aquatic Effects Assessment to determine any effects.
- ✓ Determine if standard mitigation measures will reduce or eliminate the negative effects, and if not, whether redesign or relocation should be considered to avoid or mitigate the negative effects.

TASK 4c: Examine the negative residual effects and determine the likelihood of a work/undertaking/activity resulting in death of fish and/or a HADD to fish habitat.

- ✓ Any negative effects that remain after mitigation and relocation/redesign have been implemented are considered negative residual effects and their severity must be assessed based on their scale, intensity, and duration.
- ✓ Note that intensity can be linked to the type of habitat that is present, particularly if it is significant habitat.
- ✓ Professional judgment will be used to determine if the death of fish or HADD of fish habitat is likely based on the overall impact (considering all negative residual effects) of the work/undertaking/activity. Provide rationale for the decision within the Fish and Fish Habitat Impact Documentation Template Table.

MTO FISHERIES PROTOCOL DECISIONS

Assessment Results for Key Task at Step 4	Proceed to MTO Fisheries Protocol
For works/undertakings/activities identified after fisheries assessment as: • not likely to result in the death of fish or HADD of fish habitat and, • no federally listed endangered or threatened aquatic species at risk are present	**Step 5:** Complete the MTO Project Notification Form.
For works/undertakings/activities identified after fisheries assessment as: • likely to result in the death of fish or HADD of fish habitat and/or, • federally listed endangered or threatened aquatic species at risk are present	**Step 6**: Complete the DFO Request for Review Form, after consulting with MTO Environmental Delivery.

1.4.5 STEP 5 – PROJECT NOTIFICATION PROCESS

The purpose of Step 5 is to complete the MTO Project Notification Form when MTO or an MTO Service Provider determines that the work/undertaking/activity may proceed without further review. Typically, the MTO Project Notification Form is completed and submitted as part of the MTO Project Notification Package which includes relevant template tables.

QUALIFICATIONS TO COMPLETE THE PROJECT NOTIFICATION FORM IN STEP 5

For projects proceeding from Step 3 (Fisheries BMPs), the MTO Project Notification Form (Step 5) may be completed by MTO or MTO Service Providers as there are no specific qualification requirements.

For projects proceeding from Step 4 (Fisheries Assessment), the MTO Project Notification Form (Step 5) must be completed by an MTO fisheries assessment specialist.

UNDERTAKE THE FOLLOWING TASKS:

5a	Complete the MTO Project Notification Form.
5b	Sign and submit the MTO Project Notification Form.

TASK 5a: Completing the MTO Project Notification Form

- ✓ An MTO Project Notification Form shall be completed prior to the commencement of work (e.g., construction) indicating:
  - the work/undertaking/activity can comply with the conditions and measures outlined in a Fisheries BMP, or
  - that the death of fish or HADD of fish habitat is not likely to occur, as outlined in the Fish and Fish Habitat Impact Documentation following a fisheries assessment.

TASK 5b: Signing and submitting the completed form

- ✓ The MTO Project Notification Form shall be signed by the appropriate individual:
  - MTO Service Provider (no specific qualification requirements) for a project using a Fisheries BMP, or
  - Fisheries assessment specialist for projects having undergone a fisheries assessment.
- ✓ The completed form must be submitted to and retained by:
  - MTO Environmental Delivery, or
  - Operations (projects completed by maintenance Service Providers).

MTO FISHERIES PROTOCOL DECISIONS

Assessment Results for Key Task at Step 5	Proceed to MTO Fisheries Protocol
MTO Project Notification Form completed, signed and submitted to the appropriate office where MTO determines at Step 3 that the work/undertaking/activity can be addressed by a Fisheries BMP	**Step 8:** Project Implementation and Monitoring.
MTO Project Notification Form completed, signed and submitted to the appropriate office where MTO undertakes a fisheries assessment at Step 4 and determines that the project is not likely to result in the death of fish or HADD of fish habitat and where no federally listed endangered or threatened aquatic species at risk are present	**Step 8:** Project Implementation and Monitoring.

1.4.6 STEP 6 – REQUEST FOR PROJECT REVIEW FROM DFO

The purpose of Step 6 is to complete a DFO Request for Review Form to submit to DFO when MTO determines that the work/undertaking/activity is likely to result in the death of fish or HADD of fish habitat and/or federally listed endangered or threatened aquatic species at risk are present. This determination is based on the fisheries assessment completed in Step 4. It should be noted that species of special concern must be considered within the fisheries assessment; however, SARA permits are only required for endangered or threatened aquatic species.

DFO will review the submission under the *Fisheries Act* and/or SARA and determine if a *Fisheries Act* authorization, SARA permit, or SARA-Compliant *Fisheries Act* authorization is required.

QUALIFICATIONS TO COMPLETE STEP 6

This step must be completed by an MTO fisheries assessment specialist.

UNDERTAKE THE FOLLOWING TASKS:

6a	Confirm submission requirement with MTO and complete the DFO Request for Review Form.
6b	Sign and submit the DFO Request for Review Form.

TASK 6a and 6b: Completing the DFO Request for Review form

- ✓ Submit Fish and Fish Habitat Impact Documentation and all supporting materials to MTO to review. MTO will confirm the requirement to submit a DFO Request for Review Form.
- ✓ MTO will instruct the fisheries assessment specialist to then complete the DFO Request for Review Form and submit to MTO Environmental Delivery for review and the appropriate signatures (MTO and fisheries assessment specialists).
- ✓ Once completed and signed, the form shall be sent to DFO for review and decision.

Note: Early engagement with DFO is extremely important for projects that are identified as likely to result in the death of fish or HADD of fish habitat to not impact the project schedule. Therefore, it is the responsibility of the fisheries assessment specialist to advise the project team early in the design phase of this potential scheduling constraint.

MTO FISHERIES PROTOCOL DECISIONS

Assessment Results for Key Task at Step 6	Proceed to MTO Fisheries Protocol
If DFO determines that the work/undertaking/activity is not likely to result in the death of fish or HADD of fish habitat and/or impact federally listed endangered or threatened aquatic species at risk, DFO will notify MTO that the work/undertaking/activity does not require a *Fisheries Act* authorization or SARA permit.	**Step 8:** Project Implementation and Monitoring.
If DFO determines that the work/undertaking/activity is likely to result in the death of fish or HADD of fish habitat and/or will impact federally listed endangered or threatened aquatic species at risk, DFO will notify MTO that a *Fisheries Act* authorization and/or SARA permit or a SARA-Compliant *Fisheries Act* authorization will be required.	**Step 7:** Develop an Offsetting Plan and apply for a *Fisheries Act* authorization and/or a SARA permit.

1.4.7 STEP 7 – DEVELOP AN OFFSETTING PLAN AND APPLY FOR A *FISHERIES ACT* AUTHORIZATION AND/OR A *SPECIES AT RISK ACT* PERMIT

The purpose of Step 7 is for MTO or MTO Service Providers to develop an Offsetting Plan and apply for a *Fisheries Act* authorization when DFO has determined that the work/undertaking/activity will likely result in the death of fish or HADD of fish habitat and/or to apply for a SARA permit when federally listed endangered or threatened aquatic SAR are present. Offsetting Plans are developed on a site-by-site basis and outline the measures to be taken to counterbalance project impacts. Projects should consider the timeline required to develop and receive approval from DFO in the project schedule to avoid any delays.

QUALIFICATIONS TO COMPLETE STEP 7

This step must be completed by an MTO fisheries assessment specialist in consultation with MTO.

UNDERTAKE THE FOLLOWING TASKS:

7a	Fisheries assessment specialist in consultation with MTO develops an Offsetting Plan as part of the *Fisheries Act* authorization application.
7b	MTO submits an application for a *Fisheries Act* authorization.
7c	If requested by DFO, MTO submits a *Species at Risk Act* (SARA) permit application.

TASK 7a: MTO develops an Offsetting Plan

Once a DFO Fisheries Protection Biologist has determined that a *Fisheries Act* authorization will be required to undertake the proposed work, undertaking or activity, MTO must develop an Offsetting Plan as detailed in Section 8 of the Fish Guide. This plan should be developed in consultation with DFO.

TASK 7b: MTO applies for an authorization; DFO reviews.

- ✓ MTO completes and submits an Application Form for the Issuance of an Authorization under Paragraph 34.4 (2)(b) and 35(2)(b) of the *Fisheries Act* (Non-Emergency Situations).

- ✓ Once DFO has received the application for a *Fisheries Act* authorization, DFO has 60 calendar days to determine if the application is complete or incomplete, and to notify MTO of this determination.
    - If the application is not complete, DFO will notify MTO and identify the information or documentation required and the 60-calendar day review period ceases.
    - MTO will then resubmit the necessary documentation and the 60-calendar day review period starts over again.
- ✓ Once DFO notifies MTO that the application for a *Fisheries Act* authorization is complete, DFO has 90 calendar days to issue or decline the authorization.
    - Upon receipt of an approved authorization, MTO can proceed with the project, following all of the terms and conditions outlined in the authorization.
    - Should DFO decline to authorize the death of fish or HADD of fish habitat, MTO cannot proceed with the project without risk of being in non-compliance with the *Fisheries Act*.
    - If declined, the project would require redesign and/or additional mitigation/relocation measures and re-submission to DFO for further review.

NOTE: There are certain circumstances where the 90-calendar day timeline limit ceases to apply. See Section 8.7 of the Fish Guide.

TASK 7c: MTO applies for SARA permit; DFO reviews.

- ✓ If DFO determines that a SARA permit is required, MTO will be notified to complete and submit an Application for a Species at Risk Permit to DFO.
- ✓ MTO or MTO Service Provider completes the SARA permit application and submits to DFO for review. DFO is normally required to make a decision on the permit application within 90 days of notification that the application has been received.
- ✓ If DFO determines that a SARA permit is required in conjunction with a *Fisheries Act* authorization, DFO has the option to issue a SARA-Compliant *Fisheries Act* authorization. If issued, the SARA-Compliant *Fisheries Act* authorization will contain all terms and conditions necessary to meet SARA requirements and a separate SARA permit will not be issued.
- ✓ If a SARA permit is issued, and a *Fisheries Act* authorization is not required, the terms and conditions necessary to meet SARA requirements will be identified in the SARA permit.
- ✓ If DFO determines that a *Fisheries Act* authorization and/or a SARA permit are required, but declines to issue the authorization or permit, the project will return to

Step 4 and require a review of how DFO concerns (e.g., additional/alternative avoidance or mitigation options) can be addressed.

MTO FISHERIES PROTOCOL DECISIONS

Assessment Results for Key Task at Step 7	Proceed to MTO Fisheries Protocol
If DFO declines MTO a *Fisheries Act* authorization and/or SARA permit	**Step 4:** Fisheries Assessment Process.
Once DFO issues MTO a *Fisheries Act* authorization and/or SARA permit or a SARA-Compliant *Fisheries Act* authorization	**Step 8:** Project Implementation and Monitoring.

1.4.8 STEP 8 – PROJECT IMPLEMENTATION AND MONITORING

The purpose of Step 8 is to implement the project with all committed design considerations, mitigation, offsetting, and monitoring requirements.

MTO can proceed with those projects/activities where no federally listed aquatic species at risk are present and that the work/undertaking/activity will not result in the death of fish or HADD of fish habitat by implementing the necessary design considerations and mitigation measures.

For works/undertakings/activities that are likely to result in the death of fish or HADD of fish habitat or that impact federally listed aquatic species at risk, MTO can proceed with the project subject to the mitigation, offsetting and monitoring requirements as outlined in the *Fisheries Act* authorization and/or SARA permit.

Where applicable, Ontario ESA requirements shall be met prior to proceeding with a project whether a *Fisheries Act* authorization or SARA permit is required or not.

Should the project/activities change from what was approved by DFO, an amendment to the authorization or permit will likely be required. Any changes to the project/activities, such as design or mitigation measures, should be communicated promptly to DFO to determine whether an amendment is required, including additional/new conditions. Cancellations of authorizations or permits may be made by DFO where the changes are such that they cannot be accommodated by an amendment.

QUALIFICATIONS TO COMPLETE STEP 8

This step is completed by MTO or MTO Service Provider.

For works/undertakings/activities where a *Fisheries Act* authorization or a SARA-Compliant *Fisheries Act* authorization is issued, MTO shall use an MTO fisheries contracts specialist to conduct monitoring during construction.

For works/undertakings/activities where a SARA permit has been issued, MTO shall ensure that the monitoring is undertaken by a person or persons with demonstrated appropriate experience monitoring aquatic species at risk; they need not be an MTO fisheries contracts specialist unless otherwise specified.

Monitoring qualifications and requirements should be determined on a case-by-case basis, depending on the scope of the work/undertaking/activity and the species likely to be encountered.

1.5 SUMMARY OF MTO FISHERIES PROTOCOL ROLES AND RESPONSIBILITIES

Table 1 below provides a summary of the roles and responsibilities for each step of the MTO Fisheries Protocol.

Table 1-1. Roles and Responsibilities

Step	Task	Lead Agency and Description of Task	Agency Contact/ Responsible
1	Initial Project/ Activity Assessment	MTO shall consider the potential for a project/activities that result in the death of fish or HADD. If the following criteria can be met, there is no likelihood of project/activity resulting in the death of fish or HADD. MTO may proceed without any further fisheries assessment if the project/activity is: a) to occur in an artificial waterbody (e.g., stormwater management pond) that is not connected to a waterbody that contains fish at any time during any given year. **OR** b) located beyond 30 meters of the high water level of a waterbody and mitigation can prevent any impacts on the waterbody.	MTO Environmental Delivery

Step	Task	Lead Agency and Description of Task	Agency Contact/ Responsible
		OR c) located within 30 meters of the high water level of a waterbody and is a type of routine work, as identified in **Table 2** and all of the necessary mitigation measures identified in OPSS.PROV 182 can be applied appropriately. If any of these criteria can be met, **proceed to Step 8**. If none of these criteria can be met, or when uncertain, **proceed to Step 2**. If the project/activity is an **Emergency Work,** then refer to the Duty to Notify, Spills, and Emergency Work section of this Guide. Determination that a project/activity will not result in the death of fish or HADD does not exempt MTO from requirements under other applicable legislation, including the Federal *Species at Risk Act* and the Ontario *Endangered Species Act*.	
2	Gathering of Existing Fisheries Information	MTO shall gather all relevant existing fisheries information for the project/activity and conduct necessary site investigations in accordance with the Fish Guide to determine: • fish community and habitat present • waterbody type and applicable in-water work timing window(s) • if there are aquatic species at risk (SAR) present (i.e., fish and mussels) • if there are aquatic invasive species present or the potential to introduce new invasive species or expand the range of current invasive species • if important or exceptional fish habitat is present • if there are applicable fisheries management objectives	MTO Environmental Delivery MNR District or Regional Office

Step	Task	Lead Agency and Description of Task	Agency Contact/ Responsible
		This fisheries information, shall be obtained by following the steps below in accordance with the MTO Environmental Guide for Fisheries: • Use existing fisheries data/mapping that may be available from previous MTO surveys conducted within the last 10 years and contact MNR to confirm the information and timing windows are still valid. **OR** • Contact MNR to obtain relevant fisheries information and in-water work timing windows. MNR will provide this information within 30 working days. **AND** • Supplement fisheries information from other available sources as required. **AND** • Obtain aquatic SAR information through the use of DFO and MECP mapping tools. Confirmation may be sought by contacting the agencies directly. **Proceed to Step 3**. **NOTE:** If aquatic species at risk or their critical habitat are identified then a separate process may be required.	
3	Applicability of MTO Best Management Practice for Fisheries	MTO shall determine if the project/activity can be addressed by an MTO Fisheries Best Management Practice for Fisheries (Fisheries BMP) as identified in the MTO Best Management Practice for Fisheries. If these criteria can be met, **proceed to Step 5**. If these criteria cannot be met, or when uncertain, **proceed to Step 4**. **NOTE:** Where applicable, Ontario *Endangered Species Act* requirements shall be followed.	MTO Environmental Delivery

Step	Task	Lead Agency and Description of Task	Agency Contact/ Responsible
4	Fisheries Assessment Process	An MTO **fisheries assessment specialist** shall assess the project/activity to determine the likelihood that the project may result in the death of fish or HADD. A fisheries assessment shall be undertaken in accordance with MTO Environmental Guide for Fisheries and shall include: • conducting the appropriate field investigations if required, after a detailed review of all of the existing fisheries data; • a review of the project/activity to recommend modifications and appropriate mitigation measures; and • determination of the negative residual effects and the likelihood of a project/activity resulting in the death of fish or HADD. For projects/activities identified after fisheries assessment as not likely to result in the death of fish or HADD and no federally listed endangered or threatened aquatic species at risk are present, **proceed to Step 5**. For projects/activities identified after fisheries assessment as likely to result in the death of fish or HADD and/or where federally listed endangered or threatened aquatic species at risk are present, **proceed to Step 6**.	MTO Environmental Delivery
5	Project Notification Process	Where MTO determines that the project/activity can be addressed by Fisheries BMP at Step 3 or, where MTO makes the decision based on the outcome of fisheries assessment at Step 4 that the project is not likely to result in death of fish or a HADD and where no federally listed aquatic species at risk are present, it may proceed on this basis and without further *Fisheries Act* or *Species at Risk Act* review.	MTO Environmental Delivery

Step	Task	Lead Agency and Description of Task	Agency Contact/ Responsible
		MTO shall complete the MTO Project Notification Form in accordance with the Fish Guide, **proceed to Step 8**.	
6	Request for Project Review from DFO	Where MTO makes the decision based on the outcome of fisheries assessment at Step 4 that the project/activity has the potential to, or is likely to result in the death of fish or HADD and/or where federally listed aquatic species at risk are present, MTO shall refer the project/activity to DFO, requesting a review under the Fisheries Protection Provisions of the *Fisheries Act* and/or under the *Species at Risk Act*. MTO shall complete a Request for Review Application form in accordance with the Fish Guide to submit to DFO. If DFO determines that the project/activity will not result in the death of fish or HADD and/or impact federally listed aquatic species at risk, DFO shall notify MTO that the project/activity does not require a *Fisheries Act* Authorization or *Species at Risk Act* permit, **proceed to Step 8**. If DFO determines that the project/activity will result in the death of fish or HADD and/or will impact federally listed aquatic species at risk, DFO shall notify MTO that a *Fisheries Act* Authorization and/or *Species at Risk Act* permit will be required, **proceed to Step 7**. NOTE: It should be noted that species of special concern must be considered within the fisheries assessment; however, *Species at Risk Act* (SARA) permits are only required for endangered or threatened aquatic species.	MTO Environmental Delivery DFO Triage
7	Develop an Offsetting Plan and submit an application for *Fisheries Act* Authorization	MTO shall develop an Offsetting Plan and submit an Application for Authorization under Paragraph 35(2)(b) of the *Fisheries Act* Regulations and/or an application for a *Species*	MTO Environmental Delivery

Step	Task	Lead Agency and Description of Task	Agency Contact/ Responsible
	and/or *Species at Risk Act* Permit	*at Risk* Permit in accordance with the Fish Guide. Once DFO has received an application for *Fisheries Act* Authorization, DFO has 60 calendar days to determine if the application is complete or incomplete, and to notify MTO of this determination. If the application is not complete, DFO shall notify MTO and identify the information or documentation required; MTO shall then resubmit the necessary documentation. Once DFO notifies MTO that the application for *Fisheries Act* Authorization and/or *Species at Risk Act* permit is complete, DFO has 90 calendar days to issue or make a decision to decline to issue the Authorization and/or permit. If DFO declines MTO a *Fisheries Act* Authorization and/or *Species at Risk Act* permit, **go back to Step 4**. Once DFO issues MTO a *Fisheries Act* Authorization and/or *Species at Risk Act* permit, **proceed to Step 8**.	DFO Regulatory Review
8	Project Implementation and Monitoring	MTO can proceed with projects/activities where no federally listed aquatic species at risk are present and those that will not result in the death of fish or HADD by implementing the necessary design considerations and mitigation measures. For projects/activities that result in the death of fish or HADD or that impact federally listed aquatic species at risk, MTO can proceed with the project subject to the mitigation, offsetting and monitoring requirements as outlined in the *Fisheries Act a*uthorization and/or *Species at Risk Act* permit. For projects/activities where a *Fisheries Act a*uthorization is issued, MTO shall use an MTO **fisheries contracts specialist** to conduct monitoring during construction.	MTO Environmental Delivery

Step	Task	Lead Agency and Description of Task	Agency Contact/ Responsible
		Where applicable, Ontario *Endangered Species Act* requirements shall be met prior to proceeding with a project whether a *Fisheries Act* authorization is required or not. **NOTE:** If, during the implementation of the project/activity, death of fish, HADD of fish habitat or impacts to federally listed aquatic species at risk occur, refer to the Duty to Notify, Spills, and Emergency Work section of this Guide.	

2 INITIAL WORK/UNDERTAKING/ACTIVITY ASSESSMENT (STEP 1)

Overview of Step 1: Initial Work/Undertaking/Activity Assessment

Purpose	• This step is intended as a screening process to determine if work/undertaking/activity will affect fish or fish habitat.
Tasks	• Confirm presence of waterbody. • Determine the distance between the project and the high water level of a waterbody. • Determine if the work/undertaking/activity is listed as Routine MTO Work.
Decisions & Documentation	• If the project is located in an area that will not impact fish or fish habitat, or is a Routine MTO Work, proceed to Project Implementation & Monitoring (Step 8). • Otherwise, proceed with Gathering of Existing Fisheries Information (Step 2).

2.1 CONFIRMING PRESENCE OF A WATERBODY

The first step is to determine whether or not a waterbody is present within the project area, and if yes, whether the waterbody supports fish and fish habitat. If confirmed, the next step is to begin to assess whether impacts may occur from anticipated works.

A waterbody is defined as any permanent or intermittent, natural or constructed (artificial) body of water, including lakes, ponds, wetlands, and watercourses, but not including stormwater management ponds unless directly connected (i.e. provides passage) to a waterbody that contains fish at any time during the year. The waterbody in question may be artificial, and/or not contain fish itself; however, it is important to identify if it is connected to a fish-bearing waterbody. When no such connection exists, additional fisheries review is not required.

The following sources of information can help identify most waterbodies:

- Ministry of Natural Resources - Ontario Flow Assessment Tool
- Canadian National Topographic System (NTS) produced by Natural Resources Canada (NRC), available online through NRC Toporama mapping site at the NRC website
- Ministry of Natural Resources - Topographic Maps

Field visits may be necessary to confirm the presence of a waterbody and confirm whether fish and fish habitat is present. This may include conducting site visits during the spring to determine presence of small ephemeral streams that flow only when water levels are high and are not identified on topographic maps. If the presence of a waterbody cannot be determined using mapping tools, then conservatively it will be reviewed in further detail in upcoming steps.

Once it is confirmed that a waterbody supporting fish and fish habitat is present within the project area, the next step is to determine the distance between the activity and the waterbody. Areas that are regularly flooded are important as changes to these areas can have an effect on the entire waterbody. For this reason, the 30 m distance is measured from the high water level. Figure 2-1 illustrates the high water level for both flowing waters (rivers, streams) and inland lakes or wetlands.

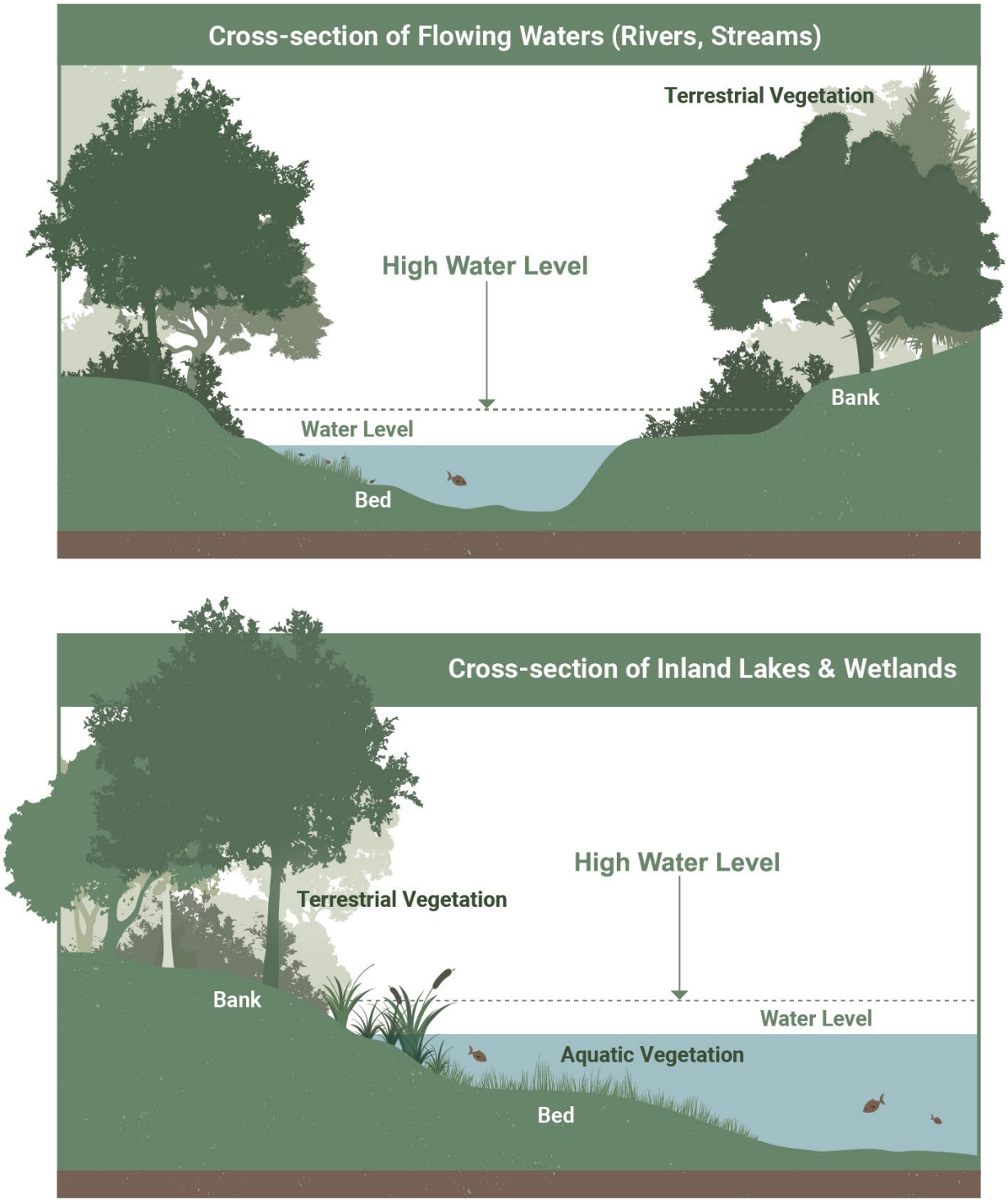

Figure 2-1. Determining High Water Level. Source: Modified from DFO

2.2 ROUTINE MTO WORKS

MTO has developed a list of routine works that are unlikely to impact fish and fish habitat when necessary mitigation measures are implemented. Typically, these are associated with maintenance works; however, some activities may be more specific to capital construction projects. Works/undertakings/activities that meet all of the following can proceed without any additional fisheries assessment:

- Work/undertaking/activity is within 30 m of a waterbody and is a type of Routine MTO Works (Table 2-1); and,
- All appropriate mitigation measures outlined in OPSS.PROV 182 General Specifications for Environmental Protection for Construction In and Around Waterbodies and on Waterbody Banks can be applied.

It is important to ensure all required mitigation measures are implemented to protect fish and fish habitat and to prevent debris or sediment from entering the waterbody. Sediment loading into the waterbody is considered a deposit of a deleterious substance in contravention of Section 36(3) (deposit of deleterious substance prohibited) of the *Fisheries Act* and can also result in death of fish or HADD of fish habitat, therefore may contravene Sections 34.4(1) (death of fish) and 35(1) (harmful alteration, disruption or destruciton of fish habitat) of the *Fisheries Act*. Additional guidance can be found in MTO's Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects. This can be accessed online through the MTO Technical Documents website. To find this document, search for the title or click the Environmental tab and browse to the ESC Guide in the list.

Projects that are not on the Routine MTO Works list and/or cannot meet the appropriate mitigation measures will continue to work through the steps of the MTO Fisheries Protocol.

Table 2-1. Routine MTO Works

Category	Activity
Drainage	• Curb and gutter maintenance and repair • Catch basin and ditch inlet cleanout • Erosion control and repair • General drainage maintenance • Sub drain inspection and cleanout
Electrical	• Electrical Inspection & Maintenance • Electrical Installation

Category	Activity
MTO Facilities: Maintenance/Patrol Yard/ Rest Area & Picnic Sites	• Building Maintenance • Mowing • Storage of Materials (sand, etc.)
Roadway and Right-of-Way	• Acoustic barrier installation, repair, and replacement • Concrete barrier installation, repair, and replacement • Debris, litter, and graffiti control • Dust suppression • Fence installation, repair, and replacement • Geotechnical surveys (i.e. boreholes) above the high water level; no SAR habitat • Granular shoulder and roadway grading • Gravel surface and shoulder repair • Guide rail and energy absorbing system installation, repair and replacement • Milling and resurfacing • Pavement marking application • Posthole and crack repair • Roadway and shoulder sweeping • Snow fence installation and removal • Surface treatments • Utility trenching
Signage	• Sign installation • Sign inspection & management
Structural **(Does not include any in-water works. See Fisheries BMP for Bridge Maintenance where in-water work is required)**	• Bridge cleaning and washing • Bridge deck sweeping • Bridge deck repairs (asphalt, concrete, timber deck surfaces) • Erosion control • Expansion joint maintenance and repair (including bearings and bearing seats) • Inspection • Removal and application of protective coatings

Category	Activity
Vegetation **(Excludes clearing. See Fisheries BMP for Maintenance of Riparian Vegetation in ROW)**	• Grass control (for aesthetics and safety) • Weed control (incl. spraying herbicide when appropriate) • Brush control • Tree and shrub maintenance • Ground cover (placement, maintenance, and rehabilitation)
Winter	• De-icing • Direct Liquid Application • Snow plowing • Sanding and Salting • Snow Removal from bridges

3 GATHERING EXISTING FISHERIES INFORMATION (STEP 2)

Overview of Step 2: Gathering Existing Fisheries Information

Purpose	• To gather known fisheries information about the type of fish and fish habitat in the project area, including aquatic species at risk, if present. • To determine when work can occur in the project area (in-water timing window).
Tasks	• Contact agencies (MTO, DFO, MNR, etc.) and review online databases to collect existing fisheries data. • Review provincial and federal mapping and resources for aquatic SAR. • Contact MNR to confirm or obtain information on fish and fish habitat and in-water work timing windows.
Decisions & Documentation	• Once all existing fisheries information, inlcuding aquatic species at risk is gathered, proceed to applicability of MTO Best Management Practice for Fisheries (Step 3).

This section supports Step 2 of the MTO Fisheries Protocol and provides guidance on gathering information about the study area and the immediate project area. This data is used to determine if fish and/or species at risk are present, applicable timing windows, the type of fish habitat present, and for use in a fisheries impact assessment, if required.

After defining the study area, background data is collected from MTO, MNR, DFO and other supplementary data sources available. Where gaps still exist, field investigations may need to be undertaken to support the project data needs, as outlined in step 4.

3.1 IDENTIFYING THE STUDY AREA

Aquatic ecosystems are not static; they are continuous and inter-connected systems, with varying degrees of complexity. Fish and fish habitat variables (e.g., sediment, bedload, nutrients, food, and cover) move throughout and along the fluvial continuum. As a result, projects with in-water works may affect both the immediate project area, as well as adjacent areas.

The Study Area

Encompasses the broader area beyond the immediate project site. The size and features of the study area depend on the complexity of the project and potential impacts on the surrounding area.

The study area should be large enough to ensure the background information encompasses inter-connected waterbodies and adjacent portions or reaches of waterbodies. The following must be considered in determining the appropriate study area:

- The study area must encompass all waterbodies that potentially support fish and fish habitat that may be affected by the project including lakes, roadside ditches, side channels, online ponds, and wetlands.
- Any potential barriers (steep elevation changes, waterfalls) to fish passage downstream or upstream of the crossing site and within the range of any migratory species should be determined through GIS tools and topographic maps to provide broader context with respect to potential fish passage needs. These potential barriers may warrant field investigations for confirmation.
- Knowledge about fish or habitat conditions in adjacent areas may provide insight into fish and/or habitat conditions in the immediate project area (e.g., migratory species). Maintaining as much flexibility as possible for the project is important, particularly in

planning and siting highway alignments and associated waterbody crossings or encroachments.

- Information from the broader area provides context to assess relative abundance/rarity of a habitat type.
- The complexity and stage of the project are important to describe. For example, new routes in planning stages would be expected to have a much larger study area than a rehabilitation project starting in Detail Design.

3.2 DATA COLLECTION

Under Step 2, data collection is focused on obtaining available fish and fish habitat information:

- fish community and habitat present;
- waterbody type and applicable in-water work timing window(s);
- aquatic species at risk (SAR) present (i.e., fish and mussels);
- aquatic invasive species present or the potential to introduce new invasive species or expand the range of current invasive species; and,
- applicable fisheries management objectives.

Data collected in this section will be used to support a fisheries assessment, if required. For the purpose of this section, data collection is broken down into two stages:

i. **Background data** – a review of existing data from MTO, DFO and MNR
ii. **Supplemental data** – a review of existing data from various sources

Field Reconnaissance & Data Collection

Background data can provide a good overview of the features and species within the study area; however, it is important to note the limitations of a desktop review. A site visit can help identify unique features and help identify the need for specific mitigating measures that may be required, such as erosion and sediment control.

Projects that may qualify for use of the best management practices (outlined in Step 3) should consider the need for a field visit.

Field data collection considerations are provided in Step 4.

3.3 BACKGROUND DATA

As a first step, contact MTO Environmental Delivery and/or refer to the Project Terms of Reference (TOR) to determine if existing reports are available from previous MTO surveys conducted within the past 10 years.

GEOdatasets should also be reviewed for available data within the study area. The Ontario GeoHub website provides users with access to a wide variety of Ontario Open Data, including geospatial fisheries datasets, such as Aquatic Resource Area (ARA) line segments, ARA survey points, and ARA polygons. Datasets can be downloaded for use as layers in desktop mapping software (e.g., ArcGIS), or Google Earth, or can be viewed on the interactive website.

If existing information is available from MTO and/or GEO, contact MNR to confirm that the existing fish and fish habitat information and in-water work timing windows are still valid. This can help reduce the number of repeat requests MNR receives for the same location and can accelerate the background data collection process.

If MTO does not have previous reports or they are outdated, contact MNR to request the available information. The process for contacting MNR is outlined in Section 3.3.1.

Information on how to determine if provincial and federal aquatic species at risk or their habitat are present is provided in the sections below.

3.3.1 MNR: REQUESTING & CONFIRMING DATA

MNR has extensive knowledge on fish and fish habitat, timing windows, and fisheries management objectives and shall be contacted to obtain the available information. If existing data is available from MTO or other sources that is less than 10 years old, contact MNR to confirm if the information is still valid.

To make a request to MNR to provide or confirm data, use the template letter and table (APPENDIX A: MNR Information Request/Request to Confirm Template Letter and Table). The following information must be included in the request:

- A brief description of the work/undertaking/activity.
- Location of work – GPS coordinates and map (Google Earth or NTS map).
- Waterbody(ies) affected by the project.

The table template with any available waterbody location/existing fish and fish habitat information filled in, including the information to be confirmed by MNR, where applicable.

Upon receiving the request, MNR will endeavor to provide all relevant available fish and fish habitat information within 30 working days.

DOCUMENTATION

APPENDIX A: MNR Information Request/Request to Confirm Template Letter and Table

Use the template letter and to submit a request to MNR to obtain/confirm:

- ✓ Fish and fish habitat data
- ✓ In-water work timing windows
- ✓ Fisheries Management Objectives

In-Water Work Timing Windows

In-water work timing windows are provided by MNR. They are an important mitigation measure that restrict work during sensitive time periods for fish and apply to all possible effects of in-water work. Works/undertakings/activities must adhere to the in-water work timing windows to protect fish from impacts during important life stages such as spawning and egg incubation, fish and eggs/hatchings.

In-water work timing windows vary depending on the species present in the waterbody (e.g. spring vs. fall spawners) and are determined by MNR. These in-water work timing windows differ depending on geographic location, and can be modified by MNR, so it is important to check for site specific information.

If an in-water work timing window is unknown, MTO or the MTO Service Provider shall undertake an appropriate level of site assessment/field investigation in order to determine the fish and fish habitat present and the likely thermal regime. MTO or the MTO Service Provider shall then follow-up with MNR to confirm the appropriate in-water work timing window. Work will not proceed without confirmation from MNR of the appropriate in-water work timing window to be followed. Similarly, if field investigations do not support the in-water work timing window received from MNR during background data collection, MTO or its Service Provider may contact MNR to discuss modification based on the existing conditions. See Section 5.2 for additional details.

Note: In-water work timing windows should be considered firm and typically, in-water work may only be completed within the in-water work timing window. Once the in-water work timing windows are identified, it is imperative that the designer considers all aspects of the staging and completion of all the relevant construction activities in relation to the in-water work timing windows. If work is required to occur outside of the in-water work timing window, further discussion with agencies will be required.

3.3.2 ONTARIO SPECIES AT RISK

The purpose of the Ontario *Endangered Species Act* (ESA), is to identify provincial species at risk, provide protection for the species and their habitats, and promote the protection and recovery of species at risk. The act and its regulations:

- Includes prohibitions on the killing, harming, harassing, capture, possession, and transport of species at risk.
- Includes prohibitions on damaging and destroying species habitat.
- Allows for exemptions via permits, agreements, and other regulatory instruments.

To determine if provincial aquatic species at risk may be present within the study area:

- Review Species at Risk in Ontario list.
- Undertake a preliminary screening for aquatic SAR by using Natural Heritage Information Centre (NHIC) The Make a Natural Heritage Area Map and GEO.
- Review existing reports from MTO and other sources, as appropriate.

Provincial Species at Risk

If an 'endangered' or 'threatened' provincial aquatic species at risk or their habitat is present:

- Review O.Reg 242/08: GENERAL and O. Reg. 832/21: HABITAT.
- An ESA registration or permit may be required.
- Follow the ESA process in consultation with MTO.
- Note that the ESA processes runs concurrently with the MTO Fisheries Protocol process.

3.3.2.1 OBTAINING AN *ENDANGERED SPECIES ACT* REGISTRATION/PERMIT

- If it is determined that an endangered or threatened provincial aquatic species at risk or their habitat is present, the project must comply with all provincial regulatory requirements and may require an ESA registration or permit. Contact MTO Environmental Delivery for direction.

3.3.3 FEDERAL SPECIES AT RISK

The purpose of the *Species at Risk Act* (SARA) is to protect and provide for the recovery of species that are extirpated, endangered, or threatened, as well as manage species of special concern. The act includes:

- Prohibitions against killing, harming, harassing, or capturing extirpated, endangered, or threatened species.
- Prohibitions against damage or destruction of residences of endangered or threatened species, or extirpated species if a recovery strategy recommends reintroduction of the species.
- Prohibits the destruction of critical habitat of endangered or threatened species, or extirpated species if a recovery strategy recommends reintroduction of the species.

To determine the presence of federal SARA Schedule 1 aquatic species:

- Consult with DFO to confirm likelihood of SARA Schedule 1 aquatic species or their critical habitat being present in waterbodies that could be affected by the work. Refer to the SARA Registry for a list of current federal species at risk in Ontario.
- Determine if SARA listed species are present in the study area of the project using the DFO Aquatic Species at Risk Maps.
- If “Endangered” or “Threatened” federal aquatic species at risk or their critical habitat are identified, a review by DFO and SARA permit may be required. Species designated as “Special Concern” are listed in Schedule 1 of SARA but the prohibitions do not apply. Although additional DFO review may not be required, the species should be managed to prevent them from becoming “Endangered” or “Threatened”. Management Plans should be consulted to identify threats and mitigation measures and industry best management practices followed to minimize these threats.

Federal Species at Risk

If an ‘endangered’ or ‘threatened’ federal aquatic species at risk or their critical habitat is present:

- A SARA permit may be required.
- Submit a DFO Request for Review Form.
- Note that the SARA and Fisheries Act processes run concurrently.

3.3.3.1 OBTAINING A FEDERAL SPECIES AT RISK PERMIT

- Where there is the potential to encounter an Endangered or Threatened SARA Schedule 1 aquatic species or their habitat, a Species at Risk permit will likely be required, and a DFO Request for Review Form must be submitted to DFO for review. DFO will provide further direction on applying for a SARA permit upon completion of the review (e.g., standalone SARA permit vs. SARA Compliant *Fisheries Act* authorization). See Section 8.8 Submit an Application for a SARA Permit for details.

3.4 SUPPLEMENTAL DATA SOURCES

The fish and fish habitat information provided by MNR is generally supplemented with other sources of existing information. The type of information needed will vary from project to project depending on the available information and the nature of the project. Conservation Authorities, municipalities, and other organizations are often a good, reliable source of information. A list of the type of information that may be available can be found in APPENDIX B: Supplemental Sources.

After reviewing these supplemental sources of information, the next step would be to conduct a review of imagery and mapping tools. The intent will be to highlight any known features and investigate additional areas potentially requiring further field investigation; for example, flagging potential barriers, man-made features, potential issues, and offsetting areas. With this information in hand the sampling plan and field investigations will be better prepared and specifically tied to better defining the impacts related to the project.

Consultation with various ministries, agencies, non-profit organizations, adjacent landowners, Indigenous communities, and stakeholder groups may also be valuable sources of information regarding the presence of species, habitat resiliency, recent and historical habitat changes, opportunities for future offsetting measures and local issues and concerns. Documentation should consider the source and quality of information, such as anecdotal, specialists, etc.

4 USING MTO BEST MANAGEMENT PRACTICES FOR FISHERIES (STEP 3)

Overview of Step 3: Applicability of an MTO Fisheries Best Management Practice

Purpose	• Fisheries BMPs have been developed for certain activities that are considered low risk when specific mitigation measures are implemented. • The use of Fisheries BMPs reduces the need for complex assessments and streamlines the regulatory review process.
Tasks	• Determine if a work/undertaking/activity qualifies to use a Fisheries BMP. • Ensure all appropriate Fisheries BMP requirements, including mitigation are completed.
Decisions & Documentation	• If a Fisheries BMP can be used, an MTO Project Notification Form must be completed.

4.1 FISHERIES BEST MANAGEMENT PRACTICES

This section supports Step 3 of the MTO Fisheries Protocol. The Fisheries BMPs have been developed to streamline the regulatory review process for common, low-risk activities in or near a waterbody. The Fisheries BMPs outline the mitigation measures including timing windows and erosion and sediment control measures that must be in place to avoid causing the death of fish or HADD of fish habitat. It is important to note that activities still must comply with the federal *Species at Risk Act* and the provincial *Endangered Species Act*.

If the work/undertaking/activity type is listed in the Fisheries BMPs, review the requirements and determine the applicable operational constraints and protection measures that can be implemented.

The following Fisheries BMPs are currently available:

- Beaver Dam Removal
- Bridge Maintenance
- Clear Span Bridges
- Culvert Maintenance
- Like for Like Culvert Replacement
- Ditch Maintenance Within 30 m of a Waterbody
- Maintenance of Riparian Vegetation in ROW
- Temporary Watercourse Crossing

If the work/undertaking/activity can be carried out in accordance with the conditions listed in the relevant Fisheries BMP(s), it is considered to be in compliance with the *Fisheries Act*, and the MTO Fisheries Protocol, and may proceed without further review. Complete the MTO Project Notification Form including the rationale for using the Fisheries BMP and proceed to project implementation, Step 8. Depending on the scope of work and the complexity or significance of fish and fish habitat present, some Fisheries BMPs (e.g., Like-for-Like Culvert Replacement) may benefit from the support of additional fisheries expertise during. Such requirements would be outlined in the project Terms of Reference.

The completed MTO Project Notification Form must be submitted to and retained by:

- MTO Environmental Delivery, or,
- Operations (projects completed by maintenance Service Providers).

For works/undertakings/activities that do not have a Fisheries BMP, or that cannot fulfill the conditions listed within a Fisheries BMP, proceed with a fisheries assessment under Step 4 of the MTO Fisheries Protocol.

Although the Fisheries BMPs are meant to streamline the regulatory review process, they do not necessarily eliminate the requirement for carrying out fieldwork/data collection. In many cases, the data required for in-water work timing windows, general species composition and species at risk can be obtained through the background data collection at Step 2 of the MTO Fisheries Protocol, eliminating the need for a detailed field investigation. A verification site visit is usually warranted to confirm conditions exist to allow the Fisheries BMP to apply. This is to be determined by the MTO or MTO services providers. However, there are circumstances (e.g., like-for-like culvert replacement) when a more detailed field investigation (Step 4 Fisheries Assessment) may be necessary in order to determine the existing fish and fish habitat and applicable in-water work timing windows (e.g., if there is no background data available) prior to determining the applicability of a Fisheries BMP (Step 3) and also to help inform the appropriate design for the resident or migratory fish community.

DFO Standards and Codes of Practice

DFO has developed a series of Standards and Codes of Practice that can be applied to a project to comply with the fish and fish habitat protection provisions of the *Fisheries Act*.

Standards and Codes of Practice can relate to works, undertakings and activities during various phases of their life cycle, such as construction, operation, maintenance, or decommissioning.

MTO's Fisheries BMPs were developed prior to DFO's Standards and Codes of Practice. The conditions under which an MTO Fisheries BMP can be applied, as well as the fisheries protection measures contained within the BMPs meet or exceed those outlined in DFO's Standards and Codes of Practice.

When an MTO Fisheries BMP is applicable to the nature and scope of the MTO works, it should be followed under the MTO Fisheries Protocol. If an MTO Fisheries BMP does not exist, the relevant DFO Code of Practice should be used instead. Except for the DFO End-of-Pipe Fish Screen Code of Practice which is applicable to all MTO projects in fish-bearing watercourses, any use of a DFO Code of Practice must be documented on the MTO Project Notification Form, just as an MTO Fisheries BMP would be.

More information and the list of Standards and Codes of Practice can be found on DFO's website: https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html

DOCUMENTATION: MTO FISHERIES BEST MANAGEMENT PRACTICES

For projects that use a Fisheries BMP:

- ✓ Complete an MTO Project Notification Form
- ✓ A Fish and Fish Habitat Impact Assessment Report or Fisheries Memo may be required – check the project Terms of Reference.

5 FISHERIES ASSESSMENT PROCESS (STEP 4)

Overview of Step 4: Fisheries Assessment Process

Purpose	• Undertake field investigations. • Identify project impacts & opportunities to avoid or reduce impacts. • Determine if death of fish or harmful alteration, disruption or destruction of fish habitat (HADD) of fish habitat is likely.
Tasks	• Determine the field investigation requirements and conduct all field work. • Assess the potential impacts & opportunities to avoid or mitigate via design and construction. • Pathways of Effects assessment.
Decisions & Documentation	• What mitigation measures will be implemented? • Is death of fish or harmful alteration, disruption or destruciton of fish habitat (HADD) of fish habitat likely? • Fish and Fish Habitat Impact Documentation.

This section supports Step 4 of the MTO Fisheries Protocol – Fisheries Assessment Process. The section is divided into two parts:

1. Field Investigations
2. Impact Assessment

Field Investigations	Impact Assessment
The first part of this chapter focuses on filling any data gaps via field data collection. The purpose of sections 5.1 to 5.6 is to: • Define the area investigation, • Outline the field data collection needs, • Support the development of the fish habitat investigation requirements (i.e., type of information to be collected & where), • Support the development of a sampling plan, if needed (i.e., method, location, time of year), and, • Provide guidance on photographing and documenting field data.	The second part of this chapter focuses on undertaking the impact assessment to determine if the death of fish or HADD of fish habitat is likely to occur. The purpose of sections 5.7 to 5.11 is to: • Provide considerations on how avoidance and mitigation can reduce or eliminate impacts to fish and/or fish habitat, • Use DFO's Pathways of Effects (PoE) to determine residual effects, • Determine if the death of fish or HADD of fish habitat is likely, and, • Provide direction on Fish and Fish Habitat Impact Documentation.

FIELD INVESTIGATIONS

5.1 AREA OF INVESTIGATION

The area of investigation is the area defined for the collection of fish and fish habitat field information specific to the project. Data collection within the area of investigation involves habitat assessment and/or fish sampling.

The limits of the area of investigation will vary depending on the nature of the project, the potential effects that are anticipated, and how well these effects are understood. The area of investigation must be large enough to capture the relevant habitat and fish population features to adequately assess the effects of the project.

Area of Investigation

This is the area most likely to be impacted by the direct and indirect impacts of the project.

If field data collection is required for a project, the area of investigation is subdivided into zones (general & detailed) to support a tiered approach to field collection.

The area should be sufficient to:

- Identify, describe, and quantify, the type and amount of habitat that may be impacted as the result of the project.
- Identify appropriate mitigation measures including design-related opportunities.
- Support the assessment of the death of fish or HADD of fish habitat:
  - Define specific fish species, in the project area and areas of connectivity for migrating access;
  - Define spawning, rearing, feeding, migrating corridors and overwintering habitat of species residing within project area; and
  - Provide lengths, connectivity and/or migratory corridors to other watercourses within the vicinity of project area.
- Address the degree of uncertainty regarding the project and associated activities, and the potential extent of their impacts.
- Provide an adequate understanding of features in adjacent areas in order to:
  - Assess general representation of habitat features and identify potential limiting habitat features;

- Confirm habitat and potential fish community characteristics that appear to change significantly beyond the site-specific area or where distinctly different habitat features (e.g., refuge pools, riffles) are located in adjacent areas;
- Identify more natural reaches or areas where the crossing reach is highly disturbed;
- Explain a source of disturbance (e.g., sediment, water discolouration), and
- Identify nearby road crossings or other anthropogenic features that may exert an influence on the project area.

5.1.1 DIVIDING THE AREA OF INVESTIGATION INTO ZONES

The area of investigation is divided into two zones – the zone of detailed assessment and the zone of general assessment. The intent of the 'two zones approach' is to focus intensive field investigations to an area of reasonable size while ensuring the direct/footprint effects can be fully assessed. Figure 5-1 demonstrates the two zones and their minimum area requirements within the area of investigation.

5.1.1.1 Zone of Detailed Assessment

- Located in closest proximity to the proposed activity.
- More intensive field investigations.

5.1.1.2 Zone of General Assessment

- Provides the context within the broader reach and facilitates the understanding of potential indirect impacts.
- Less intensive field investigations.

5.1.2 MINIMUM REQUIREMENT FOR AREA OF INVESTIGATION AND ZONES

Table 5-1 below summarizes the details for setting the zones. Note that these are minimum requirements, and the zones may need to be increased based on site and project details.

Table 5-1. Minimum Zone Requirements

	Area of Investigation	Zone of Detailed Assessment	Zone of General Assessment
General Description	Captures the area most likely to be directly and indirectly affected by the project.	The area most likely to be directly affected by the project.	The area that could be indirectly affected by the project.
Watercourses	ROW plus: Upstream: 50 m Downstream: 200 m	ROW plus: Upstream: 20 m Downstream: 50 m	From limits of zone of detailed assessment: Upstream: 30 m Downstream: 150 m
Lakes & Ponds	ROW plus: 50 m	ROW plus: 20 m (beyond the ROW)	From limit of zone of detailed assessment: 30 m
*A fisheries assessment specialist may recommend expanding the various zones based on an individual project. Where access is not possible beyond the right-of-way (ROW), document all attempts made to access areas beyond the ROW and contact MTO Environmental Delivery to decide the best course of action.			

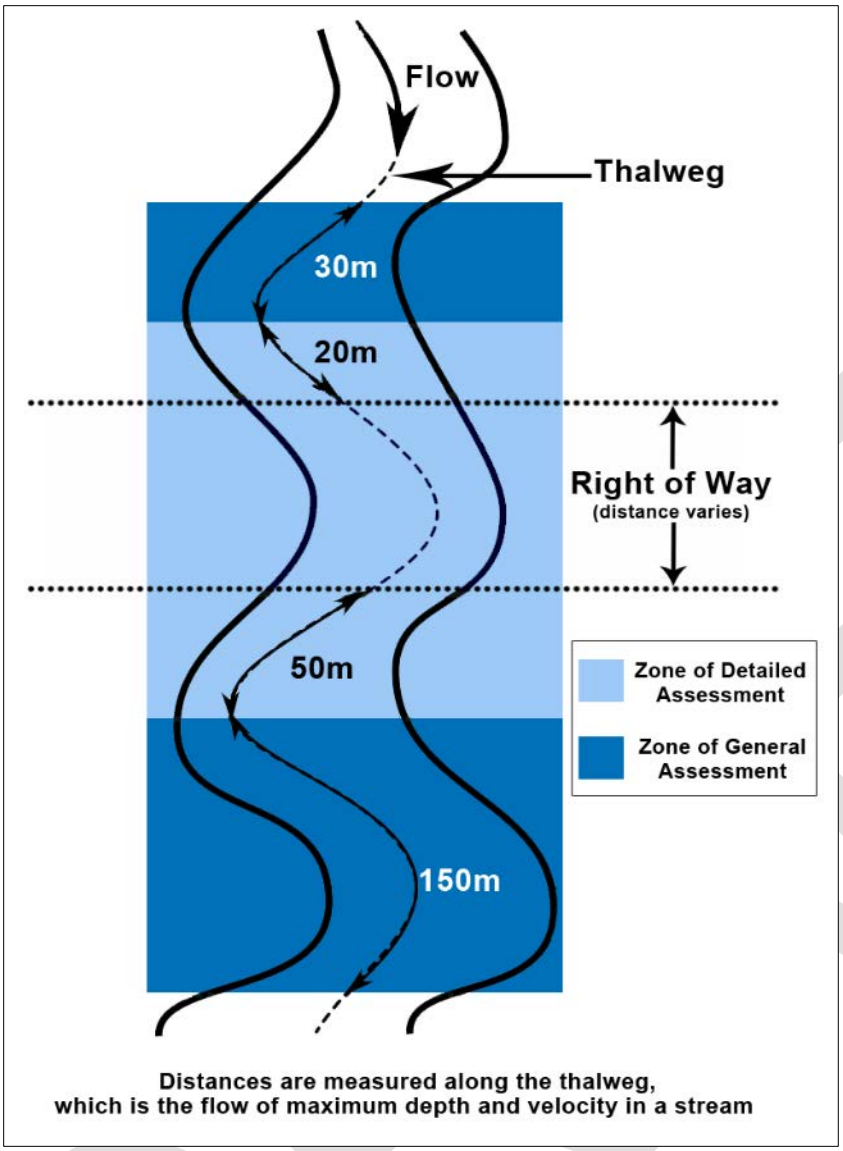

Figure 5-1. Minimum Zone Sizes of Detailed and General Assessments for a Watercourse Crossing

5.1.3 EXPANDED AREA OF INVESTIGATION

The fisheries assessment specialist may recommend to MTO Environmental Delivery that the area of investigation be expanded upstream, downstream, or into adjacent areas of a waterbody. During the investigation of background and supplemental information (Section 3.3-3.4) key areas may have been flagged during this review. Therefore, additional investigation to review these targeted areas may be required.

For example, if an existing culvert is perched or designing for fish passage may present issues, then having information on upstream and downstream permanent fish passage barriers may help put the goals of the design into context. This can also aid during the impact assessment stage. Typically, this type of investigation is not as detailed as within

the project area, and often photos and a thorough description are all that is needed. If additional detailed sampling is warranted and is outside the original terms of reference for the project, this should be discussed with MTO as soon as possible and rationale documented.

Reasons for expanding the area of investigation could be based on:

- Specific features of the project area, such as:
  - The presence of natural and artificial in-stream barriers to fish migration that may help put the highway crossing design into context with regards to whether fish passage is required.
  - Consideration of the possible benefits of in-stream barriers (e.g., controlling passage of invasive species).
  - The presence of habitat areas that might be particularly sensitive to impacts from sedimentation, erosion or storm water transport originating from activities within the study area.
  - The presence of other upstream and downstream projects/activities, which may affect the fish and fish habitat in the study area or have the potential to act cumulatively with the proposed highway development.
  - The presence of species at risk.
- The project area is insufficient or there is insufficient background data to complete the assessment.
- The need for offsetting is anticipated, and an understanding of the habitat in more natural reaches may be helpful to design appropriate offsetting measures.

5.2 FIELD DATA COLLECTION

If the background data review indicates information gaps, field data collection may be required. The needs of the assessment shall be confirmed by the fisheries assessment specialist and may include site visit(s), fish sampling, and/or habitat assessment. A rationale for the level of field investigations that were undertaken shall be included in any associated documentation. The field data collection should be sufficient to accurately assess whether fish and fish habitat may be impacted by the project and to:

- Confirm whether site habitat characteristics identified in existing MTO reports are unchanged (site reconnaissance);
- Confirm fish and fish habitat where existing information is insufficient for determining appropriate design requirements or assessing work/undertaking/activity impacts; and/or,
- Obtain fisheries information where no, limited or outdated background fisheries information is available.

Updating MNR Data

MNR reviews existing data to determine timing windows; however, in some cases data may be not available or outdated. If a field investigation is undertaken by MTO or MTO Service Providers due to limited or no background fisheries information, the data shall be provided to MNR in order to confirm the appropriate thermal regime/in-water work timing window(s) are applied to the project.

Additionally, if the data obtained during field investigations suggests changes to the fish community assemblage, thermal regime and/or timing window previously provided by MNR, and if there is no Fisheries Management Plan for the area, MTO or the MTO Service Provider shall contact MNR to discuss revising the thermal regime and proposed in-water work timing window(s).

5.2.1 TIMING CONSIDERATIONS FOR FIELD INVESTIGATIONS

Field investigations to assess the existing fish and fish habitat should be conducted during the appropriate time(s) of year to ensure that physical (e.g., flow regime, temperature) and biotic habitat (e.g., aquatic vegetation) and fish species of interest (e.g., seasonal, species at risk, migratory) can be properly observed and documented.

General fish community sampling is usually completed at the same time as the habitat assessment, where fish data does not already exist in the background data.

As discussed in the background data collection section, the project team (e.g., fisheries assessment specialist) must consult with MNR as appropriate. Consultation with local agency staff will also be helpful in identifying the local timing of migratory runs, aquatic SAR and their critical life functions. These will vary yearly and geographically. Also note that areas identified as migratory corridors may be broadly based and capture small tributaries that do not contain migratory species. In these instances, field data collection may confirm presence/absence of these species.

Table 5-2 outlines general sampling requirements for MTO projects. Field investigations are typically undertaken twice per year; however, single season sampling may be adequate on a project-specific basis and is dependent on the scope of work and available data. Four (4) season or winter sampling is rarely required. As discussed in the sampling section, the fisheries assessment specialist's plan must be comprehensive, defensible, and documented.

Table 5-2. Sampling Rationale by Season

Time of Year	Considerations
Spring **(April – June)**	Sampling for ephemeral watercourses and seasonal waterbodies to confirm direct use by fish. • Small seasonally flowing watercourses and seasonally flooded areas cannot be assessed properly during the summer when they are dry. Ephemeral streams may be used for short periods in the spring by fish from connected permanent waterbody/refuge habitats. Confirming connectivity with the main waterbody is therefore also important. • Confirm extent of specialized habitats and seasonal use for spring spawning, by species such as walleye, northern pike, rainbow trout, and various sucker species. Habitat that becomes available only during periods of seasonal flow may provide a specialized habitat function for several species. For example: – Northern Pike spawn on vegetated habitats that are flooded in the spring, often for only short periods of time. Newly emerged Brook Trout tend to use seasonally flooded margins, and other early spawning species such as Walleye, may spawn in habitat that supports little or no flow during the summer. – Migratory uses may be upstream or downstream, and encompass various life stages (e.g., spawning, larval, juvenile fish) or general movement induced by seasonal changes and related changes in habitat conditions (e.g., flow, temperature) or food sources.
Summer **(July-August)**	In permanent waterbodies, the standard sampling timing is July/August (summer) as visibility and access are typically ideal and biotic features of the habitat are present. Additional factors that support summer field investigations include: • Increased chances of recording presence of migratory salmonids, young-of-the-year (fish hatched that year) and evidence of nesting (e.g., nests of sunfish and some baitfish) will still be found in the vicinity, indicating the presence of nursery and rearing habitat and confirming or otherwise providing an indirect indication of spawning activity in the vicinity. • Provides optimal visibility under generally lower flow events to conduct fish habitat sampling and allow for access to the waterbody. • Ensures presence of aquatic vegetation and assessment of use as cover.

Time of Year	Considerations
	• Enables assessment of spawning of species such as sunfishes and many bait/forage species. • Enables assessment of flow permanence. • Enables assessment of thermal regime. • Enables identification and assessment of use of summer refuge areas. • Refuge habitats: Surveys during low flow periods (e.g., late summer/fall, sometimes winter) may be needed to assess presence, quality, connectivity and fish use of refuge habitats in cold or warm water waterbodies (or portions thereof) that have little to no base flows or depths seasonally.
Fall (September-October)	Confirm use of specialized habitats by fall spawning fish such as brook and brown trout and Atlantic, Chinook and Coho salmon, as appropriate.
Winter (November – March)	• Identify and assess use of winter refuge areas if these are limiting in the watercourse, as appropriate. • Assess presence of migration of winter spawners such as burbot. • In some areas this assessment may allow for habitat assessment during low flow or better visibility if ice cover is not a concern.
Where Fisheries data unknown	In cases where fisheries data is unknown, it is the responsibility of the fisheries assessment specialist to develop an appropriate sampling plan to determine species presence and habitat use within the project area. See Section 5.4.

5.3 FIELD INVESTIGATION: FISH HABITAT

Clear documentation of the characteristics of the fish habitat is required to ensure that the potential impacts of a project can be comprehensively identified and addressed used early in the process to guide design decisions. This information is ultimately required to ensure a defensible determination as to the likelihood of the project causing the death of fish or HADD of fish habitat.

A detailed description of the habitat attributes and functions is necessary to assess habitat characteristics and their potential use from the fish community within the watercourse.

To support a fisheries assessment, the fisheries assessment specialist should ensure the field investigation/habitat sampling plan:

- Identifies and documents the reach/areas, including:
  - Length and size of each reach/area, and
  - Links information collected to the reach/area so that characteristics of that reach/area are clear.
- Divide(s) the habitat as necessary into homogenous reaches in a watercourse and homogenous habitat areas in a pond or lake to support a fisheries assessment, for example:
  - Habitat conditions characterized by pool-riffle sequences are different than habitat conditions with continuous flats or runs;
  - Habitat conditions will change between the littoral zone and deeper water area of a pond or lake;
  - Features such as a natural or man-made barrier, a sharp change in gradient, sinuosity, soil conditions, bank/shore conditions, depth, on-line ponds or disturbances may result in changes to habitat conditions; and
  - Other opportunities to divide the habitat are listed in Table 5-3.
- Considers potential differences in the field investigation needs within the zone of detailed assessment vs the zone of general assessment.
- Considers seasonal changes in habitat and/or uses of the habitat. This may require multiple field visits, depending on the specific site considerations.
- Confirm the primary function of the habitat within the area of investigation (i.e., nursery, spawning, migration, feeding etc.) and link back to the potential target species using this area.
- Identifies constraints and opportunities within the study area, such as fish passage barriers, areas of erosion or deposition and potential habitat enhancement areas.
- Considers the impacts of the preliminary design options (culvert extension, liners, etc.), if known.

Table 5-3. Zone of Detailed Assessment Features

	Subdividing the Zone of Detailed Assessment
Typical Morphological Units	• Riffles • Pools • Runs • Flats
Existing Highways	• Upstream of an existing culvert • Through the culvert (general characterization, substrate classification) • Downstream of the culvert
Lakes and Ponds	• Littoral and offshore areas • Degree of shoreline exposure to wind and currents (sheltered or exposed), and sunlight • Shoreline irregularities (e.g., small embayment, bays, wetlands) • Gradient of shoreline drop-off (e.g., steeply sloping versus gradual slope) • Substrate type

5.3.1 HABITAT DATA COLLECTION WITHIN ZONES

The type of data collected within the zone of detailed assessment and zone of general assessment are similar but vary in the intensity of the investigation. The field investigation plan should be specific to the site, type and complexity of the project, and be designed to support the assessment of project impacts. The data collected within both zones should be sufficient to:

- Document the existing conditions within each zone.
- Document habitat type and characterize functions (e.g., cover, nursery, spawning).
- Describe the features and attributes of the habitat (e.g., morphology, substrates).
- Link fish observations to specific habitat features, such as the use of pools or cover, or the use of habitat types by specific species and age classes to assist in assessing impacts.
- Provide context for the detailed data collection and assessment of direct impacts in the zone of detailed assessment.
- Facilitate assessment of indirect impacts that may be transferred into adjacent areas.

- Identify potential offsetting opportunities if required.
- Assess fluvial geomorphology issues, if required.

In some cases, it may be necessary to collect information outside the area of investigation. This may be based on information obtained in the background data, fish sampling, or other field observations. Ensure to discuss any additional field investigation needs with MTO Environmental Delivery.

For all aspects of the field investigation, field notes and photographs of key features and representative reaches should be taken and referenced on the general map of the area. Ensure documentation requirements outlined in Appendix C are followed.

DOCUMENTATION: HABITAT DATA COLLECTION

Use the following forms to document habitat data collection:

- ✓ Watercourse Field Collection Record
- ✓ Ponds/Lakes Field Collection Record
- ✓ Photographic Record
- ✓ Habitat Mapping
- ✓ Existing Fish Habitat Conditions Summary Table

5.4 FISH COMMUNITY SAMPLING

As previously discussed, it is the responsibility of the fisheries assessment specialist to develop an appropriate sampling plan that will outline the purpose of the fish sampling and its objectives. The sampling plan should provide sufficient information in order to assess the impact(s) of the project. This includes filling in data gaps, where fish community data is incomplete, dated, or non-existent for the project. Where the project requires fisheries related documentation, this sampling plan will be included in the documentation. The sampling plan will provide the rationale and details behind many of the decisions and will include the following points:

- Purpose
- Objectives (see additional guidance below)
- Sampling method(s)
- Sampling Locations
- Timing to target the anticipated fish community during the appropriate time of year
- Fish handling procedures
- Obtain an MNR Licence to Collect Fish for Scientific Purposes as required.

The objectives of the fish sampling will focus on the collection of fish community data to better describe potential sensitivities and inform design parameters that will assist the project team. The fisheries assessment specialist will need to consider each individual project and be confident that the objective is relative to the anticipated project's impacts. For example, the extent of the sampling may differ if the project is likely to include significant realignment and infilling. To better understand these potential impacts, it is important the fisheries assessment specialist communicates with the project team to clearly identify the scope of the project before sampling commences. In order to meet these objectives, the following goals and considerations should be evaluated when determining the objective which include:

- Target potential sensitivities that need to be considered during design:
  - Species composition (species identification completed in the field or lab).
  - Presence and absence of fish and fish habitat in a waterbody.
  - Size distribution, as an indicator of their age, and/or
  - Health or markings – evidence of fungus, parasites or lesions can indicate disease or stress, while clipped fins indicate stocked fish.
- Visibility within the waterbody
- Aquatic and riparian vegetation
- Flow permanence
- Thermal regime/temperature
- Refuge habitats
- Potential for seasonal migratory fish
- Consider the unique characteristics of the individual site, including the need to sample all types of habitat that exists within the study area. Fish community sample sites must correspond to sites where the habitat characteristics have been assessed. Depending on the project complexity or initial field investigation results, this may include:
  - Specialized uses of an area (e.g., spawning, nursery, rearing, feeding, and migration).
  - Life history requirements for key fish species that may be impacted by the proposed activity.
  - Identify dependencies/requirements and/or sensitivity (e.g., species at risk and other rare species, coldwater species and groundwater dependent species); and/or,
  - Identify rare species or species with specific habitat requirements.

- Consider timing of sampling to capture migration, spawning, seasonal habitat changes (e.g., seasonal or ephemeral watercourses) and other life history requirements.
- Follow the guidance for conducting surveys for fish and mussel SAR in the DFO-Ontario Great Lakes Area (OGLA) documents, found in Section 12 Supporting Documents and References, as appropriate.
- Consider potential differences in the sampling needs within the zone of detailed assessment vs the zone of general assessment. For example, sampling may be more intensive in the zone of detailed assessment.
- Ensure appropriate licence(s) are obtained and all conditions within the licence are met, and/or
- Ensure all appropriate documentation including photographs are completed as required.

Based on the initial field visits and preliminary sampling results, it may be necessary to revise the plan to support the fisheries assessment and confirm seasonal activities. If changes to the sampling plan are required, discuss with MTO as soon as possible.

Where Are All the Fish?

Absence of fish upstream of a watercourse crossing does not necessarily mean that the upstream area is not fish habitat. When determining the presence of fish habitat where a downstream barrier (e.g. perched culvert outlet) exists, it is important for the fisheries assessment specialist to distinguish between whether suitable habitat exists that fish could use if the barrier was removed, versus a lack of suitable habitat available to support fish which would make barrier removal irrelevant.

The fisheries assessment specialist shall carefully consider fish presence/absence in conjunction with the habitat characteristics present upstream of watercourse crossings in order to determine whether removal of a downstream barrier is warranted and shall detail this information and rationale in the appropriate documentation.

5.4.1 SAMPLING METHODS, EQUIPMENT AND FISH HANDLING

Fish community inventories encompass direct documentation of fish, most often through direct capture, identification and release. Other tools, including visual observation techniques, are also useful to provide general characterization information. They can be used to confirm presence and absence, direct fish use of seasonal habitats, or to identify key information such as spawning activity.

Fish community sampling should follow a tiered approach based on the effort required within each zone of assessment, as well as the project complexity. While effort and intensity for simple projects may only require the use of one or two sampling methods to

effectively characterize the fish community, more complex projects may involve a variety of gear and methods to properly sample a wider range of habitat types. This may lead to the use of passive and active gear types to capture fish use in the project area.

Table 5-4 outlines more specific details with regards to the commonly used sampling methods on MTO projects; however, alternative approaches can be proposed by the fisheries assessment specialist. As each site is different the fisheries assessment specialist is responsible for:

- Being adequately prepared to conduct fish sampling.
- Documenting the decisions behind gear types, effort and intensity.
- Being prepared in advance to have the appropriate gear in order to sample a variety of conditions that may exist along the entire corridor (i.e., multiple habitat types). This can be achieved by looking at imagery, maps, background data, MTO inspection reports, photos, weather forecasts, flow gauges and/or other reports.
- Considering the limitations of each option and choose the most appropriate method(s) based on the objective of the study and anticipated site conditions. This detailed rationale on the decisions made by the fisheries assessment specialist will be included within the Fish and Fish Habitat Existing Conditions Report (Section 10.2).

As each site is different, the fisheries assessment specialist is responsible for being adequately prepared to conduct fish sampling and for documenting the decisions behind gear types, effort and intensity. If a fisheries assessment specialist is unprepared or unable to conduct proper fish sampling effectively this may warrant additional sampling effort and/or discussion with MTO Environmental Delivery. The fisheries assessment specialist should be prepared in advance and have the appropriate gear in order to sample a variety of conditions that may exist along the entire corridor (i.e., multiple habitat types). This can be achieved by reviewing aerial imagery, maps, background data, MTO inspection reports, photos, weather forecasts, flow gauges and/or other reports. The fisheries assessment specialist should consider the limitations of each option and choose the most appropriate method(s) based on the anticipated site conditions and objective of the sampling plan. This detailed rationale on the decisions made by the fisheries assessment specialist will be included within the Fish and Fish Habitat Existing Conditions Report (Section 10.2).

It is important that sampling method(s) are properly chosen and sampling itself be conducted with minimal impacts to the fish population. This includes proper selection of gear, adequate containment, minimizing the length of time fish are required to be out of the watercourse, temperature, shade, oxygen requirements, and that they are periodically monitored for stress. Fish should be gently released back into the watercourse as soon as possible. Ensure all conditions in the MNR Licence to Collect Fish for Scientific Purposes are followed (see Section 5.4.3 for details).

The following table outlines select methods which are generally used for purposes of fish assessment during typical MTO fisheries assessments. However, there are additional methods which may be applicable but should be discussed with MNR and MTO first (e.g., gill nets). While in-stream visual observations confirming fish are present, it is important to note these are not a primary assessment method.

Table 5-4. Overview of Select Fish Sampling Methods

Sampling Method	Use	Limitations
Primary		
Electrofishing **Screening method** (2-5 sec/m^2 for 20-30 min)	Emphasis on coverage of all habitat types. This is a standard and lower intensity approach to more quickly determine presence/absence in wadeable streams. This method may be applicable for projects with very limited or minor in-water work.	• Low conductivity • Water depth • High flow/safety considerations
Electrofishing **Single pass method** (7-15 sec/m^2 for 45 min to 2h)	This is a standard approach except where species at risk are possible or suspected. In these cases, additional effort may be required. The emphasis of this approach is more intensive in order to attempt to capture all observed fish species and 60-70% of entire population. This is applicable for projects with substantial in-water work or impacts are anticipated.	• Low conductivity • Water depth • High flow/safety considerations
Seine Netting	Standard approach for assessing deeper slow-moving watercourses including littoral and riverine conditions. While wading may be appropriate for shallower waterbodies a canoe or boat may be necessary in deeper areas. Useful where electrofishing is ineffective.	Difficult to use in areas with: • Woody debris • Coarse substrate (boulders) • High water velocity
Fyke/Trap Netting	An effective approach to capture fish species utilizing the project area over a longer period of time. Typically, overnight sets are combined with other active sampling techniques (i.e. electrofishing). This method is applicable for projects such as structural replacements or more substantial in-water work.	• Water depth • Velocity • Debris

Sampling Method	Use	Limitations
Secondary		
Minnow Traps	This is a standard and lower intensity approach to determine presence/absence of fish. This method may be applicable for projects with very limited or minor in-water work. Typically, this is used in conjunction with other sampling methods in order to capture cyprinids and juvenile fish species in the project area.	• Velocity • Only samples smaller fish • Doesn't provide target species information
Dip Nets	This is a standard and lower intensity approach to determine presence/absence of fish in shallower areas. This method may be applicable for projects with very limited or minor in-water work. Typically, this is used in conjunction with other sampling methods in order to capture juvenile fish species in the project area.	• Water depth • Not very efficient • Stream width • Limited sized range of fish
Angling	This approach is applicable for deeper watercourses where the identification of larger game fish is important to highlight for design and impact assessment purposes. Typically, this is used in conjunction with other methods but is useful for watercourses that may be inaccessible for other gear types due to conditions in the field.	• Targets typically game fish and larger bodied species without sampling a wide range of the fish community.

5.4.2 SAMPLE LOCATIONS

Sampling locations should be chosen to support the objectives of the sampling plan described in Section 5.4 and should consider the unique properties of the waterbody(ies) and habitat types being assessed, as outlined below. Fish habitat investigations should occur at all locations where fish sampling has been completed. Sampling locations should be identified on the photographic record, as discussed in Section 5.5.

5.4.2.1 LAKES

Sampling is usually focused on the fish communities associated with the littoral zone as opposed to those offshore, for the following reasons:

- Except for offshore piers, the greatest impacts are usually associated with infilling, or construction impacts along edge zones for abutments and approaches.
- The littoral zone habitats also tend to be the most productive and diverse, and usually exhibit the greatest potential to support specialized habitat functions and the most concentrated use by fish.
- Particularly in large lakes, the deeper offshore habitats will generally be more common and exhibit less diversity and associated density of fish use, although some species (e.g., walleye, pike) may use nearshore areas for short periods seasonally to spawn and the young disperse offshore early in the season.

5.4.2.2 WATERCOURSES

Similar sampling considerations to those outlined for lakes above are relevant for sampling large, deep watercourses. In shallower watercourses, assessment of representative habitat types will also be required. Offshore features that may support specific fish use include bars and islands, debris jams and deep pools.

High flow velocities and suspended sediment, particularly seasonally, may make sampling access and visibility difficult. Fisheries assessment specialists should carefully plan the timing and sample requirements prior to field work. Fisheries assessment specialist must plan on additional visits if site conditions are not suitable on the day of assessment.

5.4.2.3 WETLANDS

Access, variation in depth, vegetative cover, and open water distribution will affect fish distribution in wetlands.

Seasonal sampling considerations are also particularly important for seasonal wetlands that are only flooded and used by fish under higher water levels. This is particularly important for spring spawning species such as northern pike. Depending on the time of assessment, a reasonable approach may be to link connectivity to known fish bearing waterbodies and potentially available habitat as a surrogate for fish assessment results. This may be necessary when sampling in a dense wetland environment that can be highly variable and/or difficult to access to undertake direct sampling.

DOCUMENTATION: FISH COMMUNITY

Use the following form to document details from the fish community inventories:

- ✓ Fish Community Inventory Form
- ✓ Photographic Record
- ✓ Existing Fish Community Table

5.4.3 MNR APPLICATION FOR LICENCE TO COLLECT FISH FOR SCIENTIFIC PURPOSES

Fish sampling is conducted under a provincial Licence to Collect Fish for Scientific Purposes, which must be obtained from the local MNR Office. Prior to applying for a Licence to Collect Fish for Scientific Purposes, the fisheries assessment specialist must complete the background data collection for the study area, as outlined in Step 2 of the MTO Fisheries Protocol. Additional fish community sampling may not be required in cases where there are approved Fisheries Management Plans (FMPs), existing datasets within the MNR fisheries information system, existing MTO reports, or a species at risk has been reported to be present. Consultation with the appropriate MNR Office to determine whether further fish community sampling may also be required.

If a licence to collect fish is necessary, MTO and MTO Service Providers must follow MNR's application guidelines. Conditions of the licence require that sampling be undertaken at the locations identified on the licence during the identified timeframe and by the individuals identified in the licence. It may also contain direction for dealing with aquatic invasive species. The licence permit also requires that a scientific collectors report (including data records) be submitted to MNR. Confirmation must be provided in the MTO fisheries documentation that this reporting requirement to MNR has been completed.

It is generally useful to request a sampling area broader than the area of investigation and a sampling duration longer than may be initially anticipated to provide enough flexibility in the event of project changes.

Licence to Collect Fish for Scientific Purposes

- A licence is required to undertake sampling.
- To ensure there are no project delays, consider the need for a licence as early as possible.
- Licences may specify specific timeframes, locations, and reporting requirements.
- Applications are available on MNR's website

5.5 PHOTOGRAPHIC RECORD

Photographs are an important part of the field record. They provide a visual representation of the existing fish and fish habitat in a project area, as well as provide context and support text descriptions within fisheries reports and tables. Photos can also be used to document existing conditions prior to a potential disturbance and help identify and describe the area directly affected by the work/undertaking/activity (e.g., infilled by a culvert or abutments). In addition to photographs, it may be beneficial to use video to document the overall site conditions.

5.5.1 PHOTO INFORMATION

The information to record on the appropriate field form includes:

- **Caption:** Waterbody name and crossing number (if applicable).
- **Direction**: This is the general direction of each photograph with respect to the site from which the photograph was taken. Short forms can be used such as: U/S (upstream), D/S (downstream).
- **Date:** The date on which the photo was taken.

5.5.2 PHOTOGRAPHING WATERCOURSES

Photographs can look similar and need to be carefully referenced on the field forms and habitat map.

Take upstream-oriented and downstream-oriented photographs at each site to show general stream characteristics including:

- Channel morphology (e.g., riffles, pools, runs);
- Cover/habitat complexity (e.g., large woody debris, undercut banks, boulders, etc.);
- Riparian vegetation;
- Aquatic vegetation;
- Side channels or other inputs/outputs;
- Obstructions to fish passage;
- Major disturbances;
- Scouring of channel bed and/or banks;
- Culvert/watercrossing (e.g., piers, abutments);
- Ditch lines;
- Significant habitat features;
- Specific habitat features that may be impacted by the project activities;
- Areas of potential offsetting; and/or,
- Any other unusual or important features that should be flagged to the design team.

Photographs of important site features that need to be considered in the design (e.g., scouring, perched culverts, low-flow issues) should be shared with the project team to provide them with an accurate depiction of the fisheries concerns in order to ensure that they are successfully addressed by the design, where feasible.

Furthermore, photographs will assist with select habitat mapping options, documentation, and potential discussions with regulatory agencies. Therefore, it is important to ensure these are of good quality and well-labelled to ensure the study area is well documented.

As a minimum, take photographs of watercourses from each of the vantage points shown below in Figure 5-2.

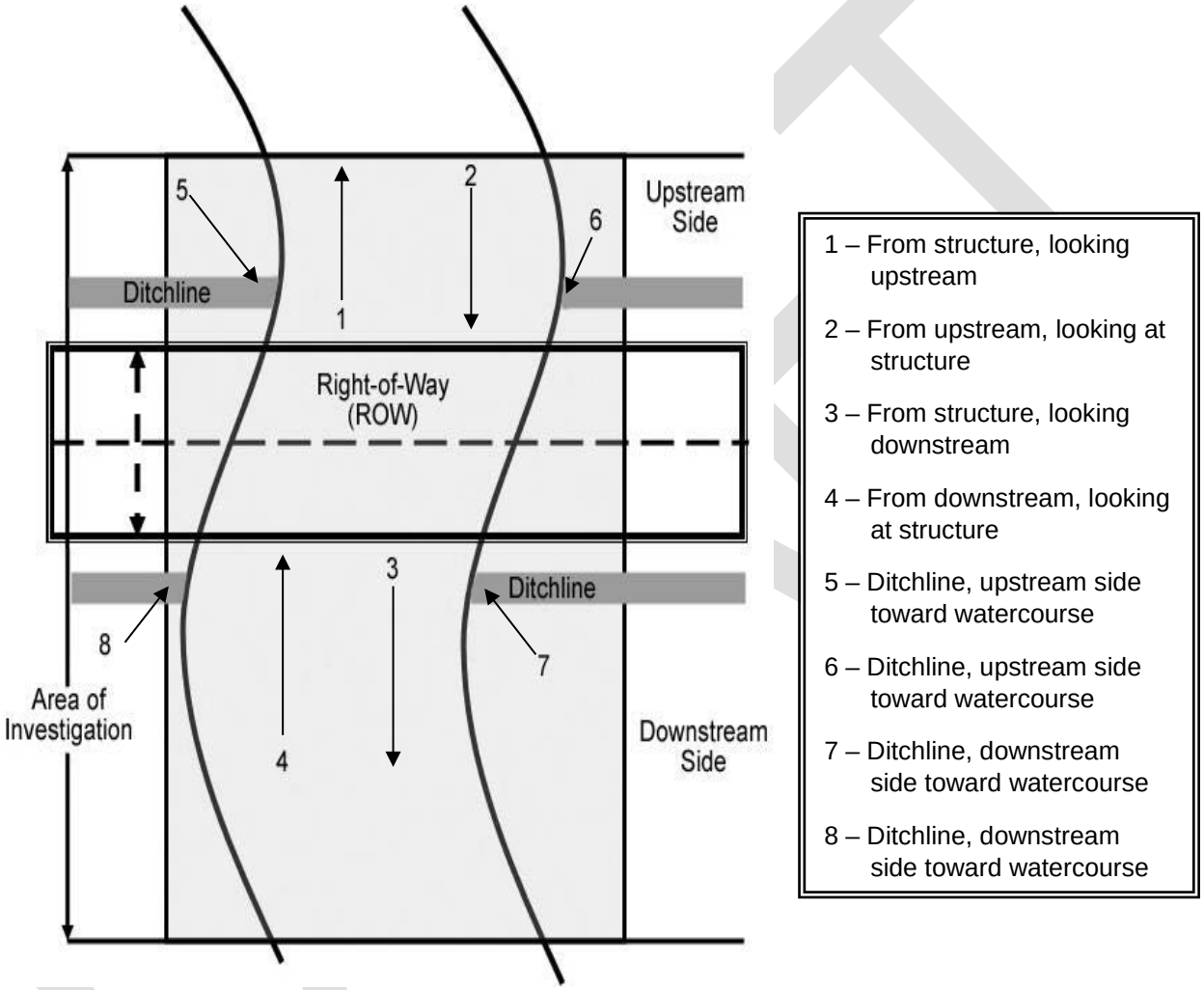

Figure 5-2. Photographic Vantage Points

5.5.3 PHOTOGRAPHING LAKES AND PONDS

Take the following photographs during lake inventories:

- Panoramic view of surrounding area;
- Shoreline and riparian conditions;
- Inlet and outlet streams;

- Aquatic plant communities;
- Specialized habitat features;
- Specific habitat features that may be impacted by the project activities;
- Areas of potential offsetting; and,
- Any other unusual or important features that should be flagged to the design team.

5.5.4 PHOTOGRAPHING FISH

Record fish photographs on the Fish Community Inventory Record Form.

Photographs are required of:

- Representative samples of species captured;
- Diseased fish;
- Aquatic species at risk;
- Aquatic invasive specie; and,
- Spawning activity (if occurring at time of assessment).

5.6 HABITAT MAPPING

Habitat mapping compliments the photographic record by providing greater detail about the location, size and complexity of specific habitat features. These include barriers, inputs such as side channels and discharge areas, vegetative cover (aquatic and riparian), fish sampling locations, areas of concern etc. while also providing an overall representative view of the project area.

Detailed habitat mapping is required for the entire zone of detailed assessment. This information is meant to be used throughout the design process to facilitate the determination of impacts and, where necessary, for consideration of potential offsetting requirements. For the zone of general assessment, mapping is usually done in less detail to provide a broader picture and help provide context to features identified in the zone of detailed assessment. For example, this may flag sensitive areas immediately downstream which need to be protected from construction impacts or even highlight permanent barriers which help put watercrossing design requirements into perspective.

Typically mapping can be undertaken using two main approaches:

- Aerial imagery which is overlaid with photos and a description of key factors, or
- Hand-drawn habitat mapping.

There may also be circumstances which dictate a combination of both depending on the availability of imagery and site conditions as well as the complexity of the project and level of detail needed for design that may not be possible with imagery alone.

Regardless of the selected mapping method, the following should be identified on the habitat map:

- Key habitat features (e.g., riffles, pools, woody debris);
- Conditions of the banks, particularly undercut banks, overhanging grasses or shrubs, eroding areas, and heavily stabilized/reinforced areas;
- Barriers to fish passage;
- Locations of fish observations and/or sampling; and/or,
- Photo locations and directions for referencing the Photographic Record.

The MTO Service Provider is responsible for effectively documenting the habitat within the study area and clearly identifying key features for purposes of impact assessment, permitting, and design requirements. As each site is different, it is up to the MTO Service Provider to decide which approach best fits the project while still meeting this objective.

5.6.1 IMAGERY-BASED HABITAT MAPPING

Mapping onto imagery can be particularly useful when mapping a site that is inaccessible due to lack of permission to enter onto private property, or unsafe site conditions (e.g., steep or unstable slopes). It is also better suited to areas where tree cover or other obstructions are not present so that the watercourse is clearly shown. Depending on the complexity of the site, multiple maps may be required to highlight fish habitat, fish community, and other importation design considerations so that all photographs and description necessary can be clearly linked to these maps. It is important to focus on detailed description on the area being directly impacted by the project activities.

In cases where high-resolution aerial photography is not available, or where landscape features obscure the site, hand-drawn habitat mapping shall be provided.

Photos of key habitat features/design considerations should be overlaid or inset on the map with locations clearly identified on the image.

Include a summary of habitat details and general site information with the habitat map.

Suggestions for imagery-based habitat mapping:

- Include a north arrow on the page.

- Where numerous photos are required, a separate page of photos linked to the habitat mapping can be provided.
- In some cases, it may be beneficial to overlay the image with hand-drawings of significant habitat features that may not otherwise be clear on the image. For example, areas of aquatic vegetation, substrate transition areas, boulder clusters etc. could be drawn onto the image in order to delineate the feature(s) and convey the size and/or proportion of the waterbody bed or bank covered by that feature.

An example of an aerial imagery and photo mapping approach which highlights key photographs, habitat details and general site information is shown in Figure 5-3. It is important to note in this example that specific details immediately adjacent to the crossing area were not included. It is anticipated that another map on a smaller scale would describe this area that would be impacted by project activities. However, there are many other ways this could be documented which may depend on the site-specific features and/or concerns as well as personal preferences.

Habitat/Fisheries Info

- Low gradient watercourse through wide floodplain area.
- Primarily organic substrate with abundant aquatic vegetation.
- Gravel near outlet and inlet only present due to erosion from road bed.
- Potential northern pike spawning habitat is present upstream and downstream of crossing and throughout most of the watershed.
- Fish species captured include northern pike, white sucker, fathead minnow, northern redbelly dace, central mudminnow.
- Nursery habitat for northern pike is abundant within the project area.

Figure 5-3. Example of General Imagery-Based Habitat Mapping

5.6.2 HAND-DRAWN HABITAT MAPPING

Whether habitat mapping is a hand drawn map or aerial overlay, it is important to clearly and thoroughly document the area and to reference locations or features identified on the map(s) within any accompanying reports.

Sections of the watercourse are to be mapped individually. The map scale is expected to be approximately 1 cm = 3 m so that a 50 m section will fit on a letter–size page. At a minimum this would include:

- 1 map page for upstream of the right-of-way (ROW);
- 1 or more map pages for the ROW depending on the width, and
- 1 map page for downstream of the ROW.

For the zone of general assessment, mapping can be done at a smaller scale (such as 1 cm = 5 m) and usually in less detail.

Small cross-sectional sketches of representative morphological features (e.g., through pools, runs, etc.) should be added, showing the bed and bank profiles.

Where a defined valley configuration is present, a cross-sectional diagram should be included to show the entire river valley and floodplain. It may be necessary to estimate the dimensions of the flood plain and river valley for the cross-section diagram. If the vertical scale needs to be exaggerated to show features, then the scale must be recorded on the map.

Suggestions for hand-drawn habitat mapping:

- A compass ring is provided on the fish habitat mapping form and north should be marked on the page.
- The length of sections should be measured using a tape measure or hip chain where possible.
- Within the section, the stream banks or lake edge should be outlined on the form. Begin by marking prominent landmarks that are evenly spaced along the section; large trees on the bank or sand bars are good landmarks. Draw the outline of the wetted width around these landmarks. It is difficult to avoid distorting the map without using landmarks. It is easier to draw a narrow stream by distorting the outline, so the width is drawn at a much larger scale than the length. This is acceptable as long as measurements noted on the map and field form are accurate.
- Any side channels or discharges into the waterbody should be included. Using the symbols provided in the legend, hydrologic features should be placed in the diagram of the waterbody.

- Accurate positioning of each habitat feature on the map will allow distances or areas to be measured later (or approximate distances can be noted for quick reference).
- A note of the general substrate class and distribution should be made including locations of large boulders. If there is a clear change in substrate, the transition should be marked.
- In-stream vegetation and cover should be mapped with the appropriate symbols (see the legend provided on the form). The type, location and distribution of each cover type will allow calculation of distance or areas later.
- A cross-sectional diagram should be included with the entire river valley and floodplain illustrated. Dimensions of the wetted channel should be available from the Watercourse Field Record Form. It may be necessary to estimate the dimensions of the flood plain and river valley for the cross-section diagram.

An example of hand-drawn habitat map for a watercourse reach is shown in Figure 5-4. Fish habitat features including substrate types, in-stream and riparian vegetation are clearly identified and a cross-section sketch with channel dimensions, showing bank structure is provided.

Contact the relevant MTO Environmental Delivery if there are any questions or concerns regarding habitat mapping requirements.

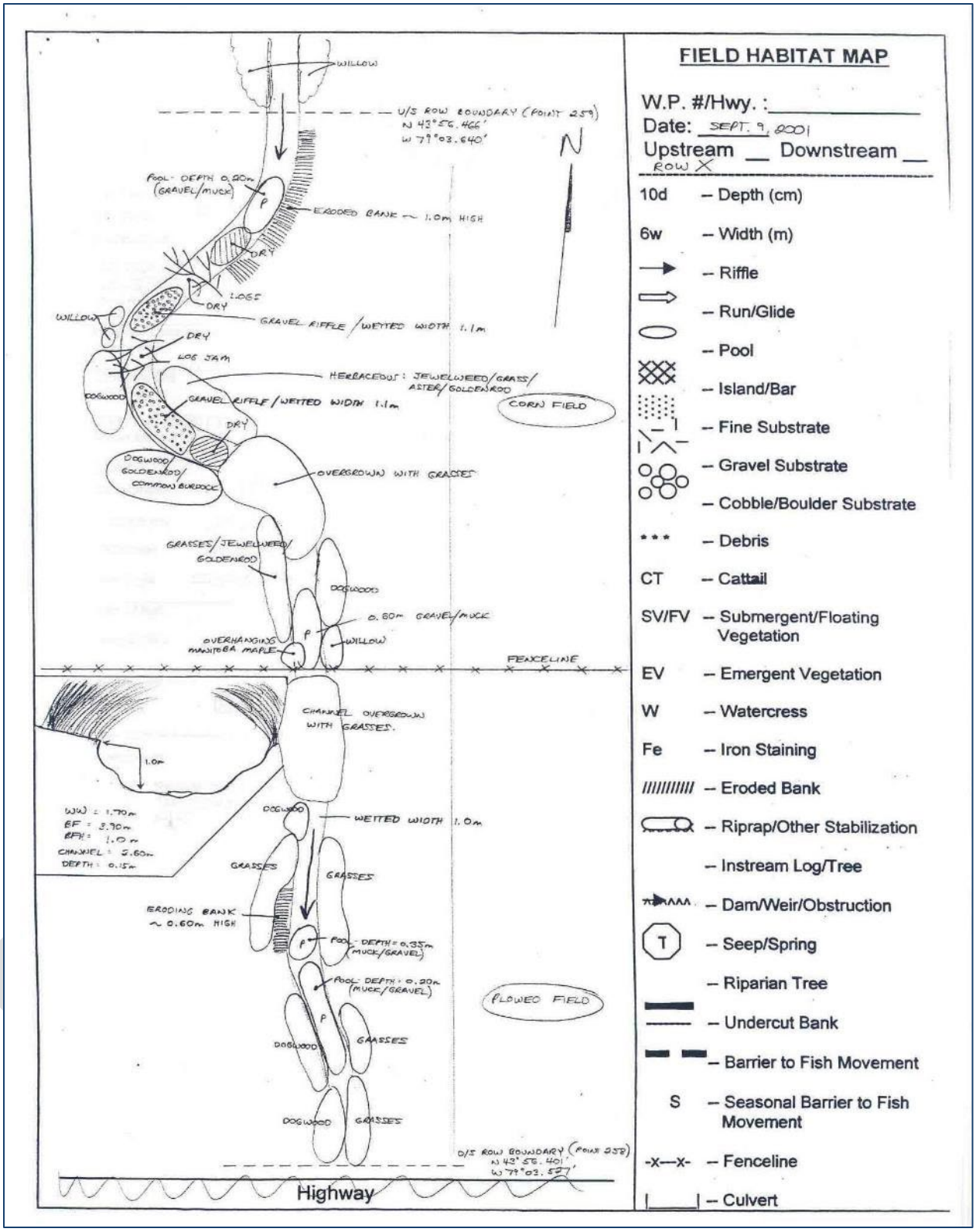

Figure 5-4. Example of Hand-drawn Habitat Mapping

IMPACT ASSESSMENT

Revisiting the Fisheries BMPs

Once all the necessary field investigations have been completed, the fisheries assessment specialist shall review any applicable Fisheries BMP(s) identified at Step 3 to determine whether the fish and fish habitat identified at the site meet the scope and operational conditions and constraints of the Fisheries BMP(s), prior to proceeding to an impact assessment.

5.7 AVOIDANCE, MITIGATION AND ASSESSING POTENTIAL IMPACTS

Background and field data, including other information gathered through site visits can provide important input into project planning, location, and design to eliminate or reduce the impact to fish and fish habitat. The remainder of this section outlines the process for assessing potential impacts by:

- Defining assessment terms (negative residual effect, avoidance, mitigation etc.);
- General principles of avoidance and mitigations;
- Using a multi-disciplinary team to consider avoidance & mitigation throughout the project lifecycle from planning and design;
- Using DFO's Pathways of Effects to determine residual effects; and,
- Fish and Fish Habitat Impact Documentation.

The outcome of the process is to ensure all reasonable efforts to reduce or eliminate the likelihood of causing the death of fish or HADD of fish habitat the project have been considered. If, after all avoidance and mitigation options are considered, the likelihood of causing the death of fish or HADD of fish habitat remains, the project team must submit a Request for Review Form to DFO, which may require a *Fisheries Act* authorization as described in Section 6.

5.7.1 DEFINING ASSESSMENT TERMS

To support the assessment of effects and the death of fish or HADD to fish habitat, it is important to standardize the nomenclature. This section provides some basic terminology used throughout the remainder of this guide.

5.7.1.1 DEATH OF FISH OR HARMFUL ALTERATION, DISRUPTION OR DESTRUCTION OF FISH HABITAT

DFO's *Fish and Fish Habitat Protection Policy Statement* provides the following interpretation:

- "death of fish" by means other than fishing, and
- "harmful alteration, disruption or destruction" as any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat's capacity to support one or more life processes of fish.

5.7.1.2 AVOIDANCE

In the context of this guide, avoidance refers to project decisions that eliminate a specific impact to fish and fish habitat, such as relocation or redesign to completely prevent causing the death of fish or HADD of fish habitat. For example, selecting a location away from habitat used for spawning purposes.

5.7.1.3 MITIGATION

For many projects, avoidance of impacts (such as alternative project location) is not feasible. Mitigation measures aim to reduce the spatial scale, duration, and/or intensity of harmful impacts to fish or fish habitat that cannot be completely avoided. Mitigation measures may include the implementation of BMPs during construction, maintenance, operation and decommissioning of a project.

5.7.1.4 PATHWAYS OF EFFECTS (POE)

Pathways of Effects (PoE) diagrams are used to describe proposed works in terms of, the activities that are involved, the type of cause-effect relationships that are known to exist, and the mechanisms by which stressors ultimately lead to effects in the aquatic environment. PoEs are discussed in-depth in Section 5.10.

5.7.1.5 EFFECTS

An effect refers to the specific impact on fish and fish habitat (e.g., change in temperature, change in habitat structure and cover) as a result of a particular activity. This can include both positive and negative effects.

5.7.1.6 RESIDUAL EFFECTS

Any effect that remains after the application of avoidance or mitigation is referred to as a residual effect and can include positive and negative residual effects. In the context of assessing the potential for the death of fish or harmful alteration, disruption or

destruction of fish habitat, only negative residual effects are considered; positive residual effects cannot be considered as a counterbalance to any negative residual effects. Whether a residual effect is temporary (e.g., minutes, hours, days, or months) or permanent, it is important to identify the residual effect(s) when avoidance and mitigation measures are not fully effective. The duration of an effect is an important factor in determining the severity of negative residual effects and is explained in further detail below in Section 5.11.2.

5.7.1.7 DEATH OF FISH OR HARMFUL ALTERATION, DISRUPTION OR DESTRUCTION OF FISH HABITAT DETERMINATION

Once the negative residual effects have been determined, the severity of each negative residual effect must be evaluated and is based on the scale, intensity and duration of the effect, and is used to assess whether death of fish or HADD of fish habitat is likely. This is the basis of the Fish and Fish Habitat Impact Documentation that will be discussed in Section 5.11.

5.8 GENERAL PRINCIPLES FOR AVOIDANCE/MITIGATION

Avoiding and minimizing negative residual effects to fish and fish habitat must begin at the planning stage, and continue throughout the design, construction and operation phases in an integrated manner throughout the project lifecycle. It is important to note that the assessment of potential impacts of the project and mitigation plans may need to be modified if the project changes.

The following general principles have been provided as a guide to support the protection of fish and fish habitat:

- All reasonable efforts must be made to avoid or prevent a harmful effect on fish and fish habitat through re-location and/or design/re-design of the crossing/structure. While other factors are considered, avoidance is preferred.
- Mitigation measures must address the full range of potential effects on fish habitat, fish and fish movement. Potential effects include direct or footprint effects as well as indirect and secondary effects, including potential for up and/or downstream habitat disturbance or alteration.
- Consider the biological requirements of the potentially affected fish and fish habitats throughout the process when determining the type and degree of mitigation.
- Mitigation measures should consider the full range of potential negative impacts throughout the project lifecycle (design, construction, and operation, including maintenance).
- Integrating mitigation measures proactively and progressively during the early stages of the design of the project increases the likelihood that they can be incorporated and implemented. This is typically when there is the most flexibility

available to avoid potential constraints later on near the end of design. It is the fisheries assessment specialist's responsibility to flag actual constraints early to the design team to allow for these discussions to occur in order to avoid scheduling impacts.

- Obtaining multi-disciplinary input from project team members helps to ensure the measures are feasible, practical, and supports the commitment to ultimately implement the measures.
- Fish habitat needs must be considered in relation to other relevant design and operational aspects (e.g., safety, geotechnical, stormwater management), as well as other natural environmental or socio-economic constraints, to identify an appropriate and reasonable set of mitigation measures.

As noted above, all reasonable efforts must be made to avoid the death of fish or HADD of fish habitat. Determining what is 'reasonable' requires consideration of:

- The use of commonly used field-tested methods, including MTO design standards and accepted practices.
- The designer may consider new and/or rarely used approaches; however, this may require testing and/or additional approvals. Ensure the approach has been evaluated to avoid the death of fish or HADD of fish habitat.
- Other considerations include:
  - Construction feasibility, cost/benefit, durability and longevity (e.g., in relation to soil/geotechnical considerations, maintenance);
  - Impacts on other natural environmental features (e.g., wildlife movement, migratory birds);
  - Socio-economic aspects (e.g., trail access, safety, heritage designation of bridges);
  - Effort taken at design stage to review viable alternatives; and,
  - The size, intensity or duration of the negative effect.
- In some situations, avoidance of negative effects is the only option since any negative residual effects would not be considered acceptable to DFO, for example, residual effects on:
  - Significant or aquatic SAR habitat; and/or,
  - Habitats where the features or underlying functions are difficult to replicate and/or are poorly understood.

There are times where designing a project to completely avoid causing the death of fish or HADD to fish habitat may be the preferred option, even if the initial costs are higher than other options. By avoiding impacts to fish habitat, the scheduling impacts and extensive costs often associated with obtaining an authorization, implementing

offsetting and undertaking the required monitoring can also be avoided. These costs can far exceed the costs associated with the revised design and construction of a different alternative. Therefore, it is important to discuss this early within the project team (including MTO).

5.8.1 TYPICAL MULTI-DISCIPLINARY TASKS

The iterative process of developing appropriate mitigation measures requires an integrated, multi-disciplinary team working together throughout the entire project. The fisheries assessment specialist is responsible for conveying fisheries impact information to the team using the Table 10-1 Design Considerations to support project decisions. Table 5-5 summarizes an example of the multi-disciplinary integration involved in the process of developing appropriate mitigation measures in relation to the design of a crossing structure.

Table 5-5. Summary of Typical Multi-Disciplinary Design Input/Requirements in Assessing Impacts and Developing Mitigation

Technical Discipline	Some Typical Assessment and Design Tasks
Fisheries Biology	• Assessment of the fish, fish habitat and fish movement related to the project proposal. • Assess impacts of various siting and design alternatives. • Input into mitigation options to reduce or eliminate potential negative effects. • Input into fish passage design.
Geotechnical Engineering	• Identify unstable soils. • Identify groundwater table elevation, flow direction, areas of likely discharge and potential for obstruction of groundwater movement. • Assess the feasibility and design requirements of specific crossing locations and design options. • Identify potential dewatering requirements especially as they may affect groundwater inputs into the watercourse.
Hydraulic Engineering/ Hydrology	• Design culvert parameters (type, slope, dimensions, embedment, substrate sizing). • Identify need for and design of scour protection. • Fish passage design. • Assess velocity barriers.

	• Design energy dissipation pools, culvert inlet, outlet pools and low flow channel.
Structural Engineering	• Design bridge/culvert span size and arrangement. • Identify need for and design of scour protection (with hydraulic engineering/hydrology) with fish passage in mind.
Fluvial Geomorphology	• Assess potential for fluvial geomorphic changes and implications on habitat and/or fish movement. • Design of naturalized design channel sections where localized realignment at inlet or outlet of culvert or through structure is required. • Fish passage design through the use of riffles, pools and low flow channels.
Other Considerations	• Wildlife corridors, re-vegetation plans, wetland features, etc. • Landscape architecture.

5.8.2 AVOIDANCE THROUGH PROJECT LOCATION

This is one of the first steps in avoiding negative residual effects. Whenever feasible, the project should be planned to avoid waterbody crossings or encroachments where significant negative effects are likely to occur. For new highway projects, various options for the location of the highway (route alternatives) are generated and evaluated and a preferred location is selected during the planning stage. For such projects, there is an opportunity to avoid negative effects, or where avoidance is not possible, to minimize these effects.

It is MTO's expectation that the information from the fisheries assessment should be considered by the project team in the selection of the project location. Tables 5-6 and 5-7 provide general considerations for siting and location selection from a fisheries perspective.

Table 5-6. General Siting/Location Considerations

General Siting/Location Considerations	
General Considerations	• Refine and reorient a crossing alignment where a replacement is required to reduce the impact of an expansion or avoid the need for channel realignment. • Replace rather than expand a structure that currently significantly impacts fish habitat and/or movement. • Design a new interchange or re-design an existing interchange to avoid encroachment into a waterbody or minimize the number of watercourse crossings. • Widen to one side rather than the other to avoid or minimize direct encroachment into a water body and/or the need to re-align a portion of the watercourse that flows parallel or meanders close to one side of the highway. • Select appropriate material, shape and size of extension of an existing culvert or bridge. Utilize methods to minimize the size of the impact on fish habitat (e.g., headwalls, retaining walls, wing walls, etc.).
Significant and/or Highly Sensitive Habitat	• Avoid crossing near areas of significant and/or highly sensitive habitat. Depending on the specific nature and sensitivity of the habitat, spanning the waterbody will typically avoid these impacts - sites should be selected that span the waterbody when feasible.
Fish Passage	• Consider fish passage under an appropriate range of flow conditions considering the life history requirements of the species present. Simulate the natural channel conditions (e.g., width, depth, slope) to avoid fish passage issues whenever possible.
Crossing Orientation	• Highways should be aligned to cross valleys and streams at right angles since this minimizes the length of a crossing. However, crossings may need to be skewed to align with the natural stream channel orientation.
Interchanges	• Where interchanges must be sited near/adjacent to waterbodies, design options should consider configurations and specific design measures (e.g., embankment steepening, retaining walls) to reduce potential impacts to adjacent waterbodies.

General Siting/Location Considerations	
Geotechnical	• Structure siting decisions at all waterbody crossings should include geotechnical considerations to ensure that sufficient flexibility exists to implement design measures to minimize effects on sensitive fish habitat (e.g., to allow for the use of head/wing walls to shorten the structure length or the construction of footings for open bottom culverts and arches) and that structures are founded in stable materials so that differential settling or related changes will not develop over time.
Natural Barriers	• Avoid crossing at a natural barrier (abrupt change in elevation of stream bed) such as cascades or waterfalls, particularly if the crossing is likely to be a culvert, to avoid the need to accommodate slope change within the new culvert. • Natural barriers upstream and downstream of the crossing may need to be investigated to put the design efforts into context of the migratory requirements as they relate to the specific MTO project.
Stream Morphology/ Gradient/ Bank Stability	• Avoid areas that are unstable, including actively eroding, degrading or aggrading areas (such as eroding banks or valley slopes, meander bars, braided streams, alluvial fans), and unstable soils (such as organics, groundwater discharge areas). These areas may result in erosion (scouring and deposition) around the structure, creating instabilities. Select a stable location (such as a riffle reach) to reduce the likelihood of significant morphological changes to the natural stream condition.
Channel Realignment	• Avoid crossings that require large permanent stream diversions, channelization or realignments. As an alternative, avoid larger channel realignments by considering designs that fully span the channel and reduce the impact in the watercourse.
Consultation	• Depending on the project, MTO or MTO Service Providers, may require input from stakeholders and agencies. The level of consultation is typically tied to the complexity of the project and the severity of the impacts.

Table 5-7. General Considerations for Project Locations: Culverts

Culvert-Specific Siting/Location Considerations	
Culvert or Structure Orientation	• The culvert or structure should be oriented to avoid or minimize the need to re-align channel sections. Alternatively, beneficially position (e.g., skew) the culvert to reinstate the natural channel.
Stable Stream Sections	• Wherever possible, select stream stretches with level approaches, stable banks, stable morphology (e.g., riffles) and straight profiles for crossings. Avoid crossing on bends which are generally more active and prone to lateral migration and erosion, and therefore likely to require scour protection and stabilization measures (both during and after construction).
Meandering Sections	• Avoid crossing on a meandering reach as this will likely require 'channelization' or straightening of the channel section and associated loss of channel length and increase in channel slope through and/or up/downstream of the culvert.
Channel Gradient	• Select sites with a channel gradient less than 2% and with relatively constant gradients and water velocities upstream and downstream to: facilitate installation, facilitate maintenance of the existing channel slope, reduce the potential for erosion, and reduce the potential creation of barriers to fish movement within or up or downstream of the culvert.
Cuts and Fills	• Avoid crossing at sites where installation will involve large fills or approaches with deep or lengthy cuts (e.g., gullies, valleys, multi-channel/braided sections), to avoid modification to the floodplain and associated functions.

5.8.3 AVOIDANCE/MITIGATION THROUGH PROJECT DESIGN PROCESS

The design process related to individual crossings provides an opportunity to eliminate or minimize the impacts to fish and fish habitat. Critical background information and relevant field data should identify the important design constraints to the design team including, species and habitat present and how/when the habitat is used, and site conditions. When provided early this information can help the design team to focus on options for project relocation, redesign, and evaluation of alternatives which help minimize impacts.

The general fish and fish habitat priorities in the design process are to:

- Avoid or minimize negative effects on fish and fish habitat;
- Avoid negative effects on species at risk and their habitats;

- Avoid negative effects on significant habitat;
- Maintain, or reinstate, fish passage where required; and,
- Maintain and/or improve existing conditions, to simulate natural channel function to the extent possible.

Designs should evaluate the size and type of crossing best suited to each location based on hydraulic capacity and verified fisheries requirements. This includes ensuring the design considers the potential need to maintain or simulate the natural bankfull channel function as best as possible. This may not always result in meeting bankfull width, especially for smaller crossings, but considerations towards impacts on the natural channel, fish passage, and downstream infrastructure must be considered by the design team. It is important that the fisheries assessment specialist provides accurate data, in a timely fashion, into this design process.

In addition to the crossing type, there are several design components which are equally critical to flag these potential requirements for their consideration. The designer is required to follow MTO standards, and as such, the design team needs to be aware of site-specific considerations early on, to evaluate the applicable ones, and to ensure features can be properly designed. These include items such as scour protection, restoration of vegetation, appropriate substrates, low flow channel, bank erosion control etc. Design components and considerations that are used to meet these requirements include:

- Potential for the relocation of project components. Examples include:
  - moving the crossing to avoid a meander bend or significant habitat; and,
  - moving the roadway away from a watercourse to avoid unstable waterbody banks or impacts to significant habitat and to ensure a buffer will be present.
- Selection of crossing type and orientation. Due to verified fisheries constraints (e.g., fish passage required, presence of critical SAR habitat) there are times where redesign of the preliminary options may need to occur.
- Sizing of the structure considers hydrology recommendations for fish passage and hydraulics (including incorporation of measures to minimize length or introduce a median opening in multi-lane facilities).
- Specific structure design aspects such as siting and design of piers and/or footings to avoid significant habitat and erosion issues, setting the alignment and invert of culverts, addition of substrate to mimic stream bottom and ensuring its stability (i.e., embedment), and providing a low flow channel for fish passage.
- Identification and design of associated features such as appropriate drainage aspects, bank and bed scour protection requirements, and consideration of riparian vegetation.
- Other users and requirements (e.g., pedestrians, wildlife, riparian rights, navigation).

Fish Passage

Fish passage is essential to maintain a healthy fish population. Some species migrate to access specific habitat upstream of MTO's crossing in order to meet their needs, particularly spawning. (See Section 8.5.2 – Improvement of Fish Passage for additional information.)

Impediments to fish passage include physical barriers, gradients, and anything that increase water velocities to a point where some species are unable to pass. Typical examples include improperly designed culverts, which are not embedded properly.

MTO's Highway Drainage Design Standard (2008), WC-12 Fish Passage through Culverts provides general guidance on fish passage considerations during design. The fisheries assessment specialist's role is to provide advice and context to designers, so that engineering, hydrology, stream hydraulics experts and other technical disciplines can use this information throughout the design process. This may include:

- Identifying actual target species and life cycle requirements, such as migratory & spawning needs.
- Assessing potential velocities timed to life cycle requirements for target species and putting these species needs into context of the actual watercourse. For example, brook trout requirements for passage in a particular watercourse should be focused on low flow passage to reach thermal refugia in the summer, and with fall flow events for migration to spawning areas. In these cases, the focus is better placed on ensuring the design meets these critical periods rather than focusing on ensuring fish passage during the spring freshet where fish may not be migrating at that time.
- Identifying water depth requirements to support passage during low flow periods, rather than only considering hydraulic capacity and designing fish passage exclusively for the 2-year storm event.
- Identifying any permanent barriers upstream or downstream that may negate the need to modify designs for fish passage.
- Addressing climate change considerations in the fish passage design to accommodate future flow conditions based on latest update to MTO Intensity, Duration, and Frequency Curves.

Additionally, DFO has developed a collection of interactive web tools that estimate the swimming performance of fish. The estimates provided by these tools can be helpful in the development and design of fish passage. See DFO's Swim Performance Online Tools (SPOT).

These discussions should occur early and involve the designers and MTO Environmental Delivery.

5.8.4 CROSSING TYPES

Typical crossing types on MTO projects include:

- Clear span structures such as bridges or structural arches;
- Open bottom culverts;
- Closed bottom culverts; and,
- Pipe culverts (round, elliptical, or arch).

The project team should consider the physical characteristics, such as slope, soil, hydraulic and/or hydrologic conditions (including groundwater) along with the type of fish and fish habitat and migratory requirements when selecting a crossing type. The designers and fisheries assessment specialist should work together early in the process to consider opportunities to reduce the project impacts through design.

The crossing type should, when reasonable:

- Avoid the need for significant channelization/permanent diversions;
- Avoid significant filling in of river valleys and floodplains;
- Ensure a stable crossing area and promote fish passage (where warranted); and/or,
- Provide for fish passage and long-term site stability with regards to prevention of scouring and bank erosion.

Fish Passage and Perched Culverts

Restoration of fish passage at perched culverts, when warranted, is typically addressed during culvert replacement projects. During detail design, it is expected that the design options, or rationale for why restoring passage is not feasible, will be discussed early with MTO. If the perched culvert only requires rehabilitation, it is still expected that restoration of fish passage will be investigated.

Determining whether reinstatement of fish passage is warranted during rehabilitation should be based on factors such as presence of suitable fish habitat upstream, potential benefits to the fish population, species' migratory requirements, presence of aquatic invasive species (AIS), cost, constructability, and timing of future culvert replacement.

Background information and discussion with MNR can provide context on known issues and fish management objectives to aid in this assessment. The rationale behind this decision is required to be included in the Impact Assessment report or other relevant documents.

For example, clear span structures such as a bridge or an arch should be considered for large and/or sensitive watercourses where mitigating the effects of a culvert (including ensuring fish passage requirements are met) will be difficult, or where there are significant valley systems or flood plain concerns. Where groundwater discharge areas that are used for spawning (e.g., brook trout) exist in the area of the crossing, open bottom box culverts should be considered. In many other cases, appropriately designed and installed closed-bottom box culverts or pipes are acceptable and will meet the needs of all the factor areas including fisheries.

The MTO Drainage Design Standards and the Drainage Management Manual provides the design standards, considerations, and computational methods appropriate for use in the design of watercrossings for MTO. If the designs warrant alternative approaches these should be discussed as early as possible with MTO especially when there is the potential for additional surveying, property, consultation, etc. that may be necessary as a result of design changes.

5.9 CONSTRUCTION AND OPERATIONAL MITIGATION MEASURES

Construction related and operational mitigation measures are implemented during the construction and operation of highway projects to prevent or minimize/reduce any remaining negative residual effects on fish and fish habitat. These measures include constraints such as:

- In-water work timing restrictions;
- Best management practices such as erosion and sediment control, temporary flow management and dewatering;
- Rehabilitation following construction, including re-stabilization and re-vegetation;
- Inspection and monitoring, including contingency plans as well as general post-construction monitoring (See Section 9 Project Implementation and Monitoring); and/or,
- Operational measures such as stormwater management.

Erosion and Sediment Control

Ensuring site appropriate erosion and sediment control is crucial to reducing the risk of impacts to fish and fish habitat. Controlling drainage and erosion at the source in design and construction should be prioritized and can reduce reliance on sediment controls. Temporary erosion control measures should be implemented to address exposed soils until permanent cover can be established.

Review the Environmental Guide for Erosion Sediment Control for Construction Projects and the Ontario Provincial Standard Specifications (OPSSs) for additional details. See Supporting Documents & References.

5.10 INTRODUCTION TO DFO'S PATHWAYS OF EFFECTS

DFO developed the Pathways of Effects (PoE) tool to determine and communicate the potential impacts of activities on fish and fish habitat which are then used to determine residual effects. This is referred to as Pathways of Effects, which consists of several diagrams related to activities in or near water. The potential for the death of fish or HADD of fish habitat will be informed by residual effects.

The PoE diagrams are used to describe projects in terms of:

- The types of activities involved in a project (e.g., vegetation clearing, flow management).
- Type of cause and effect relationships that are known to exist between an activity and fish and fish habitat that create stress on the fish and fish habitat.
- Mechanisms by which these stressors (e.g., bank stability and exposed soils, increased erosion potential) can lead to effects on the aquatic environment.

PoE diagrams can be used to review the potential effects of individual development proposals, identify appropriate mitigation measures, and assess the effects of alternative design options.

The PoEs relevant to MTO's projects have been modified for MTO's work and augmented to include typical mitigation strategies for each and should be used to assess MTO projects only. APPENDIX G1 of this guide includes Modified PoE Diagrams relevant to MTO projects.

The PoEs are highly generalized and require fisheries assessment specialists to apply expert judgment and experience in determining which pathways apply for the project type and geographic location of the proposed development activity. The purpose of the PoE diagrams is to enable fisheries assessment specialists to have a common reference tool to explain potential aquatic effects.

5.10.1 PATHWAYS OF EFFECTS: DIAGRAM OVERVIEW

PoE diagrams have a consistent, streamlined design that supports the identification of potential effects. Each cause and effect relationship are represented as a line (referred to as a pathway), which connects the activity to a potential stressor and the stressor to some ultimate effect on fish and fish habitat. Any direct links to other PoEs are also included on the diagram. Figure 5-5 is an example of a PoE diagram.

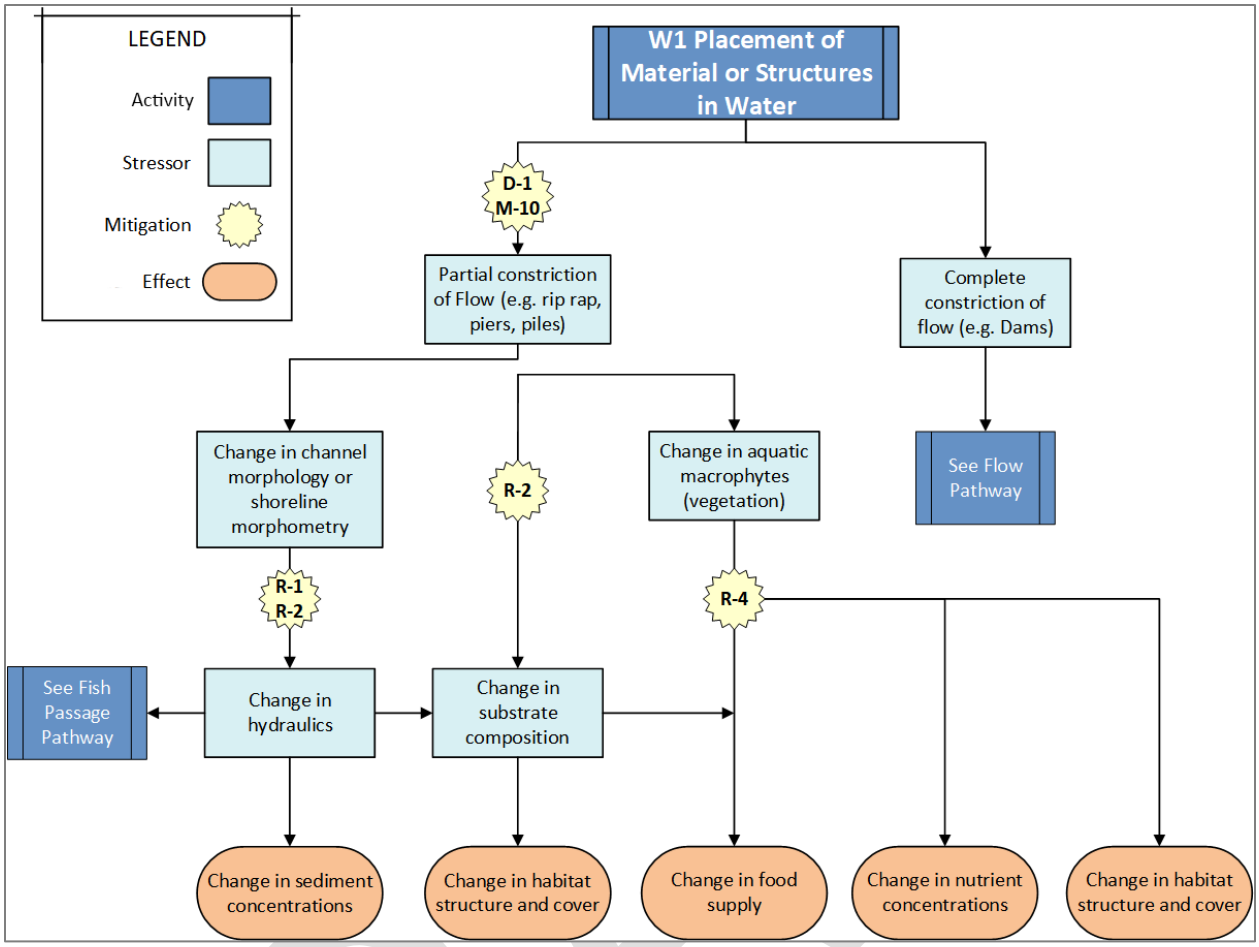

Figure 5-5. Pathways of Effects Diagram for Placement of Material in Water

PoE diagrams are broadly categorized by the type of activity that will be undertaken:

- Land-based activities (e.g., L3 - Excavation)
- In-water activities (e.g., W2 - Dredging)
- Land-based and in-water activities (e.g., B2 - Use of Industrial Equipment)

Table 5-8. List of Pathways of Effects (PoE) Diagrams Relevant to Highway Projects

Land-Based Activities		In-Water Activities	
L1	Vegetation Clearing	W1	Placement of Material or Structures in Water
L2	Grading	W2	Dredging
L3	Excavation	W3	Organic Debris Management
L4	Riparian Planting	W4	Addition of Removal of Aquatic Vegetation
Water and Land-Based Activities		W5	Change in Timing, Durations and Frequency of Flow
B1	Explosives	W6	Fish Passage Issues
B2	Industrial Equipment	W7	Structure Removal

5.10.1.1 MITIGATION CODES

Mitigation codes and their use in PoE diagrams were developed for use in MTO modified PoEs under the MTO Fisheries Protocol in accordance with the MTO Fish Guide. The list of mitigation codes for use on the PoEs, are broken into the following categories:

- Design (D1 – D5)
- Operational (O1-O3)
- Management (M1-M12)
- Rehabilitation (R1-R5)

Where appropriate, mitigation codes are shown on the PoE diagrams as a letter-number combination within a starburst circle which identifies it as falling into one of the mitigation categories, as defined above. A “master list: of mitigation measures is provided in APPENDIX G2.

Mitigation codes provide options to consider avoiding or reducing the effect to fish and/or fish habitat (“break the pathway”). It is important to note that these codes are meant to guide the fisheries assessment specialist through the assessment process and that the mitigation identified in the diagrams may not always be applicable to every project. Conversely, there may also be other mitigation measures that can be applied that can also break the pathways. Therefore, the fisheries assessment specialist must use their experience and expertise when navigating the PoEs in order to apply the appropriate mitigation. Details on applying mitigation to PoEs is provided in Section 5.11

5.10.1.2 STRESSORS

In the context of PoEs, stressors are site or environmental conditions that can ultimately result in an effect on fish and fish habitat if not fully mitigated. Stressors are represented as rectangles in PoE diagrams.

5.10.1.3 EFFECTS

In the context of PoEs, effects are the impacts that an activity will have on fish and fish habitat in the absence of mitigation. Effects are visually represented as ovals at the end of each pathway. As discussed previously, if an impact of the stressor cannot be fully mitigated, it is considered a residual effect.

DOCUMENTATION: RESIDUAL EFFECTS AND PoEs

- ✓ Aquatic Effects Assessment Table
- ✓ Fish and Fish Habitat Impact Documentation
- ✓ Fish and Fish Habitat Impact Assessment Report

5.11 USING PATHWAYS OF EFFECTS TO IDENTIFY RESIDUAL EFFECTS

The remainder of this section describes how to use DFO's Pathways of Effects to identify the project-specific activities and effects to support the identification of mitigation activities, and finally the determination of the death of fish or HADD to fish habitat. These are achieved by completing the Aquatic Effects Assessment Table (APPENDIX D3) and Fish and Fish Habitat Impact Documentation (APPENDIX D4). Figure 5-6 below summarizes the assessment process in terms of identifying effects, negative residual effects and ultimately, their potential to result in death of fish or HADD of fish habitat.

ASSESSMENT PROCESS

Effects	Negative Effect	Negative Residual Effect	Death of Fish or HADD of Fish Habitat Determination
Individual effects (e.g. change in temperature, change in habitat structure and cover) will be referred to as "effects". This can include both positive and negative effects.	If an effect has a negative effect on fish and fish habitat, it is referred to as a "negative effect".	If a negative effect remains after the application of avoidance or mitigation, it is referred to as "negative residual effect".	The severity of each negative residual effect is based on the scale, intensity and duration of the effect, and is used to determine if the death of fish or HADD of fish habitat is likely.

Figure 5-6. Defining Effects and Determining Death of Fish or HADD of Fish Habitat

5.11.1 IDENTIFYING APPLICABLE PATHWAY OF EFFECTS DIAGRAM(S)/PROJECT ACTIVITIES

The first step when using PoEs diagram(s) is to identify which PoEs will be applicable to the project by first identifying all of the design and construction components that will be associated with the project. Table 5-9, the Typical Potential Pathways of Effects for Design and Construction Activities provides a list of various components (e.g., bank erosion) and the associated activities (e.g., L1 – Vegetation Clearing, L2 – Grading, etc.) that should be considered.

The list provided is not exhaustive and there will often be other components that the fisheries assessment specialist will need to consider when identifying applicable PoEs, based on their experience and expertise; specifically, all relevant aspects of crossing location and design as well as construction and operation of the highway. This process is iterative in that as the project progresses, the effects of alternative plans, designs, and construction methods are identified, and mitigation measures are incorporated. Both temporary and permanent effects of the activities must be identified.

The reader is encouraged to review all PoEs activities for applicability to their specific project, and to seek input from the project team to identify other possible applicable activities.

Table 5-9. Typical Potential Pathways of Effects (PoE) for Design and Construction Activities

Typical Construction Activities	Pathway of Effect												
	L1	L2	L3	L4	W1	W2	W3	W4	W5	W6	W7	B1	B2
	Vegetation Clearing	Grading	Excavation	Riparian Planting	Placement of Material	Dredging	Organic Debris	Aquatic Vegetation	Flow	Fish Passage	Structure Removal	Explosives	Industrial Equipment
Bank erosion protection	X	X		X	X				X				X
Blasting												X	X
Borrow and quarrying			X									X	X
Channel construction (e.g., new channel or habitat enhancements)	X	X	X	X	X		X	X	X	X			X
Clearing and grubbing	X												X
Coffer dam construction					X				X	X			X
Culvert replacement/extension	X	X	X	X	X		X	X	X	X			X
Detours/Temporary access	X	X	X		X				X	X			X
Dewatering									X	X			X
Drainage and stormwater management									X	X			
Drilling and boreholes													X
Grading		X											X

Typical Construction Activities	Pathway of Effect												
	L1	L2	L3	L4	W1	W2	W3	W4	W5	W6	W7	B1	B2
	Vegetation Clearing	Grading	Excavation	Riparian Planting	Placement of Material	Dredging	Organic Debris	Aquatic Vegetation	Flow	Fish Passage	Structure Removal	Explosives	Industrial Equipment
New bridge/culvert installation	X	X	X	X	X	X	X	X	X	X			X
Rock protection and armouring (rip rap, aggregate)	X	X	X		X	X		X	X	X			X
Structure excavation (e.g., abutment/pier repair)	X		X				X		X				X
Structure removals (includes bridges and culverts)									X	X	X		X
Temporary diversion					X				X	X			X
Tunneling, jacking and boring			X										X
Waterbody in-filling					X				X	X			X

5.11.2 MITIGATION AND IDENTIFYING EFFECTS USING THE PoE DIAGRAMS

To identify potential effect(s) using the PoE diagram(s), review the stressor(s) associated with each activity to determine if they are applicable to the project and follow the pathway (line) until a mitigation measure removes the next stressor (breaking the cause and effect linkage) or an effect is identified. If a mitigation measure shown on a PoE diagram is not possible to implement, proceed down the path to the next stressor or effect, as above. Continue to work through each PoE diagram applicable to the project until all effects and/or mitigation measures have been identified.

As the project evolves, it may be necessary to update the list of identified effects to capture updated designs, construction approaches, etc. In this way, not only do the PoE diagrams provide a tool for assessment of impacts of the project activities on fish and fish habitat, they can also be used to identify mitigation opportunities to be considered in design and construction.

It is important to note that by breaking the link, the effect can be avoided or minimized (mitigated). The higher up the 'path' that the links are broken, the higher the probability that the mitigation will work to avoid the effect.

The assessment of potential effects should identify:

- Temporary and permanent effects on fish habitat (provide the area in m^2 of each temporary and permanent effects on fish habitat);
- Potential for death of fish; and,
- Potential changes to habitat connectivity and/or passage.

Determining the severity of an effect is an important consideration in determining the mitigation type and level of effort. Scale, duration, and intensity are typically used to assess the severity of an effect. When determining the appropriate mitigation measure, the project team should consider cost, potential to create other concerns, and the ability to effectively reduce or eliminate the impacts to fish and fish habitat.

As discussed previously, the development of mitigation measures is an iterative process started during the planning phase and progressing through each design phase. Developing a series of mitigation measures is a key component in the process of determining the risk of impacts to fish or fish habitat, since this is determined based on the implementation of mitigation measures.

As noted in Section 5.10.1.1, the mitigation codes are provided to assist the fisheries assessment specialist in determining the appropriate mitigation to be applied to the project. When completing the Aquatic Effects Assessment Table, the mitigation measures to be implemented must be modified to describe how that measure is being implemented on that particular project. Thus, while the mitigation code may be included in the Aquatic Effects Assessment Table, the description from the Master List associated with a particular code is not simply copied and pasted into the Aquatic Effects Assessment Table; it must be project-specific.

For example, if O3 -Timing of In-Water Works is used, do not write "implement timing restrictions for in-water work to protect sensitive life stages/processes of migratory and resident fish". Instead write "In-water works are only permitted during the approved in-water work timing window of July 1st to September 30th of any year". It is also beneficial if the mitigation can be related back to the relevant contract specifications and Ontario provincial standards, such as OPSS and Ontario Provincial Standard Drawings

(OPSDs), where applicable, i.e. “In-water works are only permitted during the approved timing window of July 1st to September 30th of any year in accordance with OPSS.PROV 182 and Standard Special Provision, Timing of In-Water Works, Oversight Requirements, and Measures to Avoid Harm to Fish (SSP 101F23).

The mitigation measures must also be detailed and fully integrated into the Contract Package, to ensure they are properly and fully implemented during construction. This integration must encompass the development of or additions to specific contract drawings and the selection of relevant standards and specifications.

5.11.3 DETERMINING RESIDUAL EFFECTS

Residual effects are defined as the effects that remain once all mitigation measures are taken. This is accomplished by reviewing the list of effects and determining if avoidance or mitigation measures can eliminate or reduce the effects.

The assessment of residual effects should consider both the attributes individually, and how they act in combination with each other. Some attributes may combine to act additively, or in some cases may combine to act synergistically (i.e., to cause a greater overall effect than the simple sum of effects). For example, a fish population may be able to withstand a temporary rise in water temperature. At another time, it may be able to withstand a temporary increase in suspended sediment. However, if the two effects occur together at the same time, the overall potential impact is considerably higher than the two effects occurring separately.

It is important to note that the assessment of residual effects is not an addition/ subtraction exercise; positive residual effects do not cancel out negative residual effects and either of the negative residual effects in the example above could result in the death of fish or HADD of fish habitat on their own. Therefore, while positive and negative effects are to be documented, only negative residual effects are considered in the determination of the death of fish or HADD of fish habitat. For example, a 100 m realignment of a degraded, coldwater channel that incorporates riparian plantings and fish habitat features should have positive effects on the habitat in general including a decrease in the water temperature and sediment concentrations. However, these positive effects cannot be used to counterbalance negative effects resulting from the destruction of the original channel.

Once the residual effects are identified, a fisheries assessment specialist should determine the severity of these negative residual effects and whether they have the potential to result in harmful impacts to fish and fish habitat.

5.11.4 DETERMINING THE SEVERITY OF NEGATIVE RESIDUAL EFFECTS

Once all residual effects have been determined, the fisheries assessment specialist will need to evaluate the severity of those effects. Four attributes are used for this and are outlined in Table 5-10 below.

It is important to note that in instances where the death of fish or HADD of fish habitat is likely, early referral of the file is preferable, as the process for MTO to confirm the decision to submit to DFO and for DFO to undertake the project review should be considered within the project timelines. The fisheries assessment specialist should not wait until the end of detail design when the report is being produced to flag that the death of fish or HADD of fish habitat may result from a project or activity. If there is a concern that the death of fish or HADD of fish habitat may occur, then MTO should be notified immediately and the determination of the death of fish or HADD of fish habitat expedited.

Table 5-10. Attributes for the Documentation and Quantification of Residual Effects

Attribute	Definition	Comments
Spatial Scale (size)	Refers to the direct footprint of the project, as well as areas indirectly affected, such as downstream or down-current areas. The extent can range from localized (small spatial scale), through the channel reach or lake region extent, to an entire watershed, lake or other ecological unit (large spatial scale).	Direct impacts of project are generally limited in spatial extent; it is important to specifically consider the potential for indirect impacts over a larger area.
Duration	Refers to the amount of time that a residual effect will persist after construction, as well as the duration of construction (e.g., days, months, multiple years, or permanent).	In addition to permanent habitat removal through a footprint impact, impacts may be temporary in duration (e.g., related to construction), or longer term requiring a period of time following construction for fully functional habitat conditions to become re-established. The duration of the impact depends on the resiliency and type of habitat, degree of disturbance and success of the construction and mitigation/restoration techniques employed.

Attribute	Definition	Comments
Intensity	The expected amount of change from the baseline condition. Intensity is a way of describing the degree of change, such as changes in water temperature, changes in flow velocity, suspended sediment, habitat availability, habitat accessibility, etc.	The timing of works may have a major influence on intensity. Effects such as sediment release occurring during critical spawning and egg incubation periods will have a higher intensity. Intensity can range from habitat remaining suitable but with reduced productivity to becoming unusable. As above, duration and intensity are closely linked, and the intensity of the impact also depends on the type of habitat, degree of disturbance and success of the construction and mitigation/restoration techniques employed.
Fish and Fish Habitat Features	The species present and their habitat use (e.g., generalists versus specialists) and related requirement for movement among habitat types can affect the severity of the impact. It is important to note if species at risk are present. The fish habitat features present are also relevant (e.g., spawning grounds, nursery, rearing, food supply) and identification as to whether the habitat present is limiting (to local fish and migratory fish).	Different species are sensitive to different changes in the environment. Coldwater species, for example, are sensitive to temperature changes and are often dependent on groundwater upwellings in the south; however, in the north this feature is usually not as critical. In some situations, certain habitat features may be present only at that site meaning the fish populations dependent on those features may be greatly impacted by their removal and/or alteration.

This potential for DFO review, including development of offsetting measures, if the need for an authorization is confirmed, will add time to the project. Additional design options and alternatives should be internally discussed and agreed upon to confirm no other options are viable prior to submission. Final design and mitigation refinements can be made after the initial referral.

5.11.5 EXAMPLE OF USING PoE DIAGRAMS

Although the PoE diagrams may appear complex at first glance, they are relatively simple to use. By selecting the appropriate activities for a project, they offer a clear picture of the overall likely effects the proposed project on fish and fish habitat.

Example

To illustrate the use of the PoEs, an example of a culvert replacement during highway widening is outlined below:

- Existing 2.5 m X 2 m X 60 m (width, height, length) concrete box culvert with a perched outlet ~300 mm).
- Culvert will be replaced on the same alignment with a 3.5 m X 2.5 m X 65 m concrete box culvert.
- Directly supports a permanent, warm/coolwater thermal regime.
- The habitat to be impacted by the culvert replacement is abundant throughout the area and contains no significant habitat features.
- Existing substrate material comprised primarily of sand and muck with gravel and some cobble.
- Existing in-stream cover is represented by emergent vegetation (cattails and grasses).
- Upstream and downstream banks are well-vegetated and stable, except at the culvert outlet where some erosion is noted.
- Riparian vegetation along the banks of the stream is comprised of grasses and shrub species.

5.11.5.1 IDENTIFY ACTIVITIES/PoE DIAGRAMS APPLICABLE TO PROJECT & DETERMINING EFFECTS

As noted previously, to determine which PoEs are applicable to a project, the fisheries assessment specialist should use Table 5-10 as well as their experience and expertise and input from the project team. Once the appropriate PoE diagrams are identified, the fisheries assessment specialist systematically works through each PoE to identify the appropriate stressors, mitigation measures and effects.

In this example, the highway widening requires the replacement of the existing culvert with a longer culvert. Using Table 5-9 for culvert replacement/extension, the applicable PoEs are:

- L1 Vegetation Clearing
- L2 Grading
- L3 Excavation
- L4 Riparian Planting
- B2 Industrial Equipment
- W1 Placement of Material or Structures in Water
- W3 Organic Debris Management
- W4 Addition or Removal of Aquatic Vegetation
- W5 Change in Timing, Duration, And Frequency of Flow
- W6 Fish Passage Issues

5.11.6 MITIGATION AND PATHWAYS OF EFFECTS DIAGRAMS

Using the above culvert replacement example and the Placement of Material or Structures in Water pathway, Table 5-11 outlines the likely residual effects that remain after the mitigation measures are applied to address the potential impacts. The negative residual effects from the Aquatic Effects Assessment are then carried forward to determine whether impacts to fish and fish habitat is likely.

Note: In this example, the mitigation codes have been included in the mitigation measures column to provide context and guide the reader; however, as previously discussed, they are not required. Additionally, each potential stressor has been linked to a specific mitigation measure to demonstrate how the "pathway" has been broken. Completing the Aquatic Effects Assessment Table in this format can assist the reviewer in ensuring all the appropriate mitigation measures have been applied, but while preferred, it also is not a requirement.

Table 5-11. Example of a Proponent's Aquatic Effects Assessment for the Placement of Material or Structures in Water PoE

Stressor (Potential Impact)	Mitigation Measures	Residual Effects
Partial constriction of flow	**D1 - Bridge, Culvert or Other In-water Structures** • The replacement culvert has been designed to span the bankfull width and will be embedded a minimum of 300 mm. • Waterbody aggregate will mimic native substrate and will consist of 50% SB-100, 50% SB-200 with voids filled with available salvaged material and/or SB 37.5. • A low flow channel will be installed to enhance fish passage during low water levels, in accordance with the OPSS for Construction of Riffles on Streambeds (OPSS 823). **M10 - Temporary Flow** • Isolate all in-water works and where applicable, use clean materials free of particulate matter (pea gravel, sheet piles) for coffer dams.	No residual effects anticipated with implementation of mitigation.

Stressor (Potential Impact)	Mitigation Measures	Residual Effects
	• Installation and removal of coffer dams in general accordance with OPSS.PROV 182 and Construction Specification for Dewatering and Temporary Flow Passage Systems (OPSS. PROV 517) and Standard Special Provision Dewatering System Temporary Flow Passage System (SSP 517F01). **M6 - Fish Screens** • Any pumps used for the temporary flow control shall have the appropriately sized screens to prevent impingement or entrainment of fish. **M7 - Fish Transfer** • All fish shall be salvaged from within the isolated area and immediately be released as directed in the Licence to Collect Fish for Scientific Purposes obtained from MNR, in accordance with OPSS.PROV 182.	
Change in channel morphology or shoreline morphometry	**R1 - Waterbody Bank** • Removal of woody debris and stone present on the bank below the high water level will be kept to a minimum and to the extent required to replace the culvert. • Bank material will be salvaged and re-instated in accordance with the contract documents or as directed by the fisheries contracts specialist. **R2 - Waterbody Bed and Substrate** • Any areas of the watercourse disturbed by construction will be restored to their original grade and contour, ensuring a smooth transition between the new culvert and the waterbody bed to prevent creation of a barrier to fish passage or alteration of flows.	Change in habitat structure and cover

Stressor (Potential Impact)	Mitigation Measures	Residual Effects
	• Salvaged substrates shall be used where possible. • Where salvaged substrate is not available, waterbody aggregate shall be used.	
Change in hydraulics	**R2 - Waterbody Bed and Substrate** • Any areas of the watercourse disturbed by construction will be restored to their original grade and contour, ensuring a smooth transition between the new culvert and the waterbody bed to prevent creation of a barrier to fish passage or alteration of flows.	No residual effects anticipated with implementation of mitigation.
Change in substrate composition	**R2 - Waterbody Bed and Substrate** • Any areas of the watercourse disturbed by construction will be restored to their original grade and contour, ensuring a smooth transition between the new culvert and the waterbody bed to prevent creation of a barrier to fish passage or alteration of flows. • Salvaged substrates shall be used where possible. • Where salvaged substrate is not available, waterbody aggregate shall be used.	Change in habitat structure and cover Change in food supply
Change in aquatic macrophytes (vegetation)	**R4 - In-stream Cover** • Removal of aquatic vegetation present in the creek will be kept to a minimum and to the extent required for the culvert extension. • Where practical salvage and re-instate in-stream aquatic vegetation.	Change in habitat structure and cover Change in food supply Change in nutrient concentrations

5.11.7 DETERMINING IF DEATH OF FISH OR HARMFUL ALTERATION, DISRUPTION OR DESTRUCTION OF FISH HABITAT IS LIKELY

Once each negative residual effect is determined, and the severity of those effects estimated, the sum of the severity of all negative residual effects represents the overall impact of the project on fish and fish habitat. This information is then used to determine if the death of fish or HADD of fish habitat is likely. Any individual or combination of negative residual effect(s) may result in the death of fish or HADD of fish habitat. Again, positive effects resulting from construction such as creating new or improving existing fish habitat cannot be used to counterbalance or reduce residual negative effects. At this stage, the fisheries assessment specialist should have sufficient information to determine if there is potential for the death of fish or HADD of fish habitat.

While there is no defined threshold for the severity of any residual effect as to when it results in the death of fish or HADD of fish habitat, professional judgment will be used to determine if the death of fish or HADD of fish habitat is likely based on the assessment of each residual effect. In cases where the death of fish or HADD of fish habitat is likely, an iterative review should be completed to determine if there are any additional construction mitigation measures that could be added to further reduce or eliminate the residual effects. If this fails, efforts should also be made to determine whether design or location changes can reasonably be made to avoid the death of fish or HADD of fish habitat.

When assessing whether residual effects may result in the death of fish or HADD of fish habitat, the following must be considered by fisheries assessment specialists (refer to Table 5-10 above for definitions).

5.11.7.1 SPATIAL SCALE

Typical Considerations:

- At the geographic scale, is the scale of residual effects small enough that the disturbance will not displace fish that would otherwise be occupying the habitat?
- Do the residual effects prevent fish from accessing habitat such as spawning, rearing, or refuge habitat within the ecosystem during critical life stages (e.g., a fish passage barrier that prevents fish from accessing spawning area during critical periods)?
- Is the effect, such as the amount of specific habitat removed from the ecosystem (e.g., infilled) large enough that it would affect the ability of fish to carry out their life functions?
- Is the habitat that is being altered or destroyed the only habitat of its type and quality in the area of the project or is the habitat uniform and/or prevalent throughout the system?

5.11.7.2 DURATION

Typical Considerations:

- When considering the length of time required for habitat disturbance (e.g., removed vegetation, realigned watercourse, etc.) to re-establish fully functional habitat conditions, determine whether the duration of the impact is a matter of, days, weeks, months or multiple years.
- Is the impact permanent (i.e., is the post-construction condition not expected to improve sufficiently to reverse the residual effect(s))?
- Does the temporary/permanent impact limit or diminish the ability of fish to rely on use of such habitats to carry out one or more of their life processes?

5.11.7.3 INTENSITY

When determining intensity of the activity, it is important to consider the contribution of the following components to fish habitat that may be impacted by the project which may include, but are not limited to groundwater inputs, bed load transport, substrate, and vegetation (submergent/emergent and riparian, etc.).

The timing of works can have a major influence on intensity as conditions at different times of the year may not result in the same level of change from the baseline condition (e.g., the potential for change in existing conditions due to direct impacts during critical spawning periods will have a higher intensity than during non-critical periods).

When describing intensity, the following possible outcomes should be considered in the process of determining change from baseline condition:

- The habitat remains suitable;
- The habitat will remain suitable but with expected reduced productivity; or,
- The habitat will be unsuitable to the existing fish community and their life history requirements.

The intensity of the impact also depends on the type of habitat, degree of disturbance, and the likelihood of success of the mitigation/restoration.

Typical Considerations:

- What is the change in habitat anticipated from baseline conditions during and after construction?
- Has the habitat changed sufficiently to limit or diminish its use by fish for carrying out any of their life processes?

- Has the habitat quality been significantly reduced or has the habitat been permanently removed/destroyed, thereby limiting or diminishing ability of fish to rely on use of such habitats to carry out one or more of their life processes?

Note: The fisheries assessment specialist shall consider together, all three aspects – spatial scale, duration, and intensity for each residual effect – when documenting whether there is a potential for the death of fish or HADD of fish habitat.

5.11.8 EXAMPLES OF THE DEATH OF FISH OR HADD OF FISH HABITAT DETERMINATION

- While the activity may have a large footprint (spatial scale), the duration of the impact may be short enough that it does not limit or diminish the ability of fish to rely on use of the habitat to carry out one or more of their life processes. Therefore, this activity would not likely result in the death of fish or HADD of fish habitat.
- The effect may be permanent, for example, change in food supply from vegetation clearing, but is limited to a habitat that is otherwise common in the area (other food sources are available) and therefore does not limit or diminish the ability of fish to rely on the use of the habitat to carry out one or more of their life processes. Therefore, this activity would not likely result in the death of fish or HADD of fish habitat.
- There is a small footprint impact, but it permanently destroys important spawning habitat or will prevent fish from migrating to spawning grounds and therefore will significantly affect the ability of fish to rely on use of the habitat to carry out one of their life processes. Therefore, this activity would likely result in the death of fish or HADD of fish habitat and discussion with MTO should occur immediately.

5.12 FISH AND FISH HABITAT IMPACT DOCUMENTATION

MTO developed the Fish and Fish Habitat Impact Documentation process to support the fisheries assessment specialist in making a determination if the death of fish or HADD of fish habitat is likely. This is consistent with DFO *Fish and Fish Habitat Protection Policy Statement* in that during the development proposal review the proponent can make the determination whether the death of fish or HADD of fish habitat is likely by seeking expert support. For the purposes of MTO projects this expert support is required to be a fisheries assessment specialist. In addition, it is designed to support consistency in approach across MTO projects, including documenting the rationale for the assessment and better defining when a project needs to be submitted to DFO for review.

Fish and Fish Habitat Impact Documentation Table must be submitted to MTO Environmental Delivery for all projects that are required to undertake a fisheries assessment (Step 4 of the MTO Fisheries Protocol), regardless of whether or not the death of fish or HADD of fish habitat was deemed to be likely. This step must be completed prior to completing an MTO Project Notification Form or DFO Request for

Review Form. It is anticipated that this will be completed for each individual crossing; however, if there are instances where a project has multiple crossings with the same habitat type and same scale, duration, and intensity of impacts, then these may be able to be bundled together within one Fish and Fish Habitat Impact Documentation table. In these instances, it is best to discuss with MTO Environmental Delivery to confirm.

The Fish and Fish Habitat Impact Documentation process is based on information gathered throughout the fisheries assessment, such as background data, habitat and fisheries field investigation information and the PoEs assessment. A description of what to include within each field is provided in the Fish and Fish Habitat Impact Documentation found Template D4. The Fish and Fish Habitat Impact Documentation form can be found in APPENDIX D. If the scale of the proposed impact is anticipated to potentially result in the death of fish or HADD of fish habitat, this should be done early in the design process to be able to notify MTO of scheduling impacts associated with potential regulatory review. In these circumstances a draft Fish and Fish Habitat Impact Documentation will be provided early to MTO and team for discussion purposes.

When considering whether a project is likely to result in the death of fish or HADD of fish habitat a fisheries assessment specialist should identify:

1 **Impacts to fish and fish habitat caused by the project***:* For example, have all potential impacts been considered? Pathways of Effects diagrams may help proponents determine what kinds of impacts can be expected from typical developments.

2 **The expected duration of impacts***:* For example, is the duration short enough that it does not diminish the ability of fish to carry out one or more of its life processes? It is important to note that, for many projects, the duration of impact will be longer than the duration of the work taking place in or near the water.

3 **The geographic scale of impacts:** For example, is the scale small enough that the disturbance will not displace fish that would otherwise be occupying the habitat?

4 **The availability and condition of nearby fish habitat**: Is the habitat that is being altered or destroyed the only habitat of its type and quality in the area of the project?

5 **The impact on the relevant fish:** For example, are the fish that are affected by the proposed project likely to experience increased mortality rates, increased stress and reduced fitness as a result of direct injury or reduced habitat function such that a localized effect on a fish population or stock is possible?

6 **Proposed avoidance and mitigation measures**: Will measures to avoid and mitigate impacts to fish and fish habitat be applied such that all harmful impacts are avoided? If so, an authorization is not required. If harmful impacts to fish and fish habitat remains after all avoidance and mitigation measures have been applied, an authorization may be required.

5.13 IMPACT DRAWINGS

It is often difficult to truly understand the impacts of construction on fish and fish habitat when reading a text description of the proposed works and even while reviewing contract drawings. This is especially true for complex construction activities.

An “Impact Drawing” can provide an overview of the work area with all the potential / residual impacts identified. By delineating areas of HADD on an image of the work area, we are provided with a clear, visual depiction of the project’s impacts on fish and fish habitat which assists regulators in their assessment of whether a project is likely to require a *Fisheries Act* Authorization and/or a SARA permit. These drawings also help the project team understand how the implementation of the design and mitigation will impact aquatic values in order to identify areas where avoidance or redesign may be considered to reduce those impacts, and potentially avoid the need for regulatory project review.

Impact Drawings should be able to be interpreted with ease. Ideally, the image should consist of an air photo of a sufficient resolution to represent the project, with an overlay of the new construction and any removals directly associated with the waterbody and surrounding habitat. However, the drawing’s visual complexity may vary depending on software and mapping capabilities of the creator as well as the complexity of the project. If suitable quality air photos are not available, the design drawings will be considered acceptable.

The Impact Drawing should clearly identify the following areas and their footprint area (m^2), as applicable:

- Harmful Alteration
- Disruption
- Destruction
- Alteration (not harmful)
- New Habitat created as part of project.

The Impact Drawing should also include:

- A north arrow, to help orient the reviewer
- Scale bar (if applicable)
- Temporary versus permanent impacts, if applicable to the project.
    - Depending on the scope and complexity of work, this may require separate drawings.

Additional information that will help the reviewer such as the high water level, temporary flow passage system and coffer dams locations, or the General Arrangement can be included but it is important to remember that the image is meant to be clear and easily interpreted. Therefore, the information shown on the image should be limited to that which is relevant to conveying overall impact potential.

An Impact Drawing shall be completed for MTO projects undergoing a full fisheries assessment (i.e., Step 4) and that have been assessed as likely to result in death of fish or HADD of fish habitat and require review by DFO.

Note that although the presence of federally listed endangered or threatened aquatic SAR triggers an automatic review requirement by DFO, if the project is unlikely to result in the death of fish or HADD of fish habitat, an Impact Drawing may not provide additional beneficial information to the reviewer. Therefore, the need for an Impact Drawing when the DFO review requirement is based solely on aquatic SAR presence should be evaluated on a case-by-case basis and in discussion with the MTO Environmental Planner.

The Impact Drawing(s) shall be included in the Fish and Fish Habitat Impact Assessment Report and must be included as an attachment in DFO Request for Review submissions.

An example of an Impact Drawing which highlights the quantified components of HADD of fish habitat is shown in Figure 5-7.

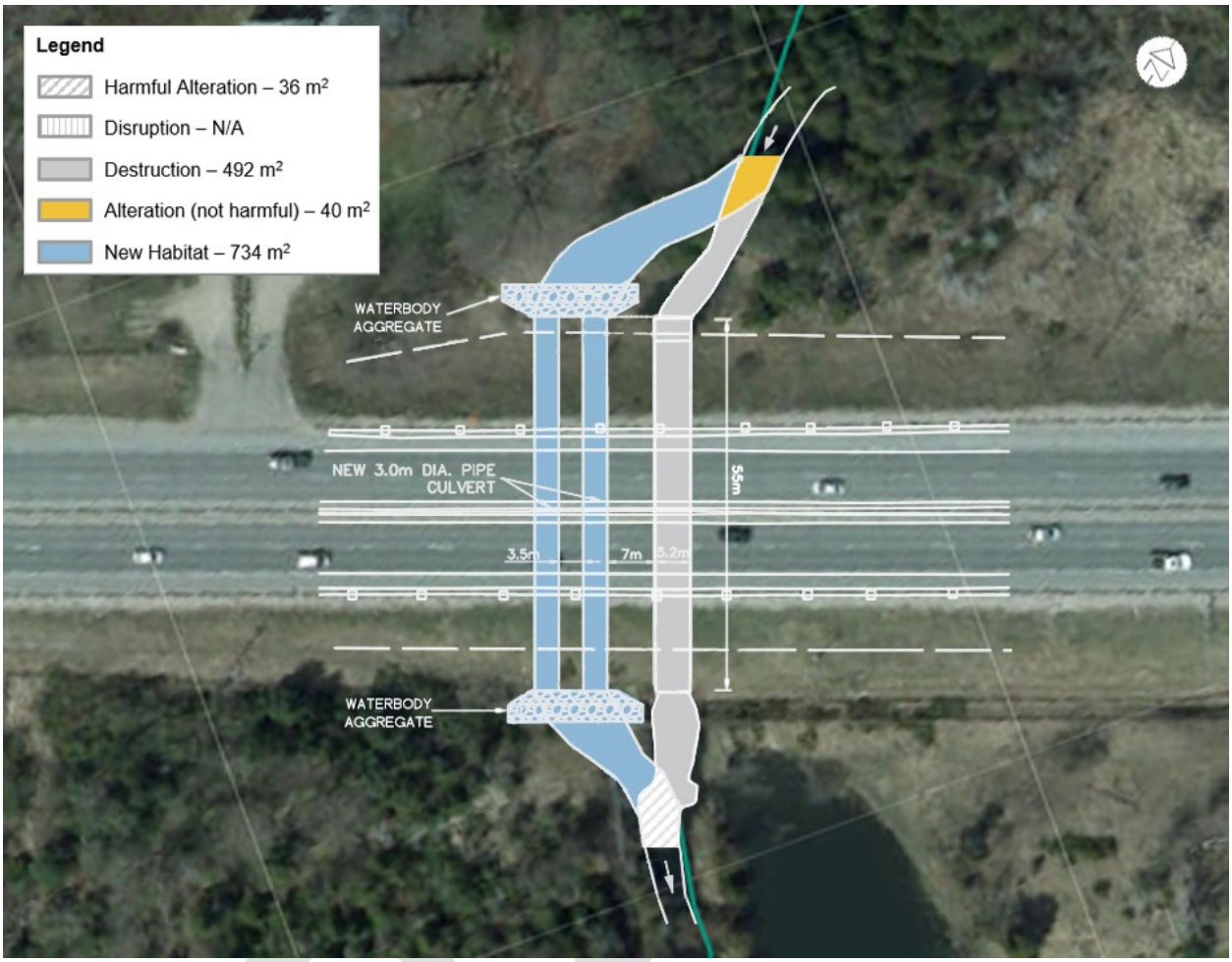

Figure 5-7. Example of an Impact Drawing

6 MTO PROJECT NOTIFICATION FORM (STEP 5)

Overview of Step 5: MTO Project Notification Form

Purpose	• To provide a brief summary of project including the project location, scope of work, applicability of Fisheries BMPs or determination that death of fish or HADD of fish habitat is not likely.
Tasks	• Complete the Project Notification Form. • Submit form and relevant attachments to the appropriate MTO office.
Decisions & Documentation	• Confirm that requirements outlined in the Fisheries Protocol are met. • Commitments, design requirements, and mitigation listed in the Project Notification Form must be consistent with other documentation (ie. Impact Assessment Report, Contract Documents etc.).

6.1 MTO PROJECT NOTIFICATION FORM

The purpose of Step 5 is to complete an MTO Project Notification Form when it is determined that the death of fish or HADD of fish habitat is not likely to occur and that the work/undertaking/activity may proceed without further DFO review. The MTO Project Notification Form is completed for the following:

i. Projects using a Fisheries BMP.

ii. Projects not likely to result in the death of fish or HADD of fish habitat and no federal species at risk are present.

The MTO Project Notification Form documents details about the project, including the location, whether federal or provincial species at risk are present within the project limits, the use of a Fisheries BMP, and any measures being used to avoid harmful impacts to fish and fish habitat, including the use of any project-specific requirements that will be included within the contract (e.g., dewatering, erosion and sediment control, etc.). The details within the MTO Project Notification Form and the measures outlined in the contract must be the same.

- The MTO Project Notification Form can be found in APPENDIX E1.
- The MTO Project Notification Package which includes a QA/QC checklist, MTO Project Notification Form and required template tables can be found in APPENDIX E2.

Table 6-1. Details on the MTO Project Notification Form

	Project completed using a Fisheries BMP	**Fisheries assessment completed**
Who can sign the form	Any project team member	Fisheries assessment specialist
MTO Project Notification Form	• MTO Project Notification Form • Other relevant attachments, as required or as specified in the project TOR.	• MTO Project Notification Form package which includes Template Tables D1 – D4 (APPENDIX D) • Other relevant attachments, as required or as specified in the project TOR.
Where to submit package	MTO Environmental Delivery	MTO Environmental Delivery

7 REQUEST FOR REVIEW FROM DFO (STEP 6)

Overview of Step 6: DFO Request for Review

Purpose	• DFO reviews the project details to determine if a Fisheries Act authorization and/or a federal species at risk permit is required.
Tasks	• MTO confirms that the death of fish or HADD of fish habitat is likely and that the DFO Request for Review Form is required. • Fisheries assessment specialist completes DFO Request for Review Form and submits the form, and all supporting materials to MTO for review. • Once completed and signed by fisheries assessment specialist and MTO, the form shall be sent to DFO for review and decision.
Decisions & Documentation	• DFO will review under the Fisheries Act and advise on whether the death of fish or HADD of fish habitat is likely to occur and will outline the next steps. • DFO will review under Species at Risk Act and advise on whether impacts to federally listed aquatic species at risk will occur and outline the next steps.

7.1 DFO REQUEST FOR REVIEW PROCESS

A DFO Request for Review is required for all projects where MTO has assessed that the death of fish or HADD of fish habitat is likely to occur and/or federal species at risk are present. The fisheries assessment specialist determines if the death of fish or HADD of fish habitat is likely to occur**.** However, for those projects where the death of fish or HADD of fish habitat is unknown or is likely, DFO will advise if a *Fisheries Act* authorization is required. Requests for review, including forms and guidance, can be found on the DFO Projects Near Water website. This site provides compliance guidance for the *Fisheries Act* and the *Species at Risk Act* (for aquatic species) and includes all relevant information on the process of requesting project reviews to applying for project authorizations as well as subsequent steps should they be deemed needed (e.g., offsetting). Appendix H provides MTO instructions on required signatures for fisheries form submissions.

To start this process, the fisheries assessment specialist must complete and submit the MTO Fish and Fish Habitat Impact Documentation (APPENDIX D4) for review to MTO Environmental Delivery. Once MTO has completed their review, the MTO Service Provider will complete the DFO Request for Review Form and submit to MTO for approval and confirmation to proceed. The DFO Request for Review Form and guidance, including submission requirements can be found in APPENDIX E3.

To help minimize impacts to the project schedule, fisheries assessment specialists should notify MTO as early as possible if the death of fish or HADD of fish habitat is likely or if federally listed endangered or threatened aquatic SAR are present. While all final project details may not be known until the end of detail design, the fisheries assessment specialist should be able to provide a reasonable determination at the end of preliminary design or early in detail design as to whether the death of fish or HADD of fish habitat is likely to occur. If needed, draft documentation or discussion with MTO, should be provided early in this process based on the best available information.

Once the submission is sent to DFO, they will initially review the application to ensure it is complete, and once all information is received, will determine if a *Fisheries Act* authorization application is required. DFO considers various information about the project; including: project plans, fish and fish habitat data, project design and construction, etc., when considering impacts to fish and fish habitat. For this reason, it is critical that applications are complete and accurately describe the project and fisheries assessment.

Based on DFO's assessment, the following may occur:

- Death of fish or HADD of fish habitat is not likely (no federal SAR): proceed with project implementation and monitoring.
- Death of fish or HADD of fish habitat is not likely (with federal SAR): SARA permit issued; proceed with project implementation and monitoring.

- Death of fish or HADD of fish habitat is deemed likely (no federal SAR): *Fisheries Act* authorization is issued by DFO. Project must follow all requirements outlined in the authorization.
- Death of fish or HADD of fish habitat is deemed likely (with federal SAR): SARA-Compliant *Fisheries Act* authorization is issued. Project must follow all requirements outlined in the authorization.

If DFO determines the death of fish or HADD of fish habitat is likely to occur, an Offsetting Plan will be required prior to the issuance of a *Fisheries Act* authorization. This is discussed in detail in Section 8 Developing an Offsetting Plan.