

Protocol for the Review of Water Crossings Proposed Through the Forest Management Planning Process



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Table of Contents

1.0	Introduction	1
2.0	Legislation and Policy Context	1
3.0	Overview of the Protocol	4
4.0	Roles and Responsibilities	6
5.0	Phasing-in the Protocol	7
6.0	Amendments to This Protocol	7
Appendix 1: Form for Submission of Information on a Proposed Water Crossing ..		16
Appendix 2: Risk Evaluation for a Proposed Water Crossing		17
Appendix 3: Risk Factors, Evaluation Parameters and Decision Criteria for Evaluating the Risk of Proposed Water Crossings to Fish and Fish Habitat		21
Appendix 4: Site Inspection Form		27
Glossary of Terms		28
References		34

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1.0 Introduction

The purpose of this protocol is to ensure that fish and fish habitat, as defined under the federal *Fisheries Act*, are considered during the planning and construction of water crossings in forest management. Use of this protocol, and adherence to the specified standards, guidelines and best management practices in forest management guides, will help to ensure the protection of fish and fish habitat.

Condition 25(b) of the Ontario Ministry of the Environment (MOE) Environmental Assessment Declaration Order MNR-71 regarding the Ministry of Natural Resources (MNR) Class Environmental Assessment Approval for Forest Management on Crown Lands in Ontario, pursuant to the Environmental Assessment Act, requires OMNR "... in consultation with the forest industry and other government agencies, ... develop a proposal for efficiently conducting reviews of water crossings, as required under the federal Fisheries Act. This proposal shall be provided to the federal Department of Fisheries and Oceans for their consideration within one year of the date on which this Declaration Order comes into force."

This protocol addresses the requirements of condition 25(b), and assists OMNR and the forest industry to satisfy and clarify their responsibilities under the federal *Fisheries Act*, the Department of Fisheries and Oceans Canada (DFO) *Policy for the Management of Fish Habitat (1986)* and the OMNR Strategic Plan for Ontario Fisheries II (OMNR 1992).

The protocol describes roles and responsibilities for OMNR, DFO and sustainable forest licensees. It also describes a review procedure which will ensure the protection of fish and fish habitat. Use of the protocol will ensure that decisions are more consistent and completed in a timely manner. The protocol also sets procedures to be followed by sustainable forest licensees if unmapped streams are discovered during the implementation of forest operations.

The risk evaluation approach in the protocol is consistent with and supports A *Protocol Detailing the Fish Habitat Referral Process in Ontario*, (DFO et al. 2000). The protocol is also consistent with DFO's *Policy for the Management of Fish Habitat* (DFO, 1986) and DFO's "Fish Habitat Management's Risk Management Framework".

2.0 Legislation and Policy Context

For forest management activities, the responsibility to protect fish habitat is shared between the federal and provincial governments, through the federal *Fisheries Act* (FA) and Ontario's *Crown Forest Sustainability Act* (CFSA).

Fisheries Act

The *Fisheries Act (FA)* is the principal statute which protects fish and fish habitat in Canada, and is administered by DFO. There are a number of habitat protection provisions under the *FA* that are relevant to forest management on Crown lands, as regulated under the *CFSA*. Key habitat provisions in the *FA* include:

- Sections 20, 21, 22 (provide for the free and unobstructed passage of fish, or water flows necessary for fish);
- Section 32 (no person shall destroy fish by any means other than fishing);
- Section 35 (protection of fish habitat); and
- Subsection 36(3) (prohibits the deposit of sediment and other deleterious substances).

Section 35 prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat from a work or undertaking, except where authorized by the federal Minister of Fisheries and Oceans. After review of a proposed work or undertaking (e.g. construction of a water crossing) which concludes that construction will result in a HADD, the federal Minister may authorize the HADD if the expected HADD is acceptable. Under the *Policy for the Management of Fish Habitat (1986)*, DFO typically does not authorize a HADD unless acceptable measures to compensate for the HADD are developed and implemented by the proponent. The *Fisheries Act* authorization will set out the conditions for mitigation and compensation. If DFO does not conclude the proposed work or undertaking will result in a HADD they will issue a letter of advice.

Guidance and clarification of how fish habitat will be protected is provided in DFO's *Policy for the Management of Fish Habitat (1986)*. The long-term objective of the policy is to achieve an overall net gain in the productive capacity of fish habitat. A fundamental goal for achieving this long-term objective is to prevent further loss of the productive capacity of existing habitat by applying the "No Net Loss Guiding Principle" to habitat management decisions related to the conservation and protection of existing habitats. In addition to protection of fish and fish habitat, other mechanisms to achieve the objective of the policy include restoration of fish habitat and creation of fish habitat. For example, restoration of fish migration due to blocked or impeded migration at a water crossing assists in achieving the net gain objective.

In areas governed by the *CFSA*, OMNR has retained responsibilities for decision-making in respect of the protection of fish and fish habitat, as outlined in a protocol between OMNR, Conservation Ontario, Parks Canada and DFO, entitled: *A Protocol Detailing the Fish Habitat Referral Process in Ontario (August 2000)* (referred to as the Referral Process). For forest management activities carried out under the *CFSA*, OMNR staff assist sustainable forest licensees in the preparation and review of forest management plans and associated annual work schedules. OMNR staff identify when proposed forest operations may cause the harmful alteration, disruption or destruction of fish habitat, and then work with the sustainable forest

licensee to prevent, minimize and/or mitigate potential impacts. Under the Referral Process, OMNR only refers those water crossing proposals to DFO where a potential HADD is likely and the impacts to fish and fish habitat cannot be mitigated. DFO then reviews the water crossing referral and determines if the HADD is acceptable; if acceptable, DFO initiates a *Canadian Environmental Assessment Act* (CEAA) review to determine if the environmental impacts are significant. If it is determined that the environmental impacts are not likely significant, DFO issues a *FA* authorization on the basis of an acceptable mitigation and habitat compensation plan. The habitat compensation plan is developed co-operatively by the sustainable forest licensee, OMNR and DFO. DFO can refuse authorization if there is no acceptable mitigation and habitat compensation plan.

A decision to issue an authorization or approval under sections 22, 32 and 35 of the *Fisheries Act* triggers the requirement for the CEAA. An Environmental Screening Report and decision under the CEAA must be completed prior to DFO issuing an authorization under the *Fisheries Act*. The CEAA review involves other affected federal agencies, and includes a review of environmental impacts beyond fish habitat.

The Crown Forest Sustainability Act (CFSA)

The *Crown Forest Sustainability Act (CFSA)* provides for the sustainability of Crown forests, and through its regulations, requires adherence to a set of manuals, including the *Forest Management Planning Manual (FMPM)* (OMNR 2004), the *Forest Information Manual (FIM)* (OMNR 2001) and the *Forest Operations and Silviculture Manual (FOSM)* (OMNR 1995).

The FMPM prescribes the planning process, and the content and format requirements, for a Forest Management Plan (FMP) and an Annual Work Schedule (AWS) for each forest management unit. The planning and documentation requirements include requirements for the planning of water crossings.

The FIM prescribes the mandatory information and information products required by OMNR and the sustainable forest licensee.

The FOSM provides direction and guidance to resource managers responsible for managing and operating in Crown forests. This direction is provided through various forest management guides, including, at the time of writing this protocol, the *Timber Management Guidelines for the Protection of Fish Habitat* (OMNR 1988), the *Environmental Guidelines for Access Roads and Water Crossings* (OMNR 1990), and the *Code of Practice for Timber Management Operations in Riparian Areas* (OMNR 1991). Forest management guides are periodically reviewed and, when necessary, revised. All three of these documents are currently being updated and may be published under different titles in the future.

Water Crossing Planning Requirements in the *Forest Management Planning Manual* (OMNR 2004)

Under the *Forest Management Planning Manual* (2004), there are new Annual Work Schedule (AWS) requirements for the planning, review and approval of water crossings for new roads that are constructed for forest management purposes. These requirements (FMPM, Part D, Section 3.2.6.1), which came into effect for the 2005-06 AWSs, include:

- a) The location, description of the proposed crossing structure and construction conditions for each water crossing will normally be documented in two successive AWSs (i.e., for the year prior to, and the year of, construction).
- b) Each proposed water crossing in the first AWS (i.e., the AWS for the year prior to construction) will require an OMNR review with respect to the *Fisheries Act*. The approval of each water crossing will be documented as part of the next AWS (i.e., the AWS for the year of construction). That review will occur in accordance with the requirements of this protocol.

In order to ensure efficient and expeditious OMNR review, planning of the details of water crossings in the AWS will involve the co-operative efforts of appropriate sustainable forest licensee and OMNR field staff, using the best available information. A water crossing will not be approved until a review with respect to the *Fisheries Act* has been completed.

Navigable Waters Protection Act (NWPA)

The public right of navigation is also under the jurisdiction of the federal government, and is administered by Transport Canada through the authority of the *Navigable Waters Protection Act (NWPA)*. This protocol does not provide guidance to OMNR or sustainable forest licensees on obligations under the *NWPA*. The review of undertakings which may have implications to the public right of navigation is the responsibility of Transport Canada, and sustainable forest licensees will contact Transport Canada directly on water crossings with issues relating to navigability. Some approvals under the *NWPA* also trigger the *CEAA*.

3.0 Overview of the Protocol

The protocol describes the Process for the Review of Proposed Water Crossings (Figure 1), which involves a risk evaluation approach. The process provides the opportunity to begin risk evaluation at the forest management plan stage, and describes when site visits are required. The roles and responsibilities of sustainable forest licensees, OMNR and DFO for each step in the process are described in Roles and Responsibilities Related to the Review of Proposed Water Crossings (Table 1). Figure 1 and Table 1 are intended to be used together to ensure that water crossings identified in forest management plans (FMPs) and annual work

schedules (AWSs) are planned and constructed using techniques and appropriate mitigation measures to ensure the protection of fish and fish habitat. The protocol also describes requirements for the review of water crossings of unmapped or incorrectly mapped streams which are discovered during the implementation of operations, including requirements for AWS revisions.

In the planning of water crossings, fish passage, the possibility of sediment deposition (deposition of deleterious substances), and the possibility of harmful alteration, disruption or destruction (HADD) of fish habitat, must be considered. A risk evaluation approach is used to ensure that the sections of the *Fisheries Act* that apply to these considerations are addressed.

While the focus of this protocol is the efficient review of water crossings submitted in AWSs, the protocol also provides the opportunity for a preliminary review of some proposed water crossings at the FMP stage. This provision recognizes that some sustainable forest licensees undertake detailed planning for some water crossings in FMPs, and that the workload at the AWS stage could therefore be reduced.

Key Components of the Protocol

To ensure timely reviews, the Form for Submission of Information on a Proposed Water Crossing (Appendix 1) was developed to facilitate the submission of detailed information on proposed water crossings by the sustainable forest licensee. This form expands on the direction in the FMPM (Part D, Section 3.2.6.1), and while not mandatory, is recommended for use. The design and information contained in this form is based on similar forms used by sustainable forest licensees. The form is available in both electronic and paper format.

A key concept in the risk evaluation is the use of a layered approach where each evaluation builds on previous evaluations. The process provides a risk evaluation at the forest management plan stage, the AWS stage one year in advance of crossing installation, during site inspections (if conducted), and at the time of installation. This layered risk evaluation approach facilitates an efficient, coherent and consistent review and approval process. This protocol is built on DFO's Risk Management Approach that is currently being implemented across Canada, where project and fish habitat impacts are examined with respect to low, medium and high risk. In DFO's Risk Management Approach, low risk projects will typically be handled with operational statements that outline standard mitigation measures and best management practices which, if followed, eliminate a HADD and the need for an authorization. Medium and high risk projects are those projects that will result in a HADD, and therefore require an authorization or need to be redesigned to proceed.

The protocol includes a Risk Evaluation for a Proposed Water Crossing (Appendix 2) that will be used by OMNR to assess the risk that a water crossing may impact on fish or fish habitat. The low risk water crossing proposals will be filtered out using the risk evaluation process, since standard mitigation measures can be applied to the project to mitigate impacts on fish and fish habitat. The medium and high risk

water crossings will be examined further to determine if relocation, redesign or additional mitigation measures will reduce the risk to fish and fish habitat. The low risk water crossings resulting from this further examination will be filtered out using the risk evaluation process. For the remaining medium or high risk water crossings, OMNR is responsible for conducting a site visit, with the participation of the sustainable forest licensee. After the site visit, any remaining high risk water crossings will be referred to DFO for review and possible authorization.

The collection and verification of fish values information is an OMNR responsibility, in accordance with the requirements of FIM (Part B, Section 4.3.2). However, data collection arrangements may be developed between OMNR and the sustainable forest licensee for the purpose of obtaining values information, or for confirming or verifying existing values information, in accordance with the requirements of FIM (Part B, Section 4.2).

The risk evaluation approach described in this protocol builds on current good operational practices now being used in the planning and review of water crossings by OMNR, DFO and the forest industry. Use of the protocol will ensure, in a formal way, that most water crossing impacts are identified and mitigated in a consistent and standardized manner. For a due diligence approach, there must be consistency in the way reviews are conducted and decisions are documented.

OMNR staff will apply the protocol and undertake a risk evaluation for each water crossing of permanent and intermittent mapped streams proposed in an AWS. OMNR staff will also apply the protocol and undertake a risk evaluation for each water crossing of an unmapped permanent stream that is identified by the sustainable forest licensee during the implementation of operations.

4.0 Roles and Responsibilities

The process for the review of proposed water crossings is described in Figure 1. Roles and responsibilities in relation to the individual components of the process are described in Table 1.

For Crown management units, where OMNR has the responsibility for forest management planning, OMNR fulfils the responsibilities of the sustainable forest licensee as described in the 'Role of the Sustainable Forest Licensee' column of Table 1.

5.0 Phasing-in the Protocol

In order to meet the requirements of the FMPM (2004) for 2005-06 AWSs, a draft of this protocol was used province-wide starting in September 2004. This final version replaces that draft.

6.0 Amendments to This Protocol

This protocol was developed through a collaborative and consultative approach between OMNR, DFO and the forest industry. Any changes to the protocol will be developed in the same consultative and collaborative manner.

The application of this protocol will be reviewed in selected forest management units across the province during the first year of its implementation, and the protocol will be revised if necessary.

The protocol will be also be reviewed on a regular basis and modified as required.

Figure 1: Process for the Review of Proposed Water Crossings

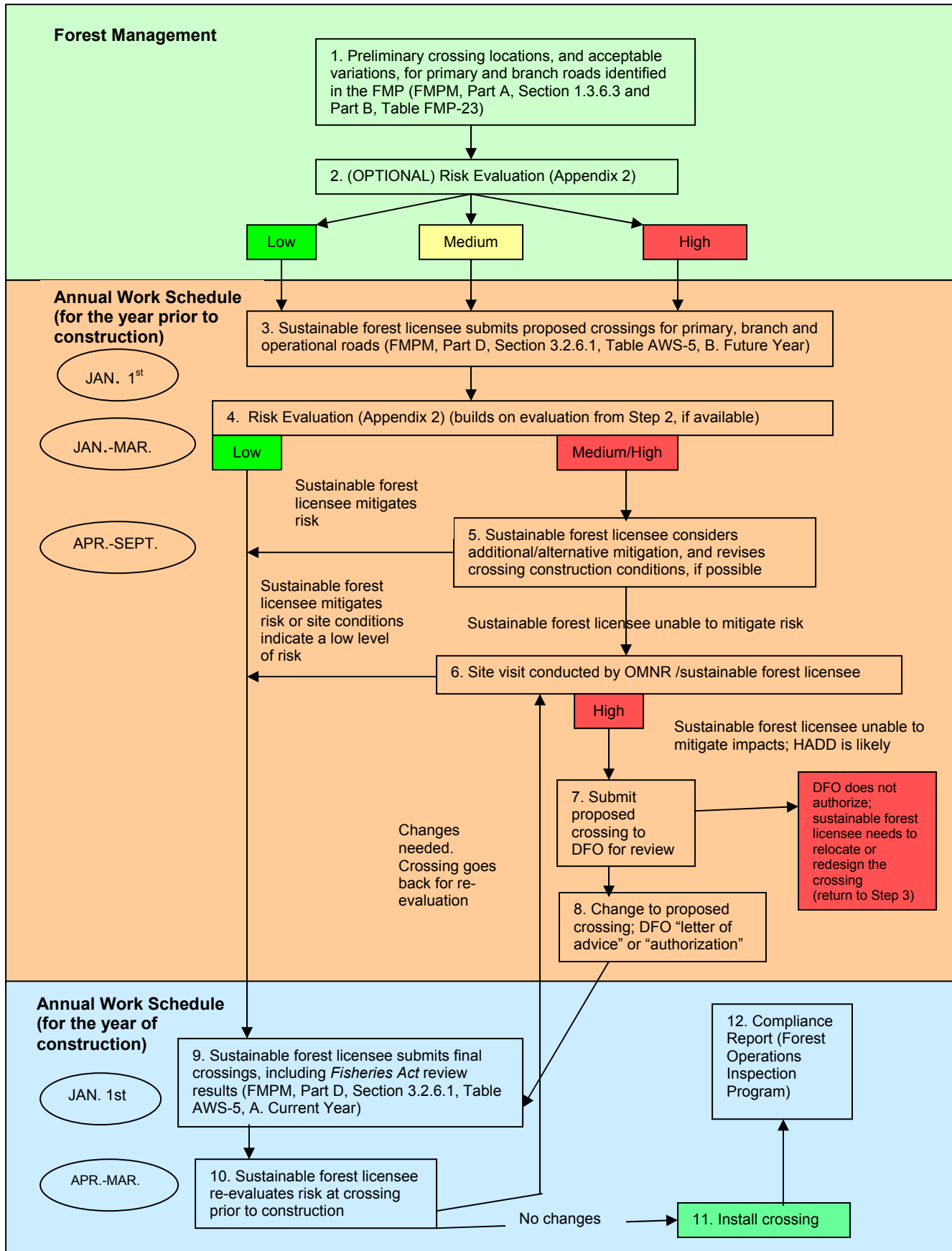


Table 1: Roles and Responsibilities Related to the Review of Proposed Water Crossings

(Note: Each row in the "Process Component" column of the table corresponds to a step in Figure 1)

Stage	Process Component	Background and Intent	Role of Sustainable Forest Licensee	Role of OMNR/DFO
Forest Management Plan	1. Preliminary crossing locations, and acceptable variations, for primary and branch roads identified in the FMP (FMPM, Part A, Section 1.3.6.3 and Part B, Table FMP-23)	In an FMP, preliminary crossings must be determined for primary and branch roads	As described in the FMPM	As described in the FMPM
Forest Management Plan	2. (OPTIONAL) Risk Evaluation (Appendix 2)	<p>Some sustainable forest licensees undertake detailed planning of some water crossings at the FMP stage.</p> <p>The intent is to provide an opportunity for a preliminary risk evaluation of some water crossings at the FMP stage.</p> <p>The risk evaluation at the FMP stage will identify potential risks to fish and fish habitat early in the planning process, thus reducing the workload at the AWS stage. Readily available information will be used, including values information.</p>	<p>Works with OMNR to undertake a preliminary risk evaluation for each proposed water crossing, using the form in Appendix 2 and the guidance in Appendix 3.</p> <p>Modifies crossing location and/or construction conditions to reduce potential risk to "low", or to eliminate the risk altogether.</p>	<p>OMNR works with sustainable forest licensee to undertake a preliminary risk evaluation for each proposed water crossing, using the form in Appendix 2 and the guidance in Appendix 3.</p> <p>DFO may provide advice, if requested.</p>
Annual Work Schedule (for the year prior to construction)	3. Sustainable forest licensee submits proposed crossings for primary, branch and operational roads (FMPM Part D, Section 3.2.6.1 and Table AWS-5, B. Future Year)	<p>The intent is to provide OMNR with sufficient time to review all proposed water crossings, assign a level of risk, and report the results to the sustainable forest licensee with the approval of this AWS.</p> <p>This information enables OMNR to determine which crossings are low risk, and which crossing are medium/high risk and require a site visit. The site visit will be completed that summer or early fall.</p> <p>In this AWS, for each proposed water crossing, the following information will be submitted: crossing location, description of the proposed structure, construction conditions and recommendations on future removal.</p>	<p>As described in the FMPM.</p> <p>Provides additional details on the crossing, using Appendix 1 or a similar form.</p>	As described in the FMPM.

Annual Work Schedule (for the year prior to construction)	4. Risk Evaluation (Appendix 2) (builds on evaluation from Step 2, if available)	<p>A risk evaluation is part of a due diligence approach to address OMNR's responsibilities under the <i>Fisheries Act</i>.</p> <p>The risk evaluation assesses the risk to fish and fish habitat at proposed crossings and ensures documentation of OMNR's review and decision-making.</p> <p>If a preliminary risk evaluation was undertaken at the FMP stage (Step 2), risk evaluation at the AWS stage can build on that evaluation.</p> <p>OMNR will use the best available information to conduct an evaluation of risk to fish and fish habitat.</p> <p>Guidance and information sources for completing the risk evaluation are provided in Appendix 3.</p> <p>The use of the "medium/high" risk category is a place holder for proposed crossings that do not screen out initially as low risk. These crossings are held in the medium/high category until further information is obtained or further investigation is undertaken to determine the proposed crossing as a potentially low or high risk.</p>	N/A	<p>OMNR undertakes a risk evaluation of each proposed water crossing, using the form in Appendix 2 and the guidance in Appendix 3.</p> <p>As part of the approval of this AWS, OMNR provides the sustainable forest licensee with the risk evaluation results for each proposed crossing, and identifies proposed crossings which require a site visit.</p>
Annual Work Schedule (for the year prior to construction)	5. Sustainable forest licensee considers additional/alternative mitigation, and revises crossing construction conditions, if possible.	<p>The intent is to provide an opportunity for the sustainable forest licensee to work with OMNR to adjust crossing structure or construction practices at medium/high risk crossings, and to identify if the company cannot mitigate the impacts.</p> <p>Using mitigation measures, the intent is to lower the risk evaluation to a "low" risk.</p> <p>There may be circumstances when the sustainable forest licensee is unable to follow advice related to mitigation. In these cases, a site visit is required. OMNR is responsible for conducting the site visit, and will encourage the participation of the sustainable forest licensee.</p>	<p>Works with OMNR to adjust crossing location or construction practices to lower the risk.</p> <p>Investigates additional/ alternative mitigation techniques to lower the risk.</p> <p>Also identifies if it cannot apply additional/ alternative mitigation techniques to lower the risk.</p>	<p>Works with the sustainable forest licensee to adjust crossing location or construction practices to lower the risk.</p> <p>OMNR identifies when a site visit is required (i.e. when additional/ alternative mitigation techniques to lower the risk are not immediately clear.)</p> <p>OMNR works with the sustainable forest licensee to undertake a site visit.</p>

<p>Annual Work Schedule (for the year prior to construction)</p>	<p>6. Site visit conducted by OMNR/sustainable forest licensee</p>	<p>The intent is to undertake site visits of the medium/high risk crossings, if further mitigation was not identified and agreed to at Step 5.</p> <p>Site visits are intended to examine the potential impacts of the proposed crossing on fish and fish habitat for crossings screened to a medium or high risk. Fish passage and erosion/sedimentation impacts will also be considered.</p> <p>A site visit also serves to confirm mitigation measures that were discussed with the sustainable forest licensee, or may result in the addition of new mitigation measures.</p> <p>Joint site visits promote an open and transparent decision-making process, and provide the opportunity for OMNR to discuss the results and/or proposed mitigation measures with the sustainable forest licensee. Joint site visits will expedite the review process.</p> <p>A standardized site inspection form (Appendix 4), ensures complete and consistent documentation of site conditions. It also ensures that enough information is collected, in the event that the proposed water crossing is forwarded to DFO, so that DFO will not have to complete an additional site visit.</p>	<p>Undertakes a site visit with OMNR during snow-free conditions.</p> <p>Works with OMNR to investigate other potential mitigation measures (including relocation or redesign options) to determine if the potential risk at medium/high risk sites can be lowered.</p>	<p>It is OMNR's responsibility to undertake a site visit, preferably with the sustainable forest licensee, during snow-free conditions.</p> <p>OMNR documents fish habitat and site conditions using site inspection form (Appendix 4)</p> <p>OMNR works with the sustainable forest licensee to identify other mitigation measures (including relocation or redesign options) to determine if the potential risk at medium/high risk sites can be lowered.</p> <p>OMNR may contact DFO to discuss concerns with the risk associated with a particular crossing before a site visit is determined to be necessary.</p> <p>DFO may provide advice, if requested.</p>
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Annual Work Schedule (for the year prior to construction)	7. Submit proposed crossing to DFO for review	<p>Only DFO may authorize a HADD.</p> <p>OMNR must refer the proposed crossing to DFO as required by "A Protocol Detailing the Fish Habitat Referral Process in Ontario", if:</p> <ul style="list-style-type: none"> the site visit reveals that a HADD is likely to occur if the crossing is constructed as proposed; no other mitigation measures are possible; and the sustainable forest licensee is unable to use a different crossing location or design. 	N/A	<p>If a referral to DFO is required, OMNR provides the following information on the proposed water crossing to DFO:</p> <ul style="list-style-type: none"> a complete description of the proposed water crossing as prepared by the sustainable forest licensee (Appendix 1), the risk evaluation form (Appendix 2), the site inspection form (Appendix 4), and photographs. <p>DFO reviews each referral, and responds to OMNR and the sustainable forest licensee as quickly as possible.</p> <p>If DFO concludes that fish and fish habitat impacts can be mitigated, DFO will contact OMNR and the sustainable forest licensee to discuss and agree on additional mitigation measures. If there is agreement, DFO will issue a "letter of advice".</p> <p>If DFO concludes that fish and fish habitat impacts cannot be mitigated, DFO will contact OMNR and the sustainable forest licensee to discuss compensation options, and DFO will begin the required review under the <i>CEAA</i>. DFO must post project information on the Canadian Environmental Assessment Registry within 14 days of initiating a <i>CEAA</i> review. The project information must be posted for a minimum of 14 days before DFO makes a decision on the significance of effects. If the effects are not significant, DFO can then issue an "authorization" under section 35(2) of the <i>FA</i> that outlines the agreed upon mitigation and habitat compensation plan.</p>
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Water Crossing Review Protocol

Annual Work Schedule (for the year prior to construction)	8. Changes to proposed crossing; DFO "letter of advice" or "authorization"	Construction practices at the proposed crossing must be consistent with the direction in the "letter of advice" or the "authorization" from DFO	Complies with direction in the "letter of advice" or "authorization" from DFO, and revises the proposed water crossing. If compensation is required for a crossing that is the responsibility of the sustainable forest licensee, the sustainable forest licensee is responsible for developing a habitat compensation plan. The sustainable forest licensee, OMNR and DFO will jointly agree on acceptable habitat compensation plan.	For Crown management units, OMNR complies with direction in the "letter of advice" or "authorization" from DFO, and is responsible for the developing a habitat compensation plan.
Annual Work Schedule (for the year of construction)	9. Sustainable forest licensee submits final crossings, including <i>Fisheries Act</i> review results (FMPM, Part D, Section 3.2.6.1, Table AWS-5, B. Current Year)	In this AWS, for each water crossing scheduled for construction, the following information will be submitted: crossing location, description of the proposed structure, construction conditions, recommendations on future removal, and the results of the <i>FA</i> review. Include DFO "letters of advice" and "authorizations", if applicable. The intent is that the approval of all water crossings scheduled for construction during the year is provided through the approval of this AWS.	As described in the FMPM.	As described in the FMPM. OMNR approves crossings for construction as part of the approval of this AWS. OMNR will file the completed risk evaluation forms (Appendix 2) and site inspection forms (Appendix 4) with the approved AWS at the appropriate OMNR district or area office.
Annual Work Schedule (for the year of construction)	10. Re-evaluate risk at crossing prior to construction	The information for each crossing (Step 9) must be available to sustainable forest licensee staff involved in crossing construction. The intent is to evaluate the risk one last time before the crossing is installed. Re-evaluation of risk before crossing installation is an important component of a due diligence approach. If conditions at the site are different than what was understood during the risk evaluation and/or site visit, the risk may be different (e.g. may cause a violation under the <i>Fisheries Act</i>), and construction practices should be changed. A revision to the AWS will be required (FMPM, Part D, Section 3.4.1.2).	Re-evaluates the risk at the crossing, immediately before installation. If site conditions are different and construction practices should be changed, the sustainable forest licensee will cease construction. The sustainable forest licensee will document the differences in site conditions and required changes to construction practices in a proposed revision to the AWS, and submit to OMNR.	If necessary, OMNR works with the sustainable forest licensee to assess the risk associated with different site conditions and construction practices. DFO may provide advice, if requested. If necessary, OMNR approves the water crossing for construction through the approval of an AWS revision. OMNR will file the completed risk evaluation forms (Appendix 2) and site inspection forms (Appendix 4) with the approved AWS revision at the appropriate OMNR district or area office.

		The sustainable forest licensee is not expected to make a HADD determination; rather the sustainable forest licensee is making a determination that the risk is greater if the crossing is constructed as approved, because the site conditions are different.		
Annual Work Schedule (for the year of construction)	11. Install crossing	<p>Water crossings will be installed in accordance with the approved AWS.</p> <p>There are provisions for the planning and construction of crossings of unmapped or incorrectly mapped permanent and intermittent streams discovered during the implementation of operations.</p>	<p>Installs crossings as per the approved AWS.</p> <p>The sustainable forest licensee will use the <i>Environmental Guidelines for Access Roads and Water Crossings</i> (OMNR 1990) (or its successor) to ensure fish and fish habitat are protected during construction.</p> <p>Implements DFO authorized habitat compensation plans.</p> <p>For each crossing of an unmapped or incorrectly mapped permanent stream discovered during the implementation of operations, the sustainable forest licensee will provide information on the stream location and the details on the crossing (Appendix 1 or a similar form) to OMNR in a proposed revision to the AWS, in accordance with the requirements the FMPM (Part D, Sections 3.4.1.2 and 3.4.1.4). Construction of the crossing will not occur until the OMNR has completed the risk evaluation (Appendix 2) and approved the crossing via an AWS revision.</p> <p>Each crossing of an unmapped intermittent stream discovered during the implementation of operations is considered to be a low risk crossing, unless known fish habitat values are affected. For those low risk crossings, the sustainable forest licensee will provide information on the stream location and the details on the crossing (Appendix 1 or a similar</p>	<p>For Crown management units, OMNR implements DFO authorized habitat compensation plans.</p> <p>For each crossing of an unmapped or incorrectly mapped permanent stream, or intermittent stream with known fish habitat values, discovered during the implementation of operations which is submitted in a proposed AWS revision, OMNR will undertake a risk evaluation (Appendix 2) and, if required, conduct a site visit. If a referral to DFO is required, OMNR provides the required information on the proposed water crossing to DFO as per Step 7. OMNR approves those crossings for construction as part of the approval of the AWS revision.</p> <p>OMNR will file the completed risk evaluation forms (Appendix 2) and site inspection forms (Appendix 4) with the approved AWS revision at the appropriate OMNR district or area office.</p> <p>OMNR will update the values maps and values information databases with stream locations as per FIM (2001).</p>

			<p>form) to OMNR. Information on the location of the stream will be provided to OMNR, in accordance with the requirements of FIM (Part B, Sections 4.1.2, 4.3.2 and 4.4.1.1).</p> <p>For each crossing of an intermittent stream with known fish habitat values, information on the stream location and the details on the crossing (Appendix 1 or a similar form) will be provided to the OMNR in a proposed revision to the AWS, in accordance with the requirements the FMPM (Part D, Sections 3.4.1.2 and 3.4.1.4). Construction of the crossing will not occur until the OMNR has completed the risk evaluation (Appendix 2) and approved the crossing via an AWS revision.</p>	
Annual Work Schedule (for the year of construction)	12. Compliance Report (Forest Operations Inspection Program)	The intent is to provide feedback for improving the planning, review and construction of water crossings.	<p>Monitors installation of water crossings for conformity with conditions on construction.</p> <p>Monitors implementation of DFO authorized habitat compensation plans.</p>	<p>Through inspection audits and spot-checks, OMNR monitors installation of water crossings for conformity with conditions on construction, and implementation of DFO authorized habitat compensation plans.</p> <p>For Crown management units, OMNR implements DFO authorized habitat compensation plans.</p>

Appendix 1: Form for Submission of Information on a Proposed Water Crossing

Sustainable Forest Licensee Name		Sustainable Forest Licensee Contact & Tel. No.	
FMU	Plan Term	AWS Year	Water Crossing ID
Watercourse name and crossing location (include Township, Lot and Concession, County, Lat & Long, UTM Coordinates, or provide map)			
Proposed crossing construction start date	Proposed crossing construction completion date	Road type (circle or highlight one) Primary Branch Operational	Year of structure removal, if not permanent (refer to road use management strategy in FMP)
Watershed Characteristics			
Watershed area (km ²)	Is the slope >30%/17°?	Stream gradient at crossing (%) (from map, OFAT etc.)	Water course type (circle or highlight one) Intermittent Permanent
Structure type (circle or highlight appropriate structure) Bridge: single span multi span Bailey portable other (specify) Culvert: round – steel round – plastic arch – steel box – wooden other (specify) Winter: ice snow pack snow pack – culvert snow pack – logs temporary bridge Ford – engineered Other (specify):			
Available Without Site Visit			
Opening size (mm) (If a bridge, distance between abutments in metres)	Design flow (attach watershed analysis)	Fill material type	Installer experience (years)
Isolate work area from flowing water? (circle/highlight one) No Yes	If “Yes”, will diversion or stream straightening be used? No Yes	If “Yes”, will coffer dam or silt fence be used? No Yes	
Additional information			
Site Visit Complete			
% of Channel infilled	Length of stream channel enclosed (m)	Bridge/arch culvert abutments in floodplain? No Yes	Bridge/arch culvert abutments in active channel? No Yes
Fill material	Fill height (m)	Road width (m)	Fording required? No Yes # of times:
% of Culvert embedded	Normal water depth in culvert (m)	Slope of road approaches (Use Fish Guide slope categories (%))	Ditching on approaches No Yes
Sediment control plan to be used? No Yes	Sediment control on ditches and road approaches? No Yes		
Additional information			
Date Submitted:	Submitted by:		

Appendix 2: Risk Evaluation for a Proposed Water Crossing

FMU		Plan Term	
Proposed year of construction		Crossing ID	
Prepared by		Road Type	
Part A			
If Schedule 1 aquatic Species at Risk have been identified near the water crossing – refer the project to DFO for review. Refer to the SARA Registry for a list of species at risk – www.sararegistry.gc.ca			
Is the stream intermittent, and does the crossing design meet the standards in the <i>Environmental Guidelines for Access Roads and Water Crossings</i> ? If “Yes”, completion of <i>Part B</i> is only required if there are known fish habitat values affected by the crossing. If “No”, complete <i>Part B</i> .			

Part B

1. Is the portion of stream within the 100 m crossing location likely to contain a riffle?		
2. Is the slope > 30%/17°? (If different on either side of the stream, use the steeper slope.)		
3. Is the proposed structure opening size less than Q25?		
4. Will construction occur outside of the work-in-water timing window?		
5. Are there any known fish habitat values affected by the crossing?		
6. Will the construction and mitigation deviate from the mandatory standards in the <i>Environmental Guidelines for Access Roads and Water Crossings</i> ?		

If “Yes” for any question in *Part B*, discuss in *Part D*.

Part C

Are there any other concerns pertaining to information described in Appendix 3? If “Yes”, discuss in <i>Part D</i> .		
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If answers to all questions in *Parts B* and *C* are “No”, risk evaluation is “low”.

Part D

Describe any concerns, and rationalize additional conditions on construction (if necessary) for questions answered “Yes” in *Parts B* and *C*.

Risk Evaluation (highlight/circle one) Low Medium/High

Site Inspection Required? Yes No Date Completed

DFO Referral Yes No Date Submitted

Data sources used in risk evaluation (check all that apply)

<input type="checkbox"/>	Form for Submission of Information on Proposed Water Crossings (App. 1)	<input type="checkbox"/>	Topographic map	<input type="checkbox"/>	Aerial photography/satellite imagery
<input type="checkbox"/>	NRVIS	<input type="checkbox"/>	Soils/ surficial geology map	<input type="checkbox"/>	Site inventory
<input type="checkbox"/>	Decision support tools	<input type="checkbox"/>	Anecdotal/public reports	<input type="checkbox"/>	Other (specify)

Rationale and Instructions for Appendix 2

Background

The risk evaluation approach is a layered approach that contributes to due diligence, and enables decisions for each proposed water crossing to be rationalized and documented. Harmful alteration, disruption or destruction of fish habitat (HADD), fish passage impacts and deposition of deleterious substances (i.e. sediment) need to be considered in the risk evaluation approach.

The risk evaluation is a four-part process. The potential risk of a water crossing is identified by addressing a series of questions on the “Risk Evaluation for Proposed Water Crossings” form. Information requirements, and the documentation and rationalization required, increases with the potential risk.

Parts A, B, C and D are to be completed for each proposed water crossing in the AWS for the year prior to construction, and for each water crossing of unmapped permanent streams discovered during the implementation of operations. Part A and B could be completed for some water crossings at the forest management plan stage to assist with the identification of the water crossing location, and could also assist with the selection of crossing structure and construction conditions.

Appendix 3 describes risk factors, evaluation parameters and decision criteria for evaluating the risk of proposed water crossing to fish and fish habitat.

Part A

If Schedule 1 aquatic Species at Risk have been identified near the water crossing, refer the project to DFO for review. Refer to the Species at Risk Act (SARA) Registry for a list of Species at Risk – www.sararegistry.gc.ca.

All streams shown as a solid line on OBM maps are deemed to be permanent streams, and assumed to have fish habitat.

Crossings of intermittent streams, depicted as dashed lines on OBM maps, which are installed in accordance with applicable guidelines, are considered to be low risk crossings that have little impact on fish and fish habitat, unless known fish habitat values are affected.

Part B

This part involves six questions that can be answered with the information provided in the AWS and a completed Form for Submission of Information on a Proposed Water Crossing (Appendix 1), without conducting a site visit or requiring in-depth knowledge of fish and fish habitat. The intent is to be able to easily screen-out a large proportion of low risk crossings by determining if it is likely that the crossing

can be constructed without causing a HADD, sedimentation or impairment to fish passage.

Part B may be completed for some water crossings at the FMP stage.

This combination of questions should:

- allow a reviewer to complete a quick evaluation of the water crossing in relation to the habitat protection provisions of the *Fisheries Act* (i.e. habitat, passage, sediment);
- identify whether there is sufficient information on the proposed water crossing for the risk evaluation; and
- identify whether there is sufficient information on the stream for the risk evaluation, or whether a site visit is required.

The following discussion elaborates on the intent of the questions:

1. A low stream gradient indicates that there is likely a location in the 100 m crossing location where neither coarse substrate nor riffle habitat is present. This condition allows installation of a crossing without changing a riffle (habitat), and permits proper installation (passage). In Part C, additional habitat features such as **rare habitat types**, aquatic vegetation, groundwater concerns, etc. are documented.
2. Slope is a surrogate for stream valley cross-section. A proposed crossing at a location with a shallow valley cross-section (slope < 30%/17°) is less likely to have chronic erosion problems (sediment) and long structures, with associated higher fill heights, which would be required where there are steeper approaches (habitat, passage).
3. A water crossing with a minimum Q₂₅ design flow has a lower risk of crossing failure (habitat, sediment), and is less likely to result in channel infill (structure width \approx channel width, habitat) or accelerated water flow (passage). This design flow consideration may need to be adjusted for Southern Ontario situations.
4. A crossing installed within the work-in-water timing window will protect fish during sensitive life stage periods. One needs to determine if there will be in-stream activities associated with construction of the crossing. If there are no in-stream activities, there should be reduced risk to fish and fish habitat.
5. Any known fish habitat values (including rare or sensitive habitats) must be described, and the suitability of the crossing location must be rationalized in Part D.

6. If the specific construction and mitigation standards of the *Environmental Guidelines for Access Roads and Water Crossings* are met, the probability of fish passage problems or long term erosion problems (habitat, sediment) is low.

Part C

Part B may not adequately identify all concerns. Part C enables the evaluator to identify that there are additional concerns, based on his/her personal knowledge and experience and the use of Appendix 3.

Part D

If concerns are identified in Parts B and C, they are documented in Part D, and rationale for additional conditions on construction (if necessary) is provided.

Appendix 3: Risk Factors, Evaluation Parameters and Decision Criteria for Evaluating the Risk of Proposed Water Crossings to Fish and Fish Habitat

Fish Presence

Risk Factor	Evaluation Parameters	Potential Risk/Decision Criteria			Information Source	Rationale
		Low	Medium	High		
Fish present in waterbody	Channel type (permanent, intermittent, ephemeral)	Intermittent ephemeral	Permanent	Permanent	Topographic maps Aerial photographs Forest resource inventory maps	Permanent streams are accepted to support fish and thus have fish habitat associated with them.
	Watershed area	Very small watersheds, no significant water surface area	Small watersheds	Large watersheds; significant water surface area	Topographic maps Aerial photographs Forest resource inventory maps	The probability of fish being present at a site is correlated with stream size. Watershed area and stream order are indicators of stream size. The threshold watershed size varies with the species, stream characteristics (slope, etc) and geographic/physiographic area.
	Watershed position (1:20,000) Stream order/	1 st order (unless flows directly to 3 rd order or higher or known fish-bearing water)	2 nd order (unless flows directly to 3 rd order or higher or known fish-bearing water)	3 rd order and greater	Topographic maps Aerial photographs Forest resource inventory maps	Temporary natural (beaver dam) or man-made barriers should not be considered as indicators of the probability of fish being absent upstream.
	Barriers that would prevent fish passage	Physical - downstream	Physical - downstream; passable only in some years	None	Topographic maps Aerial photographs	
	Fish presence	Confirmed absent from similar/nearby watersheds		Confirmed present in similar/nearby watersheds	Lake surveys Research Investigations Public reports Direct observations	If it is unlikely that fish are present at the site, the crossing should be rated as a low risk and approved for installation with no further screening.

Appendix 3: Risk Factors, Evaluation Parameters and Decision Criteria for Evaluating the Risk of Proposed Water Crossings to Fish and Fish Habitat (Cont'd)

Fish Habitat

Risk Factor	Evaluation Parameters	Potential Risk/Decision Criteria			Information Source	Rationale
		Low	Medium	High		
Fish habitat	Fish community sensitivity	Generalist		Specialist	Lake surveys Research Investigations Public reports Direct observations NRVIS Scientific literature Decision support tools	Generalist/specialist can refer to habitat requirements or life history depending on context, and varies with life stage, e.g. brook trout and walleye are specialists, and bass are generalists.
	Species at Risk	Absent	Potentially present	Present	For a list of species at risk, refer to NHIC website: www.mnr.gov.on.ca/MNR/nhic/nhic.cfm or environment Canada's website (www.speciesatrisk.gc.ca)	
	Habitat type: spawning, rearing, nursery, feeding, migration	Marginal	Important	Critical	NRVIS Decision support tools (ORSECT) Aerial photographs Surveys Research Direct observations	Decision criteria are the same as used by DFO 1998 (Habitat Conservation and Protection Guidelines). Look at fish habitat at the proposed crossing site and downstream of the proposed crossing site.

Appendix 3: Risk Factors, Evaluation Parameters and Decision Criteria for Evaluating the Risk of Proposed Water Crossings to Fish and Fish Habitat (Cont'd)

Fish Habitat (Continued)

Risk Factor	Evaluation Parameters	Potential Risk/Decision Criteria			Information Source	Rationale
		Low	Medium	High		
Fish habitat (cont'd)	Area impacted (total habitat impacted m ²)	Small streams; narrow flood plains; relatively short structures (low fills)		Large streams; causeways; long structures (high fill, wide road)	Aerial photographs Direct observations	Depending on the type of structure, the area impacted may be reduced. For example, portable bridges would generally impact a smaller area than culverts.
	Productive capacity	Bedrock/sand substrate, dystrophic waters, no cover		Aquatic macrophytes; silt/sand, cobble/ boulder substrate, instream or overhead cover	Aerial photographs Soils maps Direct observations	
	Substrate (habitat sensitivity)	Bedrock		Sand, gravel, cobble; groundwater discharge	Aerial photographs Soils maps Surficial geology Maps Direct observations	
	Habitat supply	High	Medium	Low	NRVIS Decision support tools (ORSECT) Aerial photographs Surveys Research Direct observations	If habitat is in low supply, any impacts to that habitat by construction of the crossing elevate the risk to fish that use that habitat.
	Cumulative impact	No other developments in area	Water crossings in area	Other developments in area or large numbers of crossings already in the watershed	NRVIS Sustainable forest licensee maps of roads and water crossings	This parameter relates to the density of development in the watershed.
	Potential for fishery	Low probability	Possible	Existing	OMNR files Knowledge	

Appendix 3: Risk Factors, Evaluation Parameters and Decision Criteria for Evaluating the Risk of Proposed Water Crossings to Fish and Fish Habitat (Cont'd)

Fish Passage

Risk Factor	Evaluation Parameters	Potential Risk/Decision Criteria			Information Source	Rationale
		Low	Medium	High		
Structure installation	Slope of channel at structure location	<0.5%	0.5-3.5%	>3.5%	Topographic maps Digital terrain model Aerial photographs Decision support tools (OFAT) (ORSECT)	The risk associated with a specific slope varies with stream size and substrate characteristics. As slope increases, it is more likely that a culvert cannot be properly imbedded due to coarser substrates. A culvert installed where the channel is sloped will have higher water velocity during high flows, low water depth during low flows and is less likely to have natural channel substrates inside the structure.
	Channel substrate	Sand and gravel	Cobble	Boulders and bedrock	Direct observation Aerial photographs Surficial geology Maps	
Structure sizing	Design flow	25 yr or greater	10 yr	5 yr	Supplied by sustainable forest licensee	Structures with lower design flows, or which constrict flows (prevent access to floodplain), will have higher water velocity
	Structure width relative to channel or flood plain width	>1.0	0.5 – 1.0	<0.5	Direct observation Aerial photographs	
	Changes to water velocity	Little change or low velocities	Some change or moderate velocities	Substantial change or high velocities	Installation practices at crossing provided by sustainable forest licensee Published literature on fish swimming abilities	High water velocities can act as barriers to fish passage. The influence of water velocity is different for each species.
Base flow depth	Water depth in structure	>20cm (depth adequate for most migrating fish, sturgeon may be an exception)	10cm	<5cm	Digital terrain model Topographic maps	Beaver dams should not be considered barriers to fish movement because they are a natural influence on most watercourses. Beaver dams are generally temporary in nature.
Fish present	Barriers	Other barrier to fish movement immediately downstream		No barriers	Aerial photographs Direct observation	

Appendix 3: Risk Factors, Evaluation Parameters and Decision Criteria for Evaluating the Risk of Proposed Water Crossings to Fish and Fish Habitat (Cont'd)

Erosion/Sedimentation

Risk Factor	Evaluation Parameters	Potential Risk/Decision Criteria			Information Source	Rationale
		Low	Medium	High		
Erosion and sedimentation from on land activities	Slope of approaches[should relate to <i>Timber Management Guidelines For The Protection Of Fish Habitat</i>	1 – 4% 0-15% (0-8°)	5 – 8% 16-30% (9-17°)	9 – 12% 31-45% (18-24°) Extreme >12% > 46% (>25°)	Digital terrain model Slopes provided by Regional Engineering Unit.	Stream valley cross-section describes the slope of the approaches and potential for erosion.
	Length of approaches to top of bank	0 to 10m	10 to 50m	> 50m	Information supplied by sustainable forest licensee	Approaches sloping to water crossings are sources of sediment through runoff which is exacerbated through improper grading.
Short-term sediment and direct impacts to fish	Timing (species occurrence or thermal regime)	Construction outside the timing window		Construction inside the timing window	Information supplied by sustainable forest licensee	
	Installation method	Isolated from flowing water		In stream	Information supplied by sustainable forest licensee	
	Planning and practitioner proficiency	All of listed items	1 or 2 of listed items	None of listed items	Sustainable forest licensee procedures sustainable forest licensee training records OMNR training records Compliance records	Proficiency list: <ul style="list-style-type: none"> • sustainable forest licensee procedures • sound practical experience • water crossing Installation training • training in use of guidelines
Long-term (change to natural channel processes)	Soils on banks	Bedrock, stony	Loam, clay	Sand, silt	Surficial geology maps	Type of soil influences erodibility
	Stream type (Rosgen 1996)	Bedrock dominated, entrenched, step, pool Aa+, A, B,	Meandering but not entrenched, stable banks, riffle/pool C, D, E	Entrenched and actively meandering, unstable (braided channel) – relocate crossing F, G	Rosgen, 1996	The influence of stream type must be considered within the context of channel slope (see Structure installation) and the type of structure proposed for installation at the site.
	Changes to water velocity	Little change or low velocities	Some change or moderate velocities	Substantial change or high velocities	Installation practices at crossing provided by sustainable forest licensee	Changing the water velocity and alignment of the flow can cause downstream erosion.

Appendix 3: Risk Factors, Evaluation Parameters and Decision Criteria for Evaluating the Risk of Proposed Water Crossings to Fish and Fish Habitat (Cont'd)

Erosion/Sedimentation (Continued)

Risk Factor	Evaluation Parameters	Potential Risk/Decision Criteria			Information Source	Rationale
		Low	Medium	High		
Long-term (change to natural channel processes)	Fill height	1 – 1.5 m	1.6 -3.9	4.0 + m	Information supplied by sustainable forest licensee	Higher fill heights mean there is greater surface area for water to impact, even if graded to a stable angle of repose. Stabilization of fill slopes would lower risk. Fill acts as a dam and the greater the fill height, the more head and risk of 'piping' through the fill.
Long-term (change to natural channel processes)	Fill material	Rock, cobble	Pit run gravel	Sand, silt, clay	Information supplied by sustainable forest licensee	
Crossing failure	Design flow	25 yr or greater	10 yr	5 yr	Information supplied by sustainable forest licensee	The risk of catastrophic failure
	Fill type	Rock, pit run gravel	Loam, clay	Sand, silt	Information supplied by sustainable forest licensee	Fill type influences erodibility and hence the likelihood of failure.
Downstream fish habitat occurrence	Downstream habitat type	Marginal	Important	Critical	NRVIS Decision support tools (ORSECT) Aerial photographs Surveys Research Direct observations	If a chronic or catastrophic sedimentation event occurs, downstream habitat may be directly or indirectly impacted. Distance downstream at which an impact will occur is dependent upon flow, velocity and type of material being transported. Professional judgment is used to identify how far downstream habitat may be impacted.

Appendix 4: Site Inspection Form

Crossing ID		Plan Term	
FMU		Proposed Year of Construction	

Inspection Date		Inspectors	

Fish Presence

Description: (describe sampling method, species present or likelihood of species presence)
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Fish Habitat

Average Channel Width (m) (bank to bank)		Average Water Depth (m)	
Substrate			
In stream cover			
Overhead cover			
Description: (describe the fish habitat present at the site, based on the observations of fish presence)			

Fish Passage

Description: (describe any circumstances that would affect fish passage - e.g. slope, water velocity, etc.)

Erosion/Sedimentation

Description: (describe any circumstances that would cause sedimentation - e.g. soils, slope of approaches, conditions on approaches)
--

Mitigation Measures / Site Plan

4

Description: (describe mitigation to address concerns related to fish habitat, fish passage and/or erosion/sedimentation)

Risk Assessment (High, Medium, Low) (circle one and provide rationale)

Description:	
Approved by: (Area Biologist)	

Photographs (Yes / No) (circle one) Briefly describe photos taken (e.g. upstream, downstream, specific type of habitat, etc.)

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Glossary of Terms

Area of concern (AOC)

Area of Concern (AOC) is a geographic area within an area of operations which is adjacent to an identified natural resource feature, land use or value that may be affected by forest management activities.

For aquatic values, the width of an AOC is slope dependent, as described in the Timber Management Guidelines for the Protection of Fish Habitat (OMNR 1988).

Area of operations

A geographical area comprised of individual, groups and/or portions of forest stands selected for harvest, renewal and tending operations for the ten-year period of a forest management plan. The area of operations may include areas of retention (no operations).

Compensation

The replacement of natural habitat, increase in the productivity of existing habitat, or maintenance of fish production by artificial means in circumstances dictated by social and economic conditions, where mitigation techniques and other measures are not adequate to maintain habitats for Canada's fisheries resources.

Deleterious substance

Deleterious substance is defined in the federal *Fisheries Act* as:

“ (a) any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water,

or (b) any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man or fish that frequent that water,

and without limiting the generality of the foregoing includes

(c) any substance or class of substances prescribed pursuant to paragraph (2)(a),

(d) any water that contains any substance or class of substances in a quantity or concentration that is equal to or in excess of a quantity or concentration prescribed in respect of that substance or class of substances pursuant to paragraph (2)(b), and

(e) any water that has been subjected to a treatment, process or change prescribed pursuant to paragraph (2)(c);” (section 34(1)).

Fish

"includes parts of fish, shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals." (*Fisheries Act*, sec. 2).

Fish habitat

Fish habitat is defined in the federal *Fisheries Act* as "...spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes..." (section 34(1)). Fish habitat is comprised of those physical, chemical and biological attributes of the environment which are required by fish to carry out their life processes such as spawning, nursery, rearing, feeding, overwintering and migration (Policy for the Management of Fish Habitat, DFO 1986).

Fish habitat – Marginal

Fish habitat areas with limited use by fish for feeding, growth, migration, and spawning. These habitat areas require less protection because they have a low productive capacity and contribute marginally to fish production. Marginal habitat areas include areas that have been disrupted by past human activity. Changes to these areas will not result in a loss of productive capacity of fish habitat.

Fish habitat – Important

Those habitat areas utilized by fish for feeding, growth and migration which, while important to the fish stock, are not considered critical. These can include spawning areas for species with non-stringent spawning requirements, such as cobble areas for smallmouth bass. Areas in this category usually contain a relatively large amount of similar habitat that is readily available to the stock (e.g. areas with aquatic vegetation in water bodies with an abundant supply of aquatic vegetation). Small scale changes to these areas will typically not result in a loss of productive capacity of fish habitat.

Fish habitat - Critical

Those habitat areas which are needed to maintain the overall productive capacity of the fishery. These can include spawning areas for fish species with stringent spawning requirements, such as cobble areas for walleye and lake trout, ground water upwelling areas for brook trout; highly productive nursery and feeding areas such as wetlands; areas with Species at Risk, essential refuges areas such as winter refugia for brook trout in small streams; habitats that cannot be replaced or compensated for, such as ground water upwellings, and migration routes which provide access to spawning areas for fish species with stringent spawning requirements (e.g. brook trout). These include habitat types that are relatively rare or sensitive to disturbance (e.g. areas with aquatic vegetation in water bodies with a limited supply of aquatic vegetation). Alterations in these areas will result in a loss of productive capacity of fish habitat.

Mitigation

Actions taken during the planning, design, construction and operation of works and undertakings to alleviate potential adverse effects on the productive capacity of fish habitats.

Net gain

An increase in the productive capacity of habitats for selected fisheries brought about by determined government and public efforts to conserve, restore and develop habitats.

No net loss

A working principle by which the department strives to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada's fisheries resources due to habitat loss or damage may be prevented.

OFAT

Ontario Flow Assessment Techniques is a GIS based tool to automatically estimate flow information for watersheds in Ontario. This model is able to delineate watershed area above any point selected on a watercourse and provide an estimate of flows.

ORSECT

Ontario River/Stream Ecological Classification Techniques is a GIS-based decision support tool for ecological stream classification of a river network anywhere in the province.

Percent of channel infilled

For permanent streams that have a well defined channel this is the area of the channel that is covered by fill. The area in-filled can be estimated or calculated directly from measurements of the channel and proposed structure including fill. For example if the channel is 3m wide and the proposed structure is a 1000mm culvert. This means that 66% of the channel width would be covered by fill at the crossing location. For intermittent streams where the channel is less defined the channel width would have to be estimated.

Productive capacity

The maximum natural capability of habitats to produce healthy fish, safe for human consumption, or to support or produce aquatic organisms upon which fish depend.

Risk - High

Pertains to water crossings that have a high risk of causing harmful alteration disruption or destruction of fish habitat (HADD) in particular but, may also be influencing fish passage or, causing the introduction of sediment to the watercourse. A site visit is required to gather additional information to support decision making.

High risk crossings may be identified at any stage (FMP, AWS, site inspection, re-evaluation at time of installation) in the review process.

Risk - Low

Pertains to water crossings that have a low risk of causing harmful alteration disruption or destruction of fish habitat (HADD), influencing fish passage or, causing the introduction of sediment to the watercourse. In these situations application of the Environmental Guidelines for Access Roads and Water Crossings would be sufficient to address possible risks. Low risk crossings may be identified at any stage (FMP, AWS, site inspection, re-evaluation at time of installation) in the review process.

Risk - Medium

Pertains to water crossings where it is not clear if they may cause harmful alteration disruption or destruction of fish habitat (HADD), influence fish passage or, cause the introduction of sediment to the watercourse. In these situations, while mitigation measures may not be immediately apparent, reviews feel that mitigation is still possible. Medium risk crossings may be identified at the FMP and AWS (one year in advance of installation) stages in the review process.

Road – Branch

A road that branches off an existing or new primary or branch road, providing access to, through or between areas of operations on a management unit.

Road – Operational

A road within an area of operations that provides short-term access for harvest, renewal and tending operations. Operational roads are normally not maintained after they are no longer required for forest management purposes, and are often site prepared and regenerated.

Road – Primary

A road that provides principal access for the management unit, and is constructed, maintained and used as part of the main road system on the management unit. Primary roads are normally permanent roads.

Sediment

Soils or other materials transported by wind or water as a result of erosion.

Sensitive fish species

Includes species at risk, brook trout, lake trout, lake sturgeon and muskellunge

Stream

Streams are watercourses with flowing water, including rivers, and may be permanent, intermittent or ephemeral

Stream – ephemeral

Ephemeral flows are streamflows in channels that are short-lived or transitory and occur from precipitation, snow melt, or short-term water releases. (Armantrout, N.B., compiler.1998, Glossary of Aquatic Habitat Inventory Terminology. American Fisheries Society, Bethesda, Maryland)

Stream - Intermittent

For planning purposes, intermittent streams are indicated on 1:20,000 and 1:10,000 scale OBM maps as a dashed line. In some cases there may be other map scales and local information that provide more accurate locations of streams. Planning teams are encouraged to use the most accurate information available. These other sources may also be useful in identifying streams which are shown as permanent on the OBM maps, but in fact are intermittent.

In the field, an intermittent stream is a stream that flows only during wet periods. This definition includes streams or portions of streams where the channel is above the water table, and which flow for only brief periods in direct response to recent precipitation or snowmelt. Intermittent streams tend to have poorly defined stream banks.

[Intermittent flows are flows that occur at certain times of the year only when groundwater levels are adequate but may cease entirely in low water years or be reduced to a series of separated pools. (Armantrout, N.B., compiler.1998, Glossary of Aquatic Habitat Inventory Terminology. American Fisheries Society, Bethesda, Maryland)].

Stream - Permanent

For planning purposes, permanent streams are indicated on 1:20,000 and 1:10,000 scale OBM maps as a solid line. In some cases there may be other map scales and local information that provide more accurate locations of streams. Planning teams are encouraged to use the most accurate information available.

In the field, permanent streams are streams that have a natural defined channel without terrestrial vegetation in the streambed.

[Permanent or perennial flows are flows that are continuous throughout the year (Armantrout, N.B., compiler.1998, Glossary of Aquatic Habitat Inventory Terminology. American Fisheries Society, Bethesda, Maryland)].

Stream – Unmapped

An intermittent or permanent stream not indicated on 1:10,000 or 1:20,000 OBM maps.

Sustainable forest licensee

Holder of a licence granted under Part III, section 26 of the *Crown Forest Sustainability Act*, 1994. The sustainable forest licensee is responsible for the planning of water crossings in FMPs and AWSs.

Waterbody

Waterbodies are lakes and streams.

Water crossing

A water crossing is any crossing of a stream by a primary, branch (secondary) or operational (tertiary) road.

Watercourse

A naturally occurring drainage channel which includes rivers, streams and creeks.

Watershed

The area drained by an underground or surface stream, or by a system of streams

Work-in-water timing windows

These are calendar periods that indicate when work in the water can take place. The periods are defined for various species and reflect consideration of life cycle characteristics (e.g. spawning, incubation, nursery/rearing, migration areas). These were developed in conjunction with DFO.

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