Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (Version 2)

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The Ministry of Natural Resources acknowledges the long history of the lands and waters referenced by the Stand and Site Guide. The forests, lands, and waters currently managed by the Ministry have been cared for by Indigenous peoples long before the inception of Canada, Ontario, and the Ministry. As a Ministry, we have the responsibility for the sustainable management of the forest and we recognize the need to work closely with First Nation and Métis communities to achieve this goal for generations to come.

The Ministry recognizes that some of the geographic boundaries and area used in this document may not resonate with all readers. The Ministry understands that the borders of Ontario and its management units may not align with some readers' conceptualizations of the landscape's boundaries. The Ministry uses this system to identify the managed forest and appreciates that it is not the only wat the landscape is understood.

The Ministry acknowledges the many individuals who contributed to the development and review of this second version of the Stand and Site Guide including advisory teams, subject matter experts, Provincial Forest Technical Committee, First Nation peoples, Métis peoples, practitioners, stakeholders, and other interested individuals. A more detailed list of contributors can be found in Appendix 1a.

EXECUTIVE SUMMARY

The *Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales* (the Stand and Site Guide) is one of a series of guides used by forest managers when planning and implementing operations involving harvest, renewal, tending, or the construction and use of roads, and landings on crown land in Ontario. The overall objective of this guide is to contribute to the sustainable management of Crown forests through the maintenance of their long-term health. A key aspect of this objective is the conservation of biodiversity.

The Stand and Site Guide uses a combination of coarse and fine filters (with consideration for adverse impacts on other values, silvicultural limitations, and efficiency of implementation) to address the conservation of biodiversity. Coarse filters create a diversity of ecosystem conditions through space and time, based on the concept of emulating natural patterns and processes, to provide habitat for the majority of native species of plants and animals. Fine filters are applied when the ecological requirements of a particular species or value may not be adequately addressed by coarse filters alone, or when societal and/or economic aspects of sustainable development require more or less habitat than coarse filters alone would provide.

Both coarse and fine filter direction is based on a strong foundation of scientific knowledge and operational experience. The best available information was compiled from thorough review of relevant literature and discussions with experienced researchers and practitioners. This information, and how it was used in the development of the guide, is summarized in a companion document (Background and Rationale for Direction). Where information was incomplete and/or ambiguous, a conservative approach was taken through judicious application of the precautionary principle. The direction in the guide can be thought of as an informed hypothesis. Direction associated with a high degree of uncertainty is identified as a high priority for testing within an effectiveness monitoring program that is an integral part of an adaptive management framework.

Direction is provided as a standard, guideline, or best management practice. Standards are mandatory and must be followed as written. Guidelines are also mandatory but enable professional judgement and/or local knowledge to implement. Best management practices may also be provided. These practices are not mandatory, however, implementation is generally considered to help achieve the overall objectives of the associated standard and/or guideline.

The direction applies to a wide variety of forest management operations including harvest, renewal, tending, and access. The bulk of the direction is applied during operational planning and/or implementation with some notable linkages to strategic decision making.

Sections 1 and 2 provide an introduction to the guide, an explanation of the relationship between this guide and other forest management guides, and a description of how this guide will be implemented over the coming years. Section 3 provides coarse and fine

filter direction that addresses habitat composition and pattern at stand to multi-stand scales. Section 4 addresses site-specific values that require fine filter direction to mitigate potentially adverse effects of regular forest operations. Aquatic, wetland and shoreline forest values, special habitat features, and habitat for species at risk, are addressed through the development of operational prescriptions and conditions for areas of concern or conditions on operations. Section 5 addresses the construction of access roads and water crossings, soil and productive forest conservation, and the spread of invasive species. Section 6 provides applicable direction for salvage and biofibre harvests. Section 7 describes the Ministry's approach to effectiveness monitoring.

SOMMAIRE

Le Guide de gestion forestière pour la conservation de la biodiversité à l'échelle du peuplement et du site (le Guide sur les peuplements et les sites) fait partie d'une série de guides utilisés par les gestionnaires forestiers lors de la planification et de la mise en œuvre d'activités de récolte, de renouvellement, d'entretien ou de construction et d'utilisation de routes et de débarquements sur les terres de la Couronne en Ontario. L'objectif général de ce guide est de contribuer à la gestion durable des forêts de la Couronne par le maintien de leur santé à long terme. Un aspect clé de cet objectif est la conservation de la biodiversité.

Le Guide sur les peuplements et les sites fait appel à une combinaison de filtres « grossiers » et « fins » (en tenant compte des effets négatifs sur d'autres valeurs, des limites sylvicoles et de l'efficacité de la mise en œuvre) pour aborder la conservation de la biodiversité. Fondés sur le concept d'imitation de modèles et de processus naturels, les filtres grossiers font ressortir une diversité de conditions écosystémiques afin de fournir un habitat à la majorité des espèces indigènes de plantes et d'animaux. Quant aux filtres fins, ils sont appliqués lorsque les besoins écologiques d'une espèce ou d'une valeur particulière ne peuvent pas être satisfaits adéquatement par les filtres grossiers seuls, ou lorsque les aspects sociétaux et/ou économiques du développement durable nécessitent plus ou moins d'habitat que les filtres « grossiers » seuls fourniraient.

Les approches de filtrage grossier et de filtrage fin reposent sur une solide base de connaissances scientifiques et d'expérience opérationnelle. Les meilleurs renseignements disponibles ont été compilés à partir d'un examen approfondi de la littérature pertinente et de discussions avec des chercheurs et des praticiens expérimentés. Ces renseignements et la façon dont ils ont été utilisés dans l'élaboration du guide sont résumés dans un document d'accompagnement (renseignements généraux et justification concernant l'orientation). Lorsque les renseignements étaient incomplets ou ambigus, une approche prudente a été adoptée en appliquant judicieusement le principe de précaution. L'orientation du guide peut être considérée comme une hypothèse éclairée. L'orientation associée à un degré élevé d'incertitude est considérée comme une priorité élevée pour la mise à l'essai dans le cadre d'un programme de surveillance de l'efficacité qui fait partie intégrante d'un cadre de gestion adaptative.

L'orientation est fournie à titre de norme, de ligne directrice ou de pratique de gestion exemplaire. Les normes sont obligatoires et elles doivent être suivies telles qu'elles sont rédigées. Les lignes directrices sont également obligatoires, mais elles permettent d'exercer un jugement professionnel ou de mettre en œuvre des connaissances locales. Des pratiques de gestion exemplaires peuvent aussi être fournies. Ces pratiques ne sont pas obligatoires, mais nous recommandons de les mettre en œuvre comme une façon d'aider à atteindre les objectifs généraux de la norme ou des lignes directrices connexes.

L’orientation s’applique à une grande variété d’activités de gestion forestière, y compris la récolte, le renouvellement, l’entretien et l’accès. La majeure partie de l’orientation est appliquée lors de la planification ou de la mise en œuvre des activités et elle est étroitement liée à la prise de décisions stratégiques.

Les sections 1 et 2 fournissent une introduction au guide, une explication de la relation entre ce guide et d’autres guides de gestion forestière et une description de la façon dont ce guide sera mis en œuvre au cours des prochaines années. La section 3 fournit des approches de filtrage grossier et de filtrage fin qui traitent de la composition et du modèle de l’habitat à l’échelle du peuplement et de plusieurs peuplements. La section 4 traite des valeurs propres au site qui nécessitent une approche de filtrage fin pour atténuer les effets potentiellement négatifs des opérations forestières régulières. Les valeurs des forêts aquatiques, humides et riveraines, les caractéristiques particulières de l’habitat et l’habitat des espèces en péril sont prises en compte au moyen de prescriptions et de conditions opérationnelles élaborées pour les secteurs préoccupants ou les conditions d’exploitation. La section 5 traite de la construction de routes d’accès et de franchissements de cours d’eau, de la conservation des sols et des forêts productives et de la propagation des espèces envahissantes. La section 6 présente des orientations applicables aux récoltes de récupération et de biofibres. La section 7 décrit l’approche du Ministère en matière de surveillance de l’efficacité.

1.0 INTRODUCTION

1.1 Purpose of the Stand and Site Guide

The *Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales* (the Stand and Site Guide) is one of a series of forest management guides used by forest managers when planning and implementing forest management operations. In order to protect or enhance environmental, recreational, and cultural heritage values, the series of guides provides direction to assist forest managers to decide. For example, what areas of forest to harvest (and equally important, what areas not to harvest), how large the harvest areas should be, and what harvesting and regeneration practices to use. Consistent with the *Crown Forest Sustainability Act, 1994* (CFSA), the overall objective of this guide is to contribute to the sustainable management of Crown forests through the maintenance of their long-term health. A key aspect of this objective is the conservation of biodiversity. Conservation has been defined as the maintenance of the Earth's resources that sustain ecosystem, species and genetic diversity and the processes that sustain them which may or may not involve the sustainable use of biological resources (Ontario Biodiversity Council 2011). The purpose of the Stand and Site Guide is to provide direction on planning and conducting forest operations at the stand and site level (i.e., 10s of m^2 to 100s of km^2), so that forest biodiversity will be conserved and Ontario's forests will remain healthy and sustainable. The Forest Management Guide for Boreal Landscapes and the Forest Management Guide for Great Lakes-St. Lawrence Landscapes (the Landscape Guides) provide direction on conserving biodiversity, and hence sustaining forest health, at the landscape scale (i.e., 10,000s of km^2).

These two guides are linked, both philosophically and literally within the text of each guide. The Landscape Guides (and the Stand and Site Guide to some extent) are applied at the beginning of the forest management planning process and helps planning teams set the strategic direction for the entire forest management unit, in the context of surrounding forest management units. This strategic direction provides the background when planning teams develop operations specific to the forest management unit, through the implementation of the Stand and Site Guide.

As with all forest management guides, the mandate of this document is limited to the managed forest within Crown lands in Ontario. The direction provided may also be helpful when managing other Crown forests outside of the managed forest area and private forest lands.

1.2 Content of the Stand and Site Guide

1.2.1 Organization

Section 1 describes the organization of the guide, defines commonly used terms, describes the Ministry's broad approach to the conservation of biodiversity and an

overview of the guide's legislative and policy context, climate change considerations, pilot testing and socio-economic impact analysis.

Section 2 provides an explanation of the relationship between this guide and other forest management guides, and how this guide will be implemented over the coming years.

Section 3 serves as the link to the Landscape Guides, beginning where the Landscape Guides end and dealing with management considerations at the stand, multi-stand, and meso-landscape scales. Specific details include consideration of coarse filters (Section 3.2) and fine filters (Section 3.3). The coarse filter direction builds on concepts introduced in the Landscape Guides, most notably, that the diversity of habitats required by a broad range of species can be produced by manipulating composition, pattern, and structure. Section 3 also describes how the coarse filter provides, or needs to be modified to provide (fine filters), habitat for species including white-tailed deer, moose, and other species of special interest.

Section 4 addresses site-specific values and important ecological features that require fine filter direction to mitigate potentially adverse effects of regular forest operations. This direction often requires the development of operational prescriptions and conditions to be implemented within an area of concern (AOC), or conditions on operations. Aquatic, wetland, and shoreline forest values are addressed in Section 4.1. Other special habitats (e.g., bird nests, dens) are included in Section 4.2, and species at risk are discussed in Section 4.3.

Section 5 discusses the construction of access roads and water crossings (Section 5.1), soil and productive forest conservation (including rutting, soil compaction, erosion, nutrient loss, and loss of productive forest area) (Section 5.2), and the spread of invasive species (Section 5.3).

Where recent natural disturbance areas will be harvested, Section 6.1 provides applicable direction for salvage operations. Restrictions on biofibre harvesting are addressed in Section 6.2.

Section 7 discusses the Ministry's approach to monitoring the effectiveness of the Stand and Site Guide, a requirement of the Forest Operations and Silviculture Manual, which sets out the procedures for the evaluation of forest management in Ontario.

A number of appendices provide further detail or an explanation of the concepts or directions included in Sections 3 to 6. A glossary of selected terms used in this document is included.

A separate document (Background and Rationale for Direction) provides the scientific background and rationale supporting the standards, guidelines, and best management practices. This document is available in electronic format at https://www.ontario.ca/page/forest-management-guides.

1.2.2 Direction characterization

In this guide, direction is provided as a standard, guideline, or best management practice. Standards are mandatory direction and must be followed as written; there is no flexibility for interpretation on the part of guide users. Guidelines are also mandatory direction (i.e., must be followed) that may require professional judgement and/or local or Indigenous knowledge, within the constraints set out in the guideline, to be applied appropriately at the local level. For some direction, best management practices are also provided. These practices are not mandatory (i.e., there is no requirement to use any of the best management practices), however, implementation may help to achieve the overall objectives of the associated standard(s) and/or guideline(s).

When incorporating standards, guidelines, or best management practices into operational prescriptions and conditions for areas of concern (AOCs) or conditions on operations, planning teams may choose alternative wording to improve clarity and ensure effective and efficient implementation based on local circumstances, as long as the full intent of the direction will be achieved. Proposed alterations will be developed in consultation with the Ministry.

In some cases, guidelines include words or phrases such as ‘normally’, ‘with Ministry notification’, ‘with Ministry approval’ or ‘unless approved by the Ministry’, and ‘extraordinary circumstances’, to reflect the authors’ appreciation that situations may be encountered when the guideline cannot be implemented exactly as written. The word ‘normally’ is used to indicate that the authors believe the guideline can be applied in the vast majority of situations. In some cases, flexibility is incorporated into a guideline by permitting activities in an operational prescription or condition for an AOC or a condition on operations to be undertaken with Ministry notification or approval. This provides the opportunity for local Ministry and forest licensee staff to develop local solutions for specific activities that would otherwise be considered as a deviation from direction. In rare occasions, deviation from direction may be unforeseeable and unavoidable. These situations may be considered extraordinary circumstances and the operational prescription or condition for an AOC or a CRO may be amended to permit a prohibited activity and not be considered an exception to this guide.

The requirement for Ministry notification versus approval is based on the potential risk of implementing the activity in question on the individual identified value or important ecological feature. For example, activities associated with operational prescriptions or conditions in an AOC or conditions on operations in a forest management plan (FMP) for a species at risk require Ministry approval. The procedure for implementing activities requiring Ministry notification or approval in operational prescriptions or conditions in an AOC or conditions on operations in the FMP can be found in Appendix 1b.

The extraordinary circumstances clause is explained in the glossary and is to be interpreted as instructions, and not intended to be copied directly from the guide into an

FMP. Where such a limited form of variation is permitted, the variation must not result in operations that would be inconsistent with the objective of the guideline as stated.

1.2.3 Exceptions

Direction in the approved forest management guides is used during the development of FMPs as required by the *Forest Management Planning Manual* (FMPM). Situations may arise in which planning teams may wish to deviate from a specific standard or guideline (i.e., operational prescription or condition for an area of concern, condition on operations for an important ecological feature). This deviation from specific direction will be considered an exception and documented as such in the FMP. Details of the exception need to:

- Minimize the degree of deviation from the standard or guideline
- Include measures to minimize or mitigate potential adverse effects on the value or feature in modified activities in a prescription and/or conditions for an AOC, or conditions on operations that deviate from direction in this guide
- Be agreed upon by the sustainable forest licensee and the Ministry

Inclusion of an exception in an FMP requires the development of an exceptions monitoring program as per the FMPM. This program will monitor the effectiveness of the operational prescription or condition for an area of concern or condition on operations for an important ecological feature that differs from that in the guide. The details of the monitoring program are normally customized to the nature of the exception, the degree of deviation from the standard or guideline, and the specific reason and/or circumstances that lead to exception being included. When developing an exceptions monitoring program, consider the following:

- What is the question that needs to be answered, and will the planned monitoring program answer that question?
- Can the monitoring results contribute to informing the review and/or revision of current guide direction?
- What role can standard monitoring (e.g., compliance) play?
- Is anyone else investigating a similar question?

Timing of operations occurring as part of the exception may be imminent (e.g., values encountered during active forest operations). In these cases, the Ministry will work with the sustainable forest licensee to finalize the exceptions monitoring program within a reasonable timeframe, depending on the nature and complexity of the exception, so as not to unduly delay operations.

Unless part of a larger, more comprehensive regional or provincial-based exceptions monitoring program initiated and undertaken by the Ministry, monitoring programs undertaken by individual sustainable forest licensees will normally have inadequate sample sizes to support a statistically valid design and analyses. However, in the interest of active adaptive management, results of the monitoring program and associated reporting are intended to indicate to the Ministry whether a more rigorous evaluation may be required to inform the review and revision of direction in this guide.

Sustainable forest licensees are encouraged to seek partnerships with the science community (e.g., government, academia, research institutes) when developing exceptions monitoring program strategies and assessment methodologies. They are also encouraged to consult with local Ministry staff and the guide leads with the Ministry's Forest Management Policy Section, as they may be aware of past or existing monitoring programs that have been established to answer a similar question.

1.3 Conserving forest biodiversity

1.3.1 The coarse and fine filters

There are hundreds of species of vertebrates in the boreal and Great Lakes - St. Lawrence forest regions of Ontario (see Holloway et al. 2004) and invertebrate species are likely to number in the tens of thousands. Thus, a species-by-species approach to the provision of wildlife habitat and the conservation of biodiversity is impossible in the context of forest management. However, this might be achieved through the hierarchical application of standards and guidelines that is judiciously selected to act as coarse and fine filters.

The concept of coarse and fine filters was popularized by Hunter (1990) and is illustrated in Figure 1a. In order to manage Ontario's forests to reflect society's ecological, social, and economic expectations, Ontario relies on a nested coarse and fine filter approach to meet wildlife habitat needs and provide healthy forests (see Hunter 1990 and Naylor 1998). The Stand and Site Guide builds upon this approach. The coarse filter component creates a diversity of ecosystem conditions through space and time, in turn providing habitat for the majority of native species. A series of fine filters is then used, if necessary, to modify the results of applying the coarse filter. A fine filter may be required for one of two reasons: 1) the societal and/or economic aspects of sustainable development require more or less habitat than would be provided by nature, or 2) the ecological requirements of a particular species or value are not addressed or accommodated sufficiently through application of the coarse filter alone, in some cases because the proposed actions cannot completely mimic natural events. The extent to which the first type of fine filter is applied will vary across the province, depending on local forest conditions and societal expectations. Both the coarse and fine filters are applied at all scales, from the landscape to the site level.

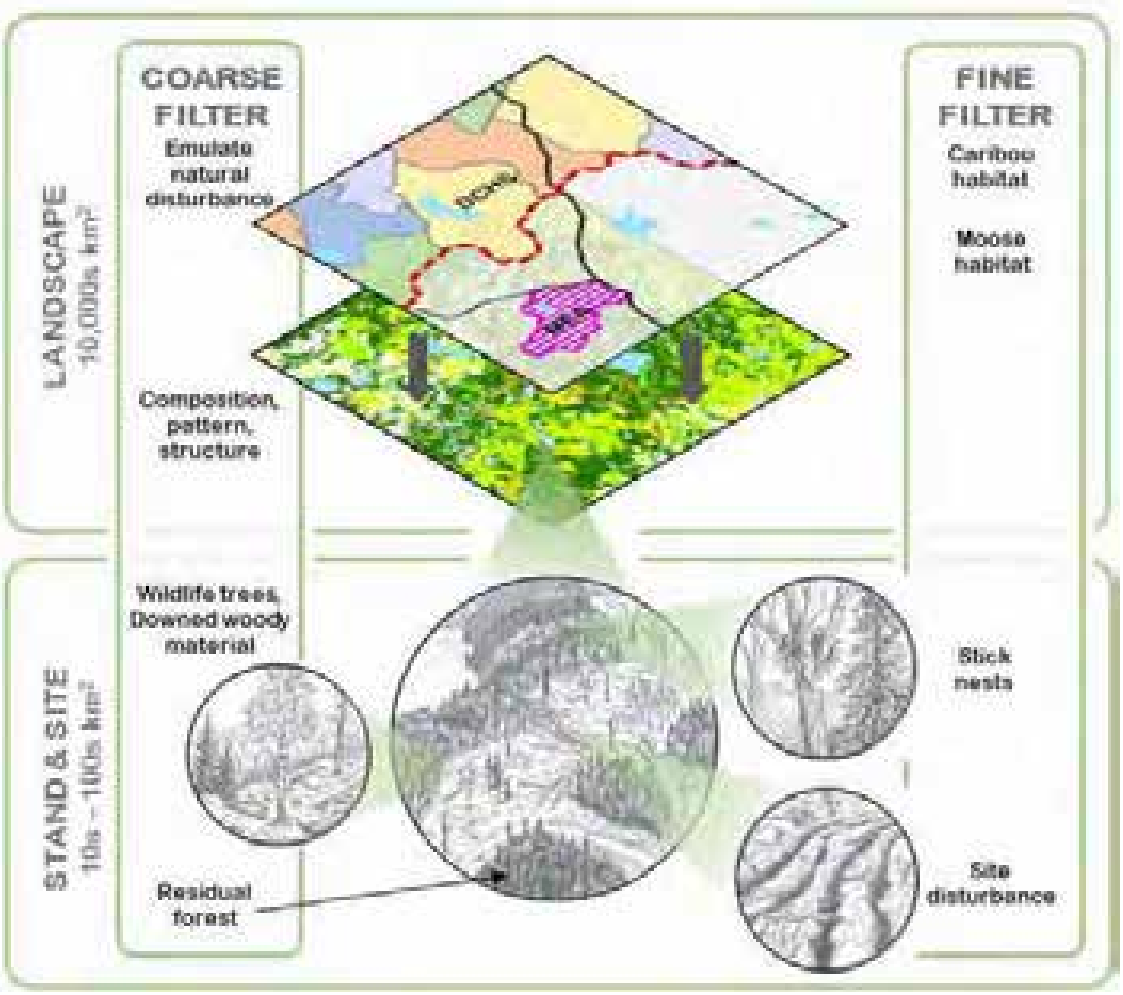

Figure 1a. A conceptual illustration showing the relationship between coarse and fine filters in habitat management. A coarse filter operates at a variety of spatial scales to: provide habitat for a very broad range of wildlife, support interactions among species, and facilitate ecosystem processes. A fine filter may be required for species whose needs are not captured by the coarse filter or to mitigate adverse effects. Biodiversity is most likely to be conserved by hierarchical application of both filters on the landscape. (Figure by Jodi Hall)

In designing a coarse filter, the most desirable mix of ecosystem conditions to include must be determined. One of the principles of the CFSA provides direction on what to consider as the coarse filter (i.e., a mix based on nature), as well as what fine filters to develop.

> *The long-term health and vigor of Crown forests should be provided for by using forest practices that, within the limits of silvicultural requirements, emulate natural disturbances and landscape patterns* [coarse filter] *while minimizing adverse effects on plant life, animal life, water, soil, air and social and economic values, including recreational values and heritage values* [fine filters] (CFSA s. 2(3)2).

In Ontario, the emulation of natural disturbances and landscape patterns is used as the basis of the coarse filter. The many values that a forest provides, as identified in this principle (e.g., plant life, animal life, water, soil), are the topics of the series of fine filters.

The predominant natural disturbance in Ontario's boreal forest has been wildfire, while a combination of fire, wind, and insect outbreaks play a role in the development of the Great Lakes - St. Lawrence forest region. In the Landscape Guides, Ontario's forest landscape is designed through application of the coarse filter by addressing three key prescriptive indicators: pattern, composition, and structure. At this scale, only a few fine filters are applied to provide for or evaluate the landscape-scale habitat requirements of one or more species such as woodland caribou, white-tailed deer, and moose.

While the direction in the Stand and Site Guide is also based on the emulation of natural disturbances as the coarse filter, it contains many more fine filters that are used at the stand and site scales to address the forest conditions and habitat needs of a number of species as expected by society and directed by the CFSA.

The fine filter direction in this guide primarily addresses the habitat needs of individual species. This is not to suggest that habitat is the predominant or only limiting factor for these species. For instance, the guide also includes timing restrictions intended to minimize disturbance of animals during key phases of their life cycle. Other programs within the Ministry address factors that may influence the health and size of wildlife populations.

Furthermore, not all species require a fine filter to ensure their continued existence. For example, based on research, it is believed that southern flying squirrel habitat (mature tolerant hardwood forests) can be maintained by application of the coarse filter at the landscape scale. Applying the stand-scale coarse filter provides a sufficient quantity of cavity trees and mast trees without any further species-specific fine filter direction.

Similarly, the general habitat needs of moose can normally be addressed through the landscape-scale coarse filter, sufficiently maintaining moose populations at natural densities. Because of their value to society, however, and to help meet targets from other Ministry programs, moose may require fine filter direction at the stand scale to ensure that the correct type, amount, and quality of habitat (e.g., winter thermal cover, security cover) is available in the proper location.

Forest management does have some impacts and effects that do not occur in nature and these are also addressed through fine filters. For instance, rutting and soil compaction can occur during forest management operations on some sites in some conditions. They do not emulate a natural disturbance and cannot be prevented through the coarse filter. Fine filter direction, however, can be used to minimize or mitigate their impact on the forest ecosystem.

The coarse and fine filter approach to wildlife habitat management has existed for some time and has been implemented in most parts of Ontario. It is, however, quite different from the featured species approach used extensively in the past and it will take some time before all forest planners and operators are entirely familiar with it and understand it fully.

A list of the scientific name of species referred to in the Stand and Site Guide can be found in Appendix 1.2c.

1.3.2 Learning from the past and preparing for the future

The Ministry uses an adaptive management framework to address uncertainty associated with how the natural world works and how our actions affect it. Adaptive management is an iterative cycle of continual improvement, where policy, developed based on the best available scientific information, is treated as hypotheses, and monitoring of the policy, as it is implemented, forms part of the evaluation of the hypotheses. This interface between science and policy forms the foundation of forest management guide development and testing. When required, guides are revised based on the new knowledge and lessons learned from implementation and evaluation, or from new science and technology.

Direction in the Stand and Site Guide is based on a thorough review of the relevant scientific literature, as well as the expert opinion of researchers and advice from practitioners, Indigenous communities, and stakeholders. When information is limited and/or opinions vary, the guide relies on the precautionary principle and conservative direction is prescribed. Application of the precautionary principle and adaptive management ensures that when risks are suspected but not known with certainty to a particular value or feature, it is protected during forest management planning and the implementation of forest management operations. Direction with a high degree of uncertainty is identified as high priority for testing through an effectiveness monitoring program (see Section 7). The results of this monitoring program, along with other sources of information, will be used during periodic reviews of the Stand and Site Guide to help determine when the guide needs to be revised.

1.4 Legislative and policy context

The overall context for forest management in Ontario is based on the Policy Framework for Sustainable Forests. The framework sets broad direction for forest policy and makes forest sustainability the primary objective of forest management.

The CFSA is the core legislation governing forest management on Crown land in Ontario. The CFSA defines sustainability as long-term Crown forest health, and reflects the broad direction set out in the Policy Framework for Sustainable Forests.

As noted in the discussion of coarse and fine filters in Section 1.3.1, the direction to emulate natural disturbances and landscape patterns is based on one of the principles of the CFSA. The CFSA also requires the development and distribution of four regulated manuals, two of which give legal context to the forest management guides. The FMPM requires that forest management guides be used during the preparation of an FMP. Similarly, the *Forest Operations and Silviculture Manual* (FOSM) lists the various policies, including the forest management guides, that relate to forest operations on Crown land.

For purposes of monitoring compliance, it is important to realize that the approved FMP is the legal instrument against which forest operations are assessed. What occurs on the ground is assessed against what is written in the approved FMP, not what is found in the Stand and Site Guide. Therefore, the FMPM requires that direction in this guide that is relevant to specific locations and operations is incorporated into the appropriate products of the FMP.

The FOSM describes the approach to effectiveness monitoring for approved forest management guides, the continuation of scientific studies to assess the effectiveness of the guides and identify areas of critical uncertainty, and the maintenance of the Provincial Forest Technical Committee that acts as a review board for the content of, and changes to, forest management guides. The FOSM requires that forest management guides be reviewed at least once every ten years and, when necessary, revised reflecting up-to-date scientific, practitioner, Indigenous, and stakeholder knowledge, as well as advances in technology and operational practices. Additionally, the FOSM requires that the most recent versions of forest management guides be posted on a publicly accessible website.

The Ministry is required to provide opportunities for public review of draft forest management guides on the Environmental Registry of Ontario under the *Environmental Bill of Rights Registry, 1994* (EBR).

There is also other provincial and federal legislation that must be followed during forest operations. Only those that are most relevant to the direction in this guide will be mentioned in the remainder of this section. These pieces of legislation form part of the rationale behind the development of the specific direction in this guide. If there are inconsistencies or gaps between federal or provincial legislation and the direction in the Stand and Site Guide, however, the legislation will always take precedence.

Direction for the protection of species at risk that are most likely to be encountered during, and adversely affected by, forest operations in Ontario is included in Section 4.3. A list of all species at risk (at time of guide development) is included in the Background and Rationale for Direction. The *Crown Forest Sustainability Act* was amended in 2025 to include Section 47.1, which excludes persons conducting forest operations in a Crown forest in accordance with an approved FMP from subsection 16 (1) or (2) of the *Species Conservation Act, 2025* provided they are conducted on behalf of the Crown or under the authority of a forest resource licence. The CFSA forest policy framework,

including the associated forest manuals and guides, protects species at risk. The Ministry will continue to incorporate species at risk direction into forest management guides, as appropriate, based on science and other information.

The federal *Species at Risk Act, 2002*, provides protections for fish species and migratory birds that are not protected under the *Species Conservation Act, 2025*.

The provincial *Fish and Wildlife Conservation Act, 1997* contains requirements related to similar topics covered in various sections of this guide (e.g., the protection of bird nests and bear dens). The direction in this guide is not intended to replace or address all of the legal requirements of the *Fish and Wildlife Conservation Act, 1997*.

The *Occupational Health and Safety Act, 1979* must be followed by all employers and employees in Ontario. The section of this guide that is most relevant to this act is Section 3.2.3.1, relating to direction on retaining wildlife trees during harvest operations. Direction in this section focuses on the retention of wildlife trees that will normally not be a worker safety hazard as defined in the Act. However, given the variability in operating conditions across the province, forest workers must ultimately use their judgment to identify potential safety hazards and work in a manner that complies with the requirements of the Act.

The *Aggregate Resources Act, 1990* applies to the development and use of gravel pits and aggregate extraction. Restrictions on the construction and use of forestry aggregate pits and wood storage yards are described for site-specific values in Section 4 of this guide.

The federal *Fisheries Act, 1985* is addressed by direction covered in Section 4.1 (aquatic and wetland habitats and shoreline forests) and Section 5.1 (access roads and water crossings) of this guide.

The provisions of the *Invasive Species Act, 2015*, which regulates invasive species to prevent their introduction and spread and to support detection, control and eradication efforts, are addressed in Section 4.1.3 (wetlands), 4.3 (species at risk), and Section 5.3. (invasive species).

The topic of bird nest sites is covered in Section 4.2.2 and Section 4.3.7 and is designed to address the provisions of the federal *Migratory Birds Convention Act, 1994* and the provincial *Fish and Wildlife Conservation Act, 1997*.

The direction in this guide reflects the principles and concepts of various strategic policy documents, such as the government's Ontario Biodiversity Strategy and the Ministry's Naturally Resourceful strategic direction, Policy Framework for Sustainable Forests, and Integrated Science Action Plan.

This guide also incorporates considerations from other policy documents, to the extent appropriate, that represent advice to government. For example, the guide provides

direction that addresses the stand and site level habitat objectives identified for forest-dwelling priority species in the draft Ontario Landbird Conservation Plans, developed for Bird Conservation Regions (BCR) 8 and 12 by Ontario Partners in Flight. The guide also requires that the submission, review, and approval of water crossings under the authority of the CFSA will comply with the requirements of the Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings.

1.5 Pilot testing

The FOSM requires that effectiveness and efficiency be applied as concepts to policy development, review, and revision. As part of the development of the revised Stand and Site Guide, pilot testing of some of the new or revised direction was undertaken. The objective of the pilot testing was to assess the effectiveness and efficiency in application of the new or revised direction prior to approval and implementation. Pilot testing of the draft revised guide ensured that some of the new or revised direction could be interpreted by forest practitioners, to develop operational prescriptions and conditions for areas of concern (AOC), and/or conditions on operations.

In addition to seeking the advice of experienced forest management planning professionals in the development of any new or revised direction, pilot testing exercises were undertaken to inform the direction development process and to improve the clarity of the direction.

Some initial pilot testing was conducted by the Ministry as part of the socio-economic impact analysis (see Section 1.6). New and revised descriptions and operational prescriptions for AOCs were interpreted and mapped using available inventories and mapping software. This process also included reclassifying the potential sensitivity of standing and flowing water features in accordance with the revised guide direction. Reclassification of these water layers was done by assigning revised potential sensitivities based on water feature attributes generated by the water classification tool (e.g., water features classified as “streams-small” from the water classification tool output would be classified as low potential sensitivity under the revised guide direction).

Application and assessment of the draft revised rutting coverage direction for selection and shelterwood silviculture systems, and commercial thinning was pilot tested in the Nipissing and French-Severn Forests for both effectiveness and practicality of field application. The revised direction was changed from an areal to a distance-based coverage approach to better facilitate assessment for compliance. The original distance-based assessment for quantifying rutting coverage considered (maximum 200 m of ruts for 300 m of extraction trail) was tested in heavily rutted hardwood shelterwood harvest blocks where rutting coverage was deemed to be not acceptable. It was determined that this assessment (200 m in 300 m) would not be effective because it resulted in the coverage of rutting not exceeding the threshold limit. It was also difficult to assess a

contiguous segment of extraction trail using this assessment. Issues with this proposed original assessment were identified and corrected by establishing a threshold length of rutted extraction trail for a given area (900 m in 20 ha). A pilot testing exercise of the alternative distance-based assessment determined that this threshold would be more effective at limiting unacceptable site damage during operations and could be used to track rutting as operations progressed.

1.6 Socio-economic impact analysis

The FOSM requires that the Ministry consider economic impacts in the development, review, and revision of the forest management guides to ensure they achieve their objectives without unnecessary burden (restrictions, workload). Prior to the approval of this direction, a socio-economic impact analysis was undertaken. The analysis was intended to quantify changes in wood supply and wood costs to the forest industry associated with the new or revised direction, compared to the baseline existing direction.

While the socio-economic analysis focused on wood supply and wood costs to the forest industry, the socio-economic implications to other forest users were considered throughout the development of the direction. Similarly, other factors such as reduction of the land base and operational restrictions were addressed through creating effective, yet efficient, direction. Impacts on other sectors of the economy are also considered as part of the larger forest management planning process.

Socio-economic impacts were explored for new or revised direction in this guide anticipated to potentially have a significant impact on wood supply and/or wood costs (e.g., AOCs for standing and flowing waters, bird nest sites, and species at risk). A detailed spatial analysis was conducted on five management units (Algoma Forest, Bancroft-Minden Forest, Boundary Waters Forest, French-Severn Forest, and Trout Lake Forest) in the managed forest.

The results of the analysis suggested that, compared to the baseline current guide direction, the new or revised direction will result in an overall minor positive impact on wood supply (e.g., increased available harvest area) and wood costs (e.g., reduced FMP production and operational costs) for the forest industry. Changes to AOC prescriptions for flowing water features resulted in the most significant potential increase in wood supply. Based on the analysis of the Boundary Waters Forest, the revised classification of potential sensitivity of streams resulted in estimated 15% reduction in area subject to water-related AOC operational prescriptions (modified operations and reserves). Permitting clearcut harvest to shore along one side of some streams is also anticipated to result in a potential modest increase in available harvest area. Reduced AOC dimensions for some bird nest sites and species at risk should also result in a small increase in available harvest area and operational flexibility. This increase would be slightly offset by proposed increased AOC dimensions for some species at risk, however, known occurrences of these species in the managed forest are very rare. New

fine filter direction for some species at risk will reduce available harvest area and operational flexibility (e.g., overlapping seasonal timing restrictions).

Reduced new branch road and existing road use restrictions in some bird nest site and species at risk AOCs, simplified bird nest classification, and removal of the requirement for an Environmental Impact Study for provincially significant wetlands, are anticipated to result in potentially reduced wood costs (by reducing FMP production and road construction costs) and increased operational flexibility. These cost reductions would be slightly offset by new fine filter direction for high-risk self-sustaining trout lakes and conditions on road construction in wetlands (e.g., potential additional cross drainage infrastructure), which are anticipated to increase road planning, construction, and access control costs.

It is acknowledged that the socio-economic analysis undertaken for this guide did not include/account for new values found and reported by forest industry and the Ministry and thus is not able to fully assess the potential socio-economic implications of the new or revised direction in this guide.

1.7 Climate change considerations

1.7.1 Climate change and impacts on Ontario's forests

Ontario's climate has changed and is projected to continue to change at a more rapid rate during this century than has been observed in the past. Ontario's annual mean temperature has increased by 1.3^{o}C from 1948 to 2016 and annual precipitation has increased by 9.7% between 1948 and 2012 (Bush and Lemmen 2019). The online data portal https://climatedata.ca/ provides future climate projections (based on shared socio-economic pathway (SSP) scenarios used in the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6)) and historical climate data at spatial scales appropriate for regional-level analysis across the province. Annual mean temperature and precipitation are predicted to continue to increase spanning the range of available emission scenarios from low (RCP 2.6 corresponding to SSP1-2.6) to medium (RCP4.5 corresponding to SSP2-4.5) to high (RCP 8.5 corresponding to SSP5-8.5) emission scenarios (see projections in Bush and Lemmen 2019 and McDermid et al 2015). Additionally, a warmer climate is projected to increase the frequency and intensity of some weather extremes across Ontario (Bush and Lemmen 2019, Notaro et al 2014, Burnett et al 2003).

A changing climate may significantly affect the functioning and productivity of terrestrial ecosystems by introducing southern competitors, pathogens, and invasive species, altering phenology and physiology, and acting synergistically with other processes including habitat fragmentation and natural disturbances (Varrin et al 2007, Columbo 2008, Nituch and Bowman 2013). Additionally, climate change may potentially impact the functioning and productivity of aquatic ecosystems by altering hydrological cycles as a result of changes in air and water temperature, frequency and amount of precipitation, evaporation rates, and ice and snow cover levels (Dove-Thompson et al 2011, Chu

2015). However, the magnitude and nature of potential impacts of climate change is difficult to predict due to the variable responses of and complex interactions between organisms at multiple scales in forests (Lawler et al 2010).

1.7.2 Addressing climate change in the Stand and Site Guide

Healthy, resilient forests are best able to resist and adapt to climate change impacts (Millar et al 2007, Thompson et al 2009). Resilience is the ability of ecosystems to persist and recover from disturbance by maintaining their structure and function (Holling 1973). Ontario's sustainable forest management framework has been designed to ensure a healthy, and therefore, resilient forest. Paramount to that framework is the CFSA that directs the conservation of large, healthy, diverse and productive Crown forests and their associated ecological processes and biological diversity. Building from this foundation, the forest management guides, which are required to be used by each planning team when they develop an FMP, describe in more detail the objectives (e.g., diverse range of forest types and ages) and practices (e.g., conserve soil and water resources) that are consistent with a healthy, resilient forest. Our current benchmark for comparison will continue to be the primary forest state created by natural disturbance. If evidence is presented suggesting an alternate forest condition that is more resistant and/or resilient to climate change, the benchmark may change.

The objective of the forest management guides that address biodiversity (i.e., Landscape and Stand and Site Guides) is to maintain or enhance biodiversity and biodiversity is generally expected to be at a level consistent with a historic natural disturbance driven ecosystem. Because there is sufficient evidence supporting an accelerated rate of climate change, which may have implications on applying direction in these guides, there is an expectation that it will be addressed.

Direction in the Stand and Site Guide continues to be consistent with the concept that maintaining and enhancing biodiversity at multiple scales will support the delivery of ecosystem goods and services, and/or maintain ecosystem resilience in the face of stresses such as climate change (Fischer et al 2006, Thompson et al 2009, 2011, Thompson 2011, Mace et al 2012). Subject experts support the guide's underlying coarse filter approach (based on the principle of emulating natural disturbance) in maintaining ecosystem resilience and resistance, and thus adapting to the anticipated stresses associated with climate change. Additionally, sustainably managed forests play an important role in mitigating climate change by sequestering and storing carbon within soils, forest biomass, and long-lived wood products. Direction that aims to sustain forest ecosystem biodiversity, health, and productivity in this guide supports maintaining or enhancing the forest carbon sink, which may offset fossil fuel emissions if net primary productivity (e.g., vegetation renewal and growth) exceeds decomposition (e.g., decay, disturbance, soil respiration). However, direct impacts of the direction in this guide on the sequestration and storage of carbon in Ontario forests are likely immeasurable.

While the Stand and Site Guide has adopted an approach that supports ecosystem resilience to climate impacts, it has also taken climate change adaptation into account.

Examples of where specific direction in this guide has integrated flexibility to be adaptive to future climate conditions include:

- Deer and moose may be affected by climate change either directly through changes in health and/or behaviour or indirectly through changes in habitat, food supply, and/or predation. The direction for winter cover in deer winter concentration areas (Section 3.3.1) differentiates between mild and severe winter cover, and requirements for access cover have been simplified considering predicted reductions in snow cover as a result of climate change. Given potential stresses associated with climate change (e.g., heat stress) on moose, the guide provides direction on optimal distance-to-cover, patch size, and composition for summer thermal cover, and proximity of moose aquatic feeding areas to summer thermal cover in moose emphasis areas.

- Forecasted impacts of climate change may alter aquatic ecosystems across the managed forest; habitat for cold water species is expected to be most significantly (adversely) affected (Minns et al 2009, Dove-Thompson et al 2011, Chu and Fisher 2012, Chu 2015, Lynch et al 2016). Consistent with the concept of maintaining ecosystem resistance and resilience to help address climate change (Millar et al 2007, Thompson et al 2009, Rist and Moen 2013), direction in this guide (Section 4.1) continues to promote the management of shoreline areas to maintain habitat diversity and complexity, including creation of some early successional shoreline forest for beavers (beaver activity may help mitigate some adverse effects of climate change on aquatic systems; see Hood and Bayley 2008). However, since climate change projections suggest significant effects on water temperature and the supply of coldwater habitats, efforts to further emulate natural patterns of disturbance along streams (with subsequent temporary removal of shade-producing tree cover) must be done in a manner that does not exacerbate predicted increases in thermal stress (see Section 4.1.2). In addition, cold groundwater inputs associated with hydrological connections may become increasingly important in providing critical thermal refugia in cold water streams if water temperatures rise as predicted. Thus, enhanced direction for hydrological connections (see Section 4.1.4) may also assist in mitigating effects of climate change.

- Potential changes in precipitation and water surface temperatures associated with climate change are likely to impact fish species distribution, assemblages, phenology, abundance, growth, recruitment, and genetics (Dove Thompson et al 2011, Alofs et al 2014, Lynch et al 2016). Climate change induced increases in water temperature may influence the timing of fish spawning (Harrod 2016, Sparks et al 2019). Thus, timing restrictions for in-water work to protect fish and fish habitat in this guide enable adjustment of dates based on local knowledge of timing of fish reproductive periods.

- Projected climate change may shift habitat suitability at the landscape scale. Travel and dispersal corridors at the stand and site scale enable movement of wildlife and provide for seasonal migration, reproduction, feeding, and cover and

facilitate persistence and post-disturbance recolonization of plant species. Corridors can also promote the movement of individuals between different populations, increasing gene flow. Direction for maintaining habitat suitability of shoreline forest in Section 4.1 focuses on retaining some shoreline forest as travel and dispersal corridors.

- Climate change projections suggest more evapotranspiration and less snow fall which may result in future drying of wetlands and reduced hydroperiod in woodland pools. Direction for non-forested wetlands and woodland pools (Section 4.1.3) ensures operations maintain hydrological flow within and/or adjacent to these aquatic features and avoid interrupting surface and groundwater inputs. Furthermore, continued management of shoreline forest for beavers may help offset some of the forecasted effects of climate change on wetlands.

- Direction for bird nest sites (Section 4.2.2) frequently includes restrictions on operations during specific time periods (e.g., the critical breeding period). The most recent nest record data has been used to refine (if necessary) the critical breeding period to reflect changes in nesting behaviour because of climate change. Furthermore, because the chronology of life history events may vary across the managed forest and may change through time because of changing climate, direction specifies that local knowledge may be used to adjust these dates.

- The potential for increased occurrence of freeze/thaw, mid-winter thaw, and extreme precipitation events may require the implementation of practices to maintain road functional and environmental performance. The direction for road construction and maintenance (Section 5.1.1) includes best management practices (e.g., water management in winter, increased road surface and cross drainage) that will facilitate adaptation to the potential risks of climate change on new and existing resource roads and infrastructure.

- Climate change predictions suggest milder winters, which may result in more harvesting during unfrozen conditions. The guide recommends strategies and techniques, that help to minimize the potential for site disturbance in these conditions.

- Given that the frequency of wildfire and wind disturbances is expected to increase with climate change, the guide provides direction on how to salvage harvest naturally disturbed stands (Section 6.1) with due ecological considerations at the stand and site scales.

To address the uncertainty of these adaptation options for the non-stationary conditions likely to be created by a changing climate, the guide has adopted an adaptive management approach. The implementation of developed direction is monitored and management strategies and policies are potentially altered to address ongoing and

predicted changes. The Ministry undertakes a program of effectiveness monitoring for the Stand and Site Guide to ensure that the direction is effective. The Ministry also considered the latest science during the reviews of Stand and Site Guide, including climate change research. The Ministry continues to improve its understanding of climate change and its effect on Ontario's Crown forests working with other agencies and partners on research studies and sharing information. As a component of the guide review process, direction has been and may continue to be adapted to reflect this improved understanding over time to ensure the long-term health of Ontario's Crown forests.

1.7.3 Direction flexibility to address climate change

The challenge in developing guide direction that is responsive to climate change for Ontario's Crown forests is that there is little consensus as to the magnitude of the effect that climate change will have. Furthermore, as with most ecosystems, it is unlikely that this uncertainty will be resolved anytime soon (Schindler and Hilborn 2015). Accepting and incorporating this uncertainty in the guide is achieved by adding sufficient flexibility to enable practitioners to adapt their practices to unanticipated outcomes of climate change (see also Millar et al 2007, Joyce et al 2009, Lawler et al 2010, Messier et al 2016).

To adapt to unforeseen conditions or potential issues associated with climate change, deviation from specific standards or guidelines associated with an area of concern or conditions on operations for an important ecological value may be permitted provided:

- The deviation from the specific direction is identified as an exception in the FMP and exceptions monitoring is undertaken as per the FMPM (see Section 1.2.3)
- Appropriate rigour and science (e.g., relevant historical climate data and future climate projections, recommended climate adaptation forest management activities) are used to support the need to deviate from the direction and predict the potential impact of the deviation

1.8 Ministry's Statement of Environmental Values

In 2020, the Ministry revised its Statement of Environmental Values under the Environmental Bill of Rights. The Statement of Environmental Values is a document that describes how the purposes of the Environmental Bill of Rights are to be considered whenever decisions that might significantly affect the environment are made by the Ministry. The Ministry has considered its Statement of Environmental Values during the development of the Stand and Site Guide. This document is intended to reflect the direction set out in the Statement of Environmental Values and to further the objectives of managing Ontario's natural resources on a sustainable basis.

2.0 INTEGRATION AND IMPLEMENTATION

2.1 Integration

The Stand and Site Guide is part of a series of forest management guides that collectively direct sustainable forest management practices. It is necessary to consider the direction in the other guides while implementing this guide. This is particularly valid for the Landscape Guides. In general, the Landscape Guides provide direction to assist with strategic objective setting for a forest management plan; it also provides context for the Stand and Site Guide, which addresses more operational topics. For some topics, however, the implementation of these two guides during forest management planning requires a more iterative approach.

For instance, the identification of some forest values and the steps required to protect or enhance them (as described in Section 4) provides important context for the most effective implementation of the Landscape Guide (i.e., identification and placement of large landscape patches (LLPs)) and Section 3 of the Stand and Site Guide. Similarly, transition from strategic to operational planning is facilitated in Section 3 of this guide by using the same terminology introduced in the Landscape Guides. Links between these two guides are included within the text of each document.

The Stand and Site Guide also contains references to information provided in the Silviculture Guide and the *Ontario Tree Marking Guide*; the *Forest Management Guide for Cultural Heritage Values*; and the *Management Guidelines for Forestry and Resource-based Tourism* - the remaining three forest management guides used during forest management planning. With respect to the Silviculture Guide, the implementation of the direction in this guide in a particular location may need to consider the planned silviculture treatment(s) for that same area. This is most likely to occur when implementing a guideline in which professional expertise and local circumstances will determine exactly how the requirement will be met or deciding whether to follow one or more of the best management practices.

2.2 Implementation

The Stand and Site Guide must be used in the preparation of ten-year forest management plans beginning with plans that come into effect on or after April 1, 2029 in accordance with the requirements of the FMPM.

Planning teams may choose to amend their current FMPs to incorporate any or all of the new or revised direction in this guide as it reflects the latest scientific and technological knowledge. The decision to incorporate this guide direction or continue to follow the direction used when the plan was originally written will be made locally to reflect the circumstances, scale, and reason for the proposed amendment.

Contingency plans that come into effect on or after April 1, 2029 will be prepared in accordance with this guide.

Where direction in this guide overlaps with direction in the current Silviculture Guide or tree marking guide (e.g., wildlife tree and cavity tree retention), this guide takes precedence. The direction in this guide reflects more recent scientific findings, current knowledge of sustainable forest management, and the direction in other more recent guides (e.g., Landscape Guides).

3.0 CONSERVING BIODIVERSITY – Management at the stand, multi-stand, and meso-landscape scales

3.1 Introduction and linkage to landscape-level direction

The goal of Section 3 is to provide direction that conserves biodiversity at all spatial scales. The direction is complimentary in that this is one of many sources of direction related to the achievement of this goal.

As described in Section 1, the coarse and fine filter approach forms the basis for conserving ecosystems and their related biodiversity. Application of the coarse and fine filter approach requires consideration of composition, structure, and function at a variety of spatial scales ranging from large landscapes (10,000s km^2) to individual sites (10s m^2). Although an individual piece of direction may be applied at a specific scale, it is difficult to assign the effect to a single scale. The aggregation of actions at the smallest scale affects achievement at the largest scale. Similarly, objectives for the largest scale provide important context for actions at the smallest scale.

The direction in this section is meant to provide context to, and nest within, strategic direction resulting from applying landscape level guides and objectives. In some cases (e.g., Section 3.3) the direction in this guide is only applied after a specific decision has been made at the landscape scale. While the direction in this guide has been integrated into landscape scale direction (e.g., scale of pattern assessment), it is critical that the practitioner maintain this integrative thinking in all decision making. Integrative thinking requires silviculture prescription decision making in the context of landscape objectives for each forest type (i.e., what is the forest level target for hardwood, mixedwood, and conifer), the contribution of previous treated sites to these targets, and the amount and characteristics of remaining sites where similar decisions are yet to be made. A lack of integrative thinking, particularly during operational implementation (e.g., silviculture decision-making), could easily lead to decisions at stand or site scale that limit or even preclude achievement at the landscape scale.

Section 3 includes direction related to the composition, structure, and function of forested ecosystems. Composition refers to the different elements, or groups of elements, represented in an ecosystem, and their relative abundance. Structure is driven by the composition, the arrangement, and the proportion of different elements. Function refers to how each element in the ecosystem interacts based on its life-cycle events. Section 3.2 addresses composition and structure (including pattern), while Section 3.3 provides fine filter direction related to function as wildlife habitat.

3.2 Applying the Coarse Filter

3.2.1 Composition

To be able to describe the composition of an ecosystem it is necessary to develop classes, or groupings, of various elements. For forested ecosystems, a very coarse

classification might be land and water. A slightly finer classification might be forested land, non-forested land, wetlands, and open water.

The Landscape Guides provide direction based on a classification defined by forest type (i.e., species and associations), age, and the combination of the two. Age is based on ecosystem development stages (e.g., Holloway et al 2004) and forest type is based on aggregations of forest units. A forest unit is a classification system that aggregates forest stands for management purposes that will normally have similar species composition, will develop in a similar manner (both naturally and in response to silviculture treatments), and will be managed under the same silviculture system. Forest stands are an aggregation of trees occupying a specific area that are sufficiently uniform in species, age, and arrangement to be distinguishable from an adjacent aggregation of trees.

The composition indicators in the Landscape Guides are at an appropriate resolution for planning composition at the strategic landscape scale and will generally provide for the conservation of all common forest types. At the stand and site scale, there may be uncommon forest types that are not well represented by the forest unit classification, and thus require individual consideration. As well, the diversity of species within a forest unit may change over time while the overall forest unit area stays within the desired range. A change in species diversity within a forest unit, or a reduction in area by forest type, is not necessarily negative if the trend is in a desirable direction. The desirable direction is based on strategic decisions (e.g., increase white pine in mixedwood forest types). The following direction is intended to complement landscape level direction by addressing composition at a finer resolution.

Direction

Standards

- When developing management direction, develop an objective and desired level for each individual forest unit. The sum of desired levels for all forest units will be consistent with any grouped composition targets (e.g., upland conifer).

Guidelines

- Where there is not a strategic decision to do otherwise, select harvest, renewal, and tending treatments that maintain existing tree species diversity at the forest unit level.

- Develop area of concern operational prescriptions and conditions (when locations are known) or conditions on operations (when locations are not known but features are likely to occur in areas of planned operations or are encountered during operations) to maintain S1, S2, and S3 Natural Heritage Information Centre vegetation communities, other plant species or vegetation communities of conservation concern, or other significant natural heritage areas as identified by the Ministry. Information on these values or features will be provided by the Ministry prior to completion of the management direction.

Best management practices

- Develop strategies to maintain or move average species composition by forest unit in a desirable direction. For example:
    - Consider the effect of typical silviculture prescriptions on future species composition and include that information in site-level prescription setting
    - Ensure the silvicultural ground rules include options to create the full range of observed/desirable species composition by forest unit
    - When selecting stands for harvest, ensure the average species composition of allocated stands does not deviate significantly from the forest unit average

3.2.2 Pattern

Sections 3.2.2.2 and 3.3 provide stand level pattern direction to be applied when completing detailed harvest area planning and implementation. Detailed harvest area planning (i.e., cutblock design) includes determining the shape of the outer boundary and delineating or describing any areas within the harvest boundary where modified harvest or no harvest will occur. Included in this process is the identification of AOCs, which may influence the amount and location of harvested, unharvested, or modified harvest areas. Implementation is the actual cutting of trees where local decisions about where to harvest (or not) can be made within the confines of the harvest boundary and the prescription for the site.

The pattern direction to be applied to a specific harvest area depends on the management intent for the area and the silviculture system used. Direction in Section 3.3 will apply when an area with a species-specific emphasis has been identified (normally through development of the management direction). Section 3.2.2.2 applies where a species-specific emphasis has not been identified. Identification of any areas with species-specific emphasis is an iterative process involving application of both landscape-level direction and the direction in Section 3.3 of this guide. Areas where species-specific, fine filter direction is applied should only be chosen from candidate areas as described in the introductory paragraphs of Sections 3.3.1 and/or 3.3.2, and will be consistent with the management direction.

3.2.2.1 Defining residual forest

Where stand-replacing wildfire is the predominant agent of natural disturbance (e.g., boreal forest), the post-fire environment is composed of a spatially complex array of burn intensities ranging from severely burnt to unburnt due to varying local conditions including fire behaviour, vegetation, and topography. The patches of undisturbed forest that remain within a wildfire perimeter are sometimes referred to as fire refugia, remnants, skips or biological legacies. However, the term residual forest is used in this guide.

To emulate natural disturbance pattern and forest age class heterogeneity, residual forest patches are retained during harvest operations to maintain the diversity of habitat for native plants and wildlife that depend on this mosaic of forest conditions. Stand replacing fire can enhance biodiversity by creating habitat for species that require early successional and open conditions. Conversely, forest residual patches provide habitat islands within a highly disturbed environment for forest-dwelling species that require conditions such as a continuous tree canopy, large diameter trees, standing and downed dead wood, and deep litter layers.

Residual forest is ecologically important in stand replacing disturbances because it supports the survival and local persistence of plants and animals during and immediately post-fire, as well as the recolonization (e.g., source of dispersal) of a disturbed area during the years and decades of post-fire recovery. Thus, the ecological functioning of residual forest continues long after the time of disturbance.

In the Great Lakes - St. Lawrence forest region, natural disturbance agents, such as ground fires, wind, ice, insects, and disease, create small-scale gaps in the overstory canopy. Harvesting attempts to emulate this relatively continuous, periodic gap phase condition by removing overstory trees individually or in small groups. This partial harvesting aims to maintain the continuous provision of habitat features associated with closed-canopy successional stages within managed stands for mature forest-dwelling plant and animal species.

To understand the various pieces of direction that refer to residual forest, it is important to understand the definition of residual forest and how it is used.

Conceptual definition:
Residual forest is a forested patch that generally functions more as habitat for wildlife that inhabit older forest than as habitat for wildlife that inhabit younger forest. The words older and younger are used in a relative sense. Residual forest is not synonymous with mature, old, or old growth forest. Residual forest can also include some immature (i.e., neither young nor old) forest. The Landscape Guides provides specific direction related to the pattern and amount of mature, old, and old growth forest.

Residual forest, as defined in this guide, is not to be confused with the common use of the term “residual” (e.g., residual stocking, residual basal area, residual tree spacing) to describe post-harvest retention objectives in partial harvest systems.

Quantifiable definition:
There are six quantifiable criteria used to assess residual forest. The criteria vary depending on the status of the stand being evaluated. For example, recently harvested stands and stands planned for harvest require a higher canopy closure than stands that have not been recently harvested or are of natural origin.

Table 3.2a. Quantifiable definition of residual forest (each of the six criteria must be met for a stand to be considered residual forest).

Stand criteria	Stand status		
	Not planned for harvest		Planned for harvest
	Natural origin or ≥20 yrs since harvest	Recent harvest (<20 yrs)	
1. Condition	Crown[1] productive forest (Polytype = FOR and established/free-to-grow)		
2. Height/Age	≥10 m or ≥35 years		
3. Minimum size patch	0.1 ha		
4. Canopy closure	n/a	≥50% based on dominant/codominant trees	
5. Sub-stand pattern	n/a	Sub-stand pattern will resemble older forest with small gaps rather than mixture of discrete young and old forest patches. Ideally, space trees uniformly. However, moderate concentration to facilitate operations is acceptable. Refer to Figure 3.2a for conceptual portrayal of acceptable and unacceptable sub-stand patterns.	
6. Composition	n/a	n/a	Unless otherwise specified in FMP (e.g., SGR for harvest area, AOC prescription, conditions on regular operations), residual forest will normally have species composition and average stem diameter and quality similar to pre-harvest stand.

[1] Available and unavailable forest

The criteria above allow for the determination of whether an existing stand (unharvested or recently harvested or the result of a planned harvest) will meet the definition of residual forest. In the case of a planned harvest, these criteria do not determine if the planned prescription is silviculturally appropriate or will create a future forest condition that is consistent with broader composition objectives. Refer to the FMPM and Silviculture Guide for further direction on acceptable treatments and applicability of silvicultural ground rules (SGR).

Canopy closure is used to define residual forest and desirable stand structure for many AOC operational prescriptions (Section 4) because it is a good reflection of habitat suitability for many forest-dwelling species of wildlife. However, canopy closure is generally more difficult to assess in the field than many standard mensurative parameters such as basal area. Thus, to assist in both implementation of the direction and compliance monitoring, planning teams may wish to develop locally-appropriate translations between canopy closure and more easily measured attributes of stand structure. For example, in marked selection or shelterwood harvests, canopy closure targets can be translated into a basal area prescription (e.g., a residual basal area of 16 m^2/ha will produce a canopy closure of about 50% in a typical white pine regeneration

cut). For unmarked partial harvests, canopy closure targets can be translated into a prescription outlining the spacing of trails and the intensity of stem removal between trails (e.g., in upland forests, 7 m wide machine trails spaced 30 m apart with removal of 1 in 4 stems within a boom's reach of the trail will normally produce a 50% canopy closure if initial stocking is ≥ 80%).

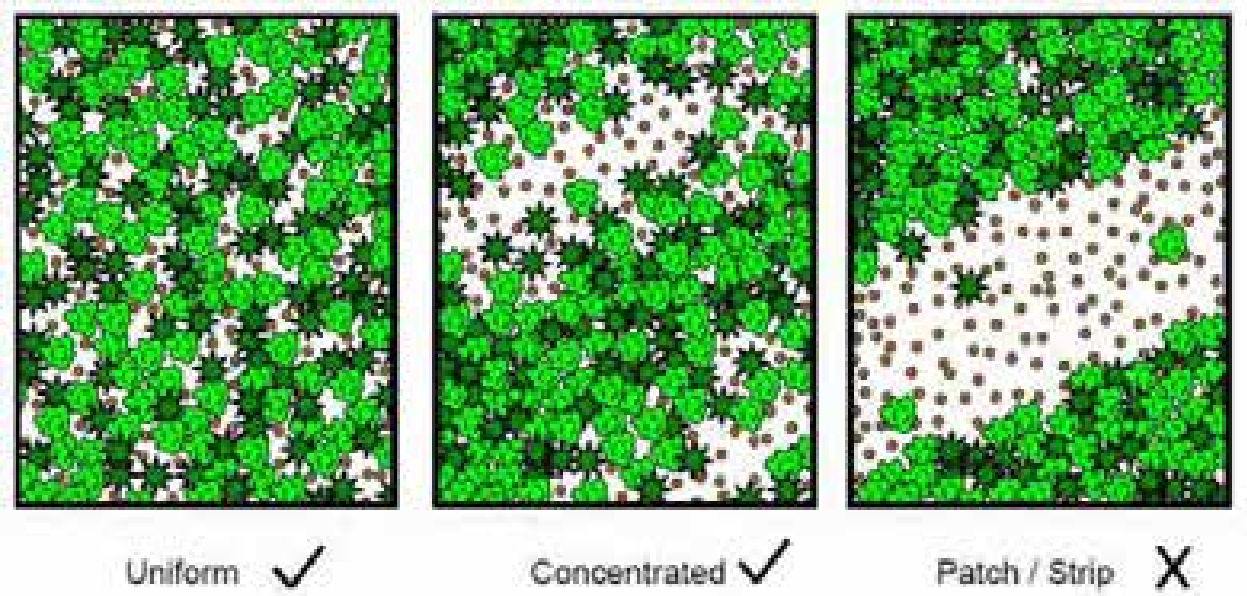

Figure 3.2a. Conceptual portrayal of acceptable (uniform and concentrated) and unacceptable (patch/strip) sub-stand patterns associated with residual forest (Note: This figure is not necessarily to scale and should not be construed as providing specific advice on maximum opening size or any other metric).

3.2.2.2 Coarse filter pattern emulation and finalizing the harvest area boundary during operational planning

Although the process is more iterative than linear, this section is normally applied after the spatial delineation of AOCs for planned harvest areas. The goal of this section is to create a stand and multi-stand harvest pattern similar to that created by natural disturbances and consistent with strategic objectives (including a natural landscape pattern). The zonal approach (e.g., 500 ha circle) is based on identifying natural pattern without requiring the arbitrary determination of a patch or disturbance boundary.

Direction

The standards and guidelines in this section only apply to areas harvested using the clearcut silviculture system. Clearcut harvest areas where the forest immediately following harvest is considered established and greater than 3 m in height are exempt. All stages of selection and shelterwood management are exempt. Where the inventory does not contain sufficient data to assess the applicability of these exemptions, verification will be required prior to completing the harvest.

Section 3.2.2.2 will be applied in areas where a species-specific emphasis has not been identified. When operating within a defined area with a species-specific emphasis

(caribou mosaic, deer emphasis area, moose emphasis area, etc.) refer to the Landscape Guide and/or Section 3.3, for operational planning direction in these areas.

Implementation of the standards and guidelines in this section will be consistent with the achievement of biodiversity objectives. If implementation of any of the direction will compromise achievement of geographically specific (e.g., habitat) or broad landscape level (e.g., pattern) biodiversity objectives, the achievement of biodiversity objectives will take priority over this direction. Any required modification of this direction to ensure consistency with biodiversity objectives will be described in the FMP. The degree and geographic scope of modification will be limited to that required for consistency with biodiversity objectives.

The direction in this section will be implemented using regular FMP products (e.g., selection of harvest, renewal, and tending areas) and conditions on regular operations.

Conditions on regular operations

Guidelines

- Operational planning will normally follow stand boundaries and/or natural features.

- Operational planning will ensure that any point within a planned clearcut harvest area will have at least 25 ha of mapped residual forest within a 500 ha circle about that point.
    - Mapped residual forest includes;
        - Unallocated stands or portions of stands that meet the definition of residual forest
        - Stands or portions of stands scheduled for harvest that will retain residual forest
        - Residual forest within AOCs associated with known values
    - Additional mapped residual forest that is required during operational planning will be preferentially retained so it is connected to the shoreline of a lake, pond, river, or stream that is within, or directly adjacent (i.e., <200 m) to, the planned harvest area with a preference for areas of hydrological connection between terrestrial and aquatic ecosystems (e.g., recognizable linear features that channel ephemeral surface and/or shallow groundwater flows to lakes, ponds, rivers, or streams). Otherwise, additional mapped residual may be connected to known values, located to encompass uncommon forest types, or located consistent with expected disturbance behavior.
    - A minimum of 5 ha of the mapped residual within any 500 ha circle will belong to a patch greater than 5 ha[1].

- Implementation of the harvest plan will ensure that any point within a new clearcut harvest area will have at least 0.5 ha of residual within a 50 ha circle

about that point. Develop a condition on regular operations for areas where this residual is not mapped in advance.

- Mapped residual that is not serving any other purpose (e.g., AOC, specific habitat function), and would otherwise be available for harvest, can be moved during operational implementation provided;
    - The other standards and guidelines in this section are respected
    - The planned harvest area is not exceeded
    - The FMP (e.g., map, data product) specifically identifies those mapped residual polygons that are eligible for movement.
    - Appropriate conditions on regular operations are developed to facilitate movement

  Movement of mapped residual that is identified in the FMP as movable will not normally require an amendment, revision, or special reporting.

[1] The 5 ha requirement can be satisfied by a single 5+ ha patch completely contained within the 500 ha assessment area, a single 5+ ha patch partially within the circle with at least 5 ha within the assessment area, or several 5+ ha patches partially within the 500 ha assessment area whose combined area within the assessment area is at least 5 ha. Refer to Appendix 3.2a for graphic examples.

Best management practices

- When measuring achievement of direction requiring a 50 ha or 500 ha moving window analysis, use a point spacing or grid cell size of no more than 50 m.

- When locating unmapped residual forest (i.e., 50 ha), give preference to locations connected to habitat features encountered during operations (e.g., bird nests, furbearer dens, woodland pools). When additional habitat features are not encountered, give preference to uncommon forest types, locations connected to known values (e.g., water, nests), or located consistent with expected natural disturbance behaviour.

3.2.2.3 Catchment considerations

A catchment (e.g., watershed) is the area of land that drains water to a given point. The term catchment is somewhat vague as it could describe an area of a few hectares that drains into a small intermittent stream or several thousand km^2 that feeds a large river.

The removal of forest cover, by either a natural disturbance or as a result of forest management, has the potential to cause catchment scale hydrochemical effects such as changes in water yield and export of nutrients and other elements (e.g., Ca, NO_3, K, dissolved organic carbon (DOC), and associated metals such as Hg) by temporarily altering evapotranspiration, infiltration, overland flow, and sub-surface flow. The amount of cover removed, the pattern of removal, and the characteristics of the catchment can influence the magnitude of these effects and the subsequent response by the biological communities.

During the revision of this guide, careful consideration was given to catchment scale effects of forest management and the need for additional direction. The variability in catchment-scale effects of forest harvesting on the long-term depletion of calcium and short-term, post-disturbance export of mercury and inconclusive research documenting how forest management operations interact with other factors (e.g., catchment geology, topography, precipitation patterns, extended periods of drought, acid precipitation) make it difficult to quantitatively define generalized mitigation (if needed). Given the current understanding of these effects, the application of related coarse and fine filter direction (natural landscape pattern, minimizing site damage, retention of residual forest, protection of hydrological connections, etc.) is thought to adequately address catchment scale effects and therefore explicit catchment direction is not prescribed. This hypothesis will continue to be examined through guide effectiveness monitoring (Section 7) and is further explained in the Background and Rationale for Direction that accompanies this guide.

3.2.3 Structure

Section 3.2.3 provides direction related to the amount and distribution of wildlife trees (3.2.3.1) and downed woody material (3.2.3.2).

3.2.3.1 Wildlife trees

Following a fire or other natural disturbance (e.g., windstorm), or as a result of natural forest succession, a combination of live, dying, and dead trees provides structure and special habitat features for wildlife. The structures and special habitat features preferred by wildlife vary widely. Trees retained during forest operations, with the intent to provide structure and features beneficial to wildlife in general, and for specific species, groups or communities, are collectively referred to as wildlife trees. Wildlife trees can include standing live, dying, or safe dead (including trees killed by stubbing, girdling or tending operations) trees.

Living wildlife trees retained during forest operations will typically be healthy, windfirm, and long-lived. Although, some living wildlife trees will fall shortly after harvest, it is anticipated that some of them will become sources of standing dead and downed wood in 20 to 40 years. Dying trees will visually be in decline and may exhibit:

- Dead branches
- Dead or discolored foliage
- Evidence of disease and/or internal decay (e.g., fungal conks)
- Significant damage to stem (e.g., large crack or seam)
- Recent excavation activity

Dying trees will provide potential cavity nesting and foraging substrates in the near future and are anticipated to become sources of standing dead and downed wood in 10 to 20 years.

Dead trees (including stubs) will be standing in various stages of decay to provide immediate potential cavity nesting and foraging trees. They can become sources of

downed wood in 0 to 10 years or remain standing for some time if structural decay is delayed (e.g. reduced fungal metabolic activity due to reduced moisture content following death).

Standing dead or dying trees are sometimes referred to as snags (or snag trees). However, this term is not used in the Stand and Site Guide, except in the supporting documentation, because it is defined very differently in ecological and health and safety contexts.

While it is desirable to retain standing dead trees as wildlife trees, such trees will only be kept if it is deemed safe to do so. Trees that are lowered to the ground for safety considerations will not contribute to the achievement of wildlife tree direction.

Some wildlife trees have special significance including cavity trees, supercanopy trees, veteran trees, mast trees, scattered conifers, diversity trees, or stubs. Cavity trees, which can be living, dead or dying, have existing cavities in the trunk or on main limbs, or characteristics suggesting they may develop cavities in the near future (e.g., fungal conks). Supercanopy trees are large, living, individual trees that tower over the forest canopy. Veteran trees are living trees retained during all phases of forest operations that are likely to grow for at least part of another rotation and become future supercanopy trees. Living mast trees produce crops of acorns or other edible fruits. Scattered conifer trees in hardwood stands and scattered hardwood trees in conifer stands are of value to some wildlife for nesting, roosting and refuge. Diversity trees include tree species that are uncommon in a local area. Stubs are trees killed by cutting at least 3 m up the trunk. The portion of the tree above the stubbing cut is available for harvest.

A single wildlife tree with more than one special attribute can be counted towards achieving multiple pieces of direction. For example, a large oak tree could be identified and counted as a mast tree, a cavity tree, and a supercanopy tree, provided it has the appropriate characteristics. However, a wildlife tree with multiple special attributes only counts as one tree with respect to the numbers of wildlife trees required for retention (e.g., the 25 stems/ha requirement for white/red pine seed tree harvest).

Definitions and further information on each category and/or attribute of a wildlife tree used in the standards, guidelines, and best management practices are provided in the Background and Rationale for Direction, which includes illustrative examples of different types of wildlife trees. For additional information on identifying and choosing wildlife trees, refer to the *Ontario Tree Marking Guide*.

Direction

All wildlife trees must be ≥10 cm dbh and ≥3 m in height. The minimum dbh for ‘large’ wildlife trees is ≥25 cm (trees ≥38 cm dbh are preferred). The minimum dbh for cavity trees, mast trees, veteran trees, and scattered conifers is ≥25 cm (trees ≥38 cm dbh are preferred). However, mast trees as small as 10 cm dbh may be retained if only ironwood mast trees are available. Supercanopy trees will generally be ≥60 cm dbh.

Because the trees or stems desirable as wildlife trees may not always be present, all of the standards and guidelines in this section include the provision ‘when available’. For example, in situations where the trees or stems available for retention are too small to meet the minimum size thresholds in the direction, trees or stems representing the largest diameters in any given harvest location will be used as a substitute.

To account for stubs, safe dead trees, trees that fork below breast height, and coppice growth, the direction often refers to wildlife trees as ‘stems’. When ≥10 stems occur over an area <0.1 ha this will be considered a clump and the stems will count for no more than 10 wildlife trees. This clumping rule does not apply when assessing the maximum allowable number of wildlife trees retained. In a clearcut harvest area, any uncut or partially cut area ≥0.1 ha that meets the definition of residual forest (3.2.2.2) will not contribute to individual wildlife tree requirements.

The direction as provided will be applied during any harvest operation (including commercial thinning) based on the dominant silviculture system in use and/or particular stage of management when harvesting the mature forest.

Much of the direction is presented in the context of retention of an ‘average’ number of wildlife trees. In this section, unless otherwise specified, the average number of wildlife trees, or specific type of wildlife trees, will be in reference to any given 10 ha area within an operational block where harvest has occurred, or for the entire operational block when the operational block is less than 10 ha. When following the direction in this section, note that the direction excludes the physical area taken up by roads, landings, and roadside work areas.

During operations, trees may be encountered that contain or are adjacent to transient habitat features (e.g., occupied bird nests). Such trees can be retained as wildlife trees. For further direction on bird nests, see Section 4.2.2.

Appendix 3.2b includes graphical examples of post-harvest stand structure created by application of the wildlife tree direction for the various silviculture systems and/or particular stage of management.

The direction in this section will be implemented using conditions on regular operations.

i) Clearcut silviculture system

In the clearcut silviculture system, most of the overstory trees are removed over a short period of time to create a fully exposed microenvironment for the establishment of a new even-aged stand. Usually, this occurs as a ‘one-pass’ operation, but additional ‘passes’ can occur. Under the clearcut silviculture system, the direction pertaining to wildlife trees is applicable primarily during harvest operations.

In addition to a minimum density of wildlife trees, a maximum density of wildlife trees is prescribed for the clearcut silviculture system. The maximum number of wildlife trees direction builds upon that found in the Silviculture Guide related to quantity of post-harvest residual trees to be retained. Similar to the direction in the Silviculture Guide, the density of wildlife trees retained must not compromise the success of the prescribed silvicultural ground rule. In some cases, a silvicultural ground rule change may be required (and reported in the annual report in accordance with the FIM) between completion of harvest and establishment to reflect actual post-harvest conditions within the context of the relative shade tolerance of the target renewal species and the forest level composition objectives in the management direction for the management unit.

Conditions on regular operations

Standards

- Retain an average of ≥25 stems/ha.

Guidelines

- Retain a relatively even mix of ≥10 (average) large living, dying, and safe dead trees (including large stubs)/ha with a minimum of 5 large living and/or dying trees/ha unless with Ministry approval (see Appendix 1b). Specifically:
    - Retain an average of ≥1 supercanopy tree/2 ha
    - Retain all reasonably identifiable large, living, hollow ‘chimney’ trees
    - Retain all reasonably identifiable living trees with pileated woodpecker nest or roost cavities
    - Focus remaining large tree retention on other cavity trees (living, dying, or safe dead), veteran trees, mast trees and diversity trees

- Wildlife trees that fall to the ground, or are purposely felled for worker safety reasons, will be retained on site to become downed woody material (see Section 3.2.3.2) unless with Ministry approval (see Appendix 1b).

- Retain an average of at least 10 well-dispersed, individual stems/ha: the remaining stems may occur in clumps.

- Large stems/stubs (i.e., ≥25 cm dbh) retained to meet wildlife tree requirements will not be knocked down during renewal and tending treatments unless required for safety reasons or unless approved by the Ministry (see Appendix 1b).

- The density of living wildlife trees, when composed predominantly of poplar and/or white birch >15 cm dbh, will not exceed 150 stems/ha for any one hectare area. A lower maximum wildlife tree retention density (i.e., between 25-149 stems/ha) may be considered by the planning team where a market exists for poplar and/or white birch.

- If intentional residual tree manipulation (e.g., felling unmarketable trees or tops at the stump) to achieve minimum post-harvest light requirements is acceptable in the approved FMP, it will be implemented in a way as to not impede future silviculture operations or compromise the ability of a site to achieve the regeneration standards associated with the assigned silvicultural ground rule.

Best management practices

- Avoid knocking down standing wildlife trees <25 cm dbh during renewal and tending treatments.

- To the extent practical and feasible, 'stub' some wildlife trees:
  i. to a height of ≥3 m (5 m is preferred);
  ii. do not stub trees with existing cavities (however, it is acceptable to stub a tree with cavities below the stubbing height) or trees that provide other functions (e.g., veteran trees, dead trees, seed trees);
  iii. all boreal tree species can be stubbed, but the preferred species are jack pine and black spruce; and
  iv. stub up to 20 trees/ha in areas that are predominantly jack pine and/or black spruce.

- To the extent practical and feasible, scatter stubs throughout clearcut.

- Retaining ≥1 supercanopy tree/ha is preferred.

- Preferred species to retain as large trees are aspen, red oak, white pine, red pine, white spruce, hemlock, cedar, or any species that are uncommon in the local area, if consistent with silviculture objectives.

- Large trees providing existing nesting or denning sites are preferred as cavity trees (see also the *Ontario Tree Marking Guide*).

- Where practical and feasible, to minimize the potential for post-harvest blowdown of wildlife trees, operators are encouraged to consider windfirmness when leaving any tree:
  - Preferentially retain windfirm species which are generally ordered as:
    - Most windfirm: white pine, red pine, red oak
    - Moderately windfirm: cedar, red maple, white spruce, white birch, aspen, jack pine
    - Least windfirm: black spruce, balsam fir
  - Preferentially retain trees located on lower-middle slopes over trees located on upper slopes and ridge crests
  - Avoid retaining trees on shallow or wet soils or stub trees in these areas to reduce blow-down risk
  - Preferentially retain trees that are pre-adapted to open-growing conditions

ii) Selection silviculture system; shelterwood silviculture system (preparatory and regeneration cuts, irregular shelterwood cuts)

Selection, shelterwood preparatory and regeneration cuts, and irregular shelterwood cuts leave dozens to hundreds of trees/ha. Thus, there is no requirement to retain 25 stems/ha. Instead, wildlife tree retention focuses on trees of special value to wildlife such as cavity trees, mast trees, scattered coniferous trees, and supercanopy trees. Selection of individual trees will generally follow direction in the *Ontario Tree Marking Guide.*

Conditions on regular operations

Standards

- Retain an average of ≥10 living cavity trees:
  - Retain ≥5 living and/or dying cavity trees on each ha
  - Retain all reasonably identifiable living trees with pileated woodpecker nest or roost cavities
  - Retain all reasonably identifiable large living (≥50 cm dbh) hollow 'chimney' trees encountered

Guidelines

- Retain as many large, safe dead trees as practical and feasible.

- Wildlife trees that fall to the ground, or are purposely felled for worker safety reasons, will be retained on site to become downed woody material (see Section 3.2.3.2) unless with Ministry approval (see Appendix 1b).

- Wildlife trees will generally be well dispersed. In shelterwood preparatory and regeneration cuts, retain at least half as individual stems; the remaining wildlife trees may occur in clumps.

- Retain an average of ≥10 mast trees/ha, unless approved by the Ministry (see Appendix 1b).

- Retain an average of ≥10 scattered coniferous trees/ha.

- Retain an average of ≥1 supercanopy tree/ha.

Best management practices

- Reasonable efforts will be made to avoid knocking down standing trees retained as wildlife trees during renewal and tending.

- Retaining ≥2 supercanopy trees/ha is preferred.

iii) Shelterwood removal cuts; white/red pine seed tree cuts

Shelterwood removal cuts and white/red pine seed tree cuts leave fewer residual trees/ha than selection or shelterwood preparatory or regeneration cuts. Thus, a minimum density of wildlife trees is prescribed. In addition, retention focuses on trees of special value to wildlife such as cavity trees, veteran trees, and supercanopy trees. Selection of individual trees will generally follow direction in the *Ontario Tree Marking Guide.*

Conditions on regular operations

Standards

- Retain an average of ≥25 stems/ha.

- Retain an average of ≥10 veteran trees/ha with a minimum of 5 veteran trees on each ha.

Guidelines

- Retain an average of ≥10 living cavity trees or large stubs/ha:
    - Retain ≥5 living and/or dying cavity trees on each ha
    - If the number of living cavity trees available is <10/ha (i.e., living cavity trees retained during the preparatory and/or regeneration cut have since died), then retain as many as are available and supplement with living trees with high potential to develop into cavity trees (e.g., hardwoods with conks (evidence of advanced heart rot), conifers classed as unacceptable growing stock)
    - Retain all reasonably identifiable living trees with pileated woodpecker nest or roost cavities
    - Retain all reasonably identifiable large living (≥50 cm dbh) hollow ‘chimney’ trees encountered

- Retain as many safe dead trees as practical and feasible.

- Wildlife trees that fall to the ground, or are purposely felled for worker safety reasons, will be retained on site to become downed woody material (see Section 3.2.3.2) unless with Ministry approval (see Appendix 1b).

- Retain an average of at least 10 well-dispersed, individual stems/ha: the remaining stems may occur in clumps.

- Retain an average ≥1 supercanopy tree/ha.

Best management practices

- Reasonable efforts will be made to avoid knocking down standing trees retained as wildlife trees during renewal and tending.

- To the extent practical and feasible, 'stub' some wildlife trees:
  i. to a height of ≥3 m (5 m is preferred).
  ii. trees with existing cavities above the stubbing height or trees that provide other functions (e.g., mast trees, seed trees, veteran trees, supercanopy trees) should not be stubbed.
  iii. all tree species can be stubbed.

- Large trees providing existing nesting or denning sites are preferred as cavity trees (see also the *Ontario Tree Marking Guide*).

3.2.3.2 Downed woody material

Downed woody material (DWM) contributes to the biodiversity, long-term productivity and health of forest ecosystems. DWM influences forest ecosystem species abundance and richness by providing shelter, cover, subnivean travel routes, foraging and basking sites, modified microclimate, and substrates for regeneration and growth. Decaying wood also provides humus and soil organic matter that contributes to soil development and nutrient cycling.

Wildlife species associated with decaying wood may be affected by forest management activities as wildlife species-specific associations are linked to DWM characteristics including species, decay class, and size. The role and temporal supply of DWM is closely linked in form and function to 'wildlife trees' (Section 3.2.3.1). In managed forests, retention of existing and future recruitment of DWM from retention of wildlife trees that eventually fall to ground is required to achieve DWM retention objectives. Downed wood structures that exist prior to harvest provide important temporal connectivity allowing pre-harvest organisms to persist in the post-harvest environment.

Direction

For the purposes of this guide, DWM refers to wood above the soil and on the ground: coarse woody material refers to sound and rotting branches, boles, logs, and stumps, generally ≥7.5 cm in diameter at the small end; fine woody material refers to stems and twigs generally 2.0-7.5 cm in diameter at the small end.

The direction in this section will be implemented using conditions on regular operations and does not apply to salvage harvest (see Section 6.1).

Conditions on regular operations

Guidelines

- Stems retained as wildlife trees (Section 3.2.3.1) that fall down or are felled for worker safety reasons to become DWM will be left on site unless with Ministry

approval (see Appendix 1b). Moving such trees for silviculture purposes is permitted.

- Downed trees (or pieces of trees) present prior to harvest will be left on site (moving such trees for silviculture purposes is permitted); where windstorms or other natural events (e.g., snow, ice) have recently caused damage to stands, trees leaning and downed by the recent disturbance, which normally would have been available for harvest, may be harvested and utilized.

Best management practices

- During all stages of forest operations, mitigative measures should be considered to minimize the:
    - Crushing of large, downed logs;
    - Smothering of coarse woody material by fine woody material or soil; and
    - Windrowing of DWM. Where long windrows do occur, breaks should be provided to allow animals, other forest users, and operations unobstructed access routes. A 10 m break for every 100 m of windrow is a good target.

- Retain as many unmerchantable logs or portions of logs (especially in large diameter classes) on site as logging method and silviculture objectives will permit.

- Dead trees present prior to harvest, including those lowered to the ground for safety considerations, should be left on site (only safe dead trees will remain standing).

3.3 Fine filter adjustments

The management of some species of wildlife requires special consideration at a landscape scale as well as at stand and site scales. These species, particularly the cervids, also tend to have high socioeconomic value and have historically been the focus of specific habitat management strategies in Ontario, and other jurisdictions. For these species, general principles regarding their habitat requirements will be applied at landscape and stand and site scales in specific, identified portion(s) of a forest management unit. Other relevant planning or administrative boundaries (e.g., cervid ecological zones, wildlife management units) will also be considered.

In the Landscape Guide, direction is provided on how planning teams will identify areas of the forest management unit that are required to meet targets for Landscape Guide pattern indicators. These areas may be identified as large landscape patches (LLPs), which are an appropriate scale and will normally be used when a decision has been made to emphasize habitat management for species addressed in this section.
The coarse filter indicators (pattern, structure, composition, and abundance), the management direction, and the directional statements will normally be the basic information used to help identify an area (e.g., LLPs) where an emphasis on habitat management for species in this section will be applied. With respect to the cervids, it will

usually be appropriate to consider applying direction for a single species; however, in some areas it may be appropriate to manage and provide habitat for more than one species. Such decisions will normally be based on an assessment of ecological conditions of the local landscape, including the present and desired forest condition. To achieve habitat objectives for the species in this section, habitat may be maintained (while still allowing forest operations to occur), retained (which generally implies a deferral of forest operations), or created (through the application of silviculture practices to change the existing pattern or structure). Application of the direction in sections 3.3.1, 3.3.2, and 3.3.3 will be documented in a forest management plan as part of regular planning products (e.g., selection of areas for harvest, renewal, and tending) and through the development of conditions on operations specific to the maintenance, retention, or creation of habitat.

In this section, the reference to ‘stands’ generally implies a ‘patch’, or a grouping of forest stands, that may have different cover typing but are intended to meet the intent of the direction.

Forest operations and habitat management for cervids and other large mammals are often intricately linked to forest roads. The specific linkages between the FMPM requirements for a use management strategy for each existing and new road or road network, and the objectives and management direction used to emphasize habitat for a species, will be considered when implementing the standards, guidelines, and best management practices in this section. In addition, road planning, construction, maintenance, and decommissioning activities described in Section 5.1 will also be considered.

3.3.1 White-tailed deer

LLPs within the forest management unit with an objective to emphasize white-tailed deer (also referred to in this guide simply as ‘deer’) habitat will be identified as deer emphasis areas (DEAs) during development of the management direction. See Notes at end of Section 3.3.1 for definitions of **bolded** terms.

In cervid ecological zones with moderate or high deer population objectives, deer winter concentration areas (**stratum I** and **stratum II** habitat) will normally be identified as winter DEAs.

Winter DEAs will be mapped, and stratum I and stratum II will be delineated, using the methodology described by Buss et al. (1998) (Figure 3.3a). Where stratum I and II have not been differentiated, and to apply direction provided, long term average local snow depth should be considered when developing winter cover habitat targets. If it is unlikely that the local average snow depth (long-term measurements from local snow stations) will exceed 50 cm, winter cover habitat targets that are in alignment with stratum II should be emphasized for the entirety of the winter DEA. However, where local snow depths exceed 50 cm, stratum I habitat should be delineated, and winter cover targets in alignment with stratum I direction should be applied in the appropriate area.

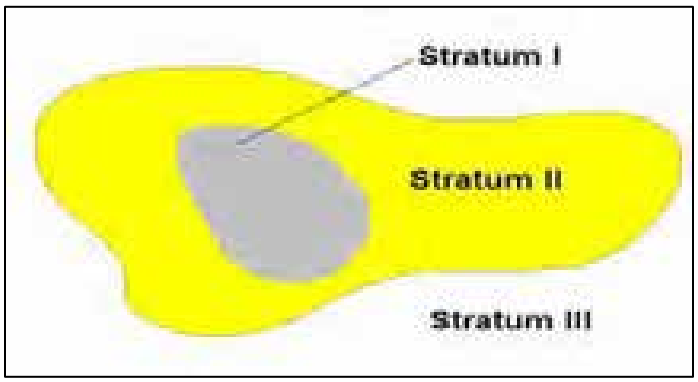

Figure 3.3a. Deer winter concentration area.

In cervid ecological zones with moderate to high and high deer population objectives, and considering local deer populations when information is available, LLPs delineated as **stratum III** will normally be identified as non-winter DEAs.

Where stratum II has been identified but does not differ significantly from stratum III the direction for winter DEAs should only be applied within stratum I.

When a deer population is exceeding its local population objective contributing to chronic negative ecological impacts and/or has been identified as an issue relative to population objectives in the cervid ecological framework, the following direction may be omitted or modified for one or more DEAs within a forest management unit.

Direction

Application of direction for DEAs should not compromise the achievement of the strategic landscape pattern and landscape class composition targets.

Strategic planning direction applies only to winter DEAs that contain a sufficiently large area of Crown forest to make implementation of this direction practical and feasible. The threshold will be determined locally based on discussions between the Ministry and the SFL (i.e., enough Crown forest within winter DEAs to allow for a relatively even flow of harvest activities through time to create browse producing habitats in proximity to cover).

Operational planning direction does not apply to winter DEAs where the interspersion of Crown and private ownerships makes it impractical or infeasible to implement the direction. DEAs where this applies will be determined locally based on discussions between the Ministry and the SFL (i.e., enough Crown forest within winter DEAs to be able to meet the winter patch size and cover to cover distance requirement).

Direction in this section will be implemented using regular FMP products and conditions on operations applied to DEAs.

i) Winter deer emphasis areas

Description of value

Mapped winter deer emphasis areas (i.e., stratum I and II) identified by the planning team, following direction provided in strategic planning.

Strategic planning

Guidelines

- To maintain a relatively uniform supply of browse-producing habitat through time:
    - For each winter DEA, develop long-term targets (i.e., 100 years) that promote a relatively uniform area of selection cuts, shelterwood preparatory/regeneration cuts, and clearcuts within each 10-year planning period
    - If the existing forest condition does not currently support harvest levels consistent with the long-term targets, show movement toward the long-term targets

- For each winter DEA, if the amount of **severe winter cover (SWC)** or **mild winter cover (MWC)** in stratum I or II is insufficient to meet retention requirements during operational planning (see below), develop long-term targets to increase the amount of the appropriate type of winter cover, and show movement toward these long-term targets.

Conditions on regular operations

Guidelines

- Harvest, renewal, and tending operations within winter DEAs will result in the following distribution of patches of **SWC**, **MWC, security cover** and **access cover**:
    - To maximize the area used by deer, any point within winter DEAs will be within 300 m of a mapped winter cover patch of **SWC** or **MWC** (i.e., 600 m cover-to-cover distance) that is ≥5 ha in size for MWC and ≥10 ha for SWC. Based on this spatial arrangement, approximately 10-15% of the winter DEA will be winter cover
    - At least 75% of winter cover patches in stratum I and 25% of winter cover patches in stratum II will be SWC
    - Harvest, renewal, and tending operations within SWC or MWC will maintain desired species composition, canopy closure, and stand height (see Notes)

- Where no mapped winter cover patches are available that meet the criteria identified the best available winter cover patch will be retained to meet cover-to-cover requirements
- To enhance access to browse, any point within planned clearcuts within stratum I or II will be within 100 m of a mapped patch of **security cover** ≥2.5 ha in size (i.e., maximum cover-to-cover distance of 200 m)
- Within stratum I and II, if residual canopy closure will be <30% in selection cuts, shelterwood preparatory/regeneration cuts, and clearcuts, retain ≥10 living conifers/ha that are ≥10 m tall to provide **access cover**. Based on availability, at a minimum, conifer will be retained in 2-3 clumps of a minimum of 3-5 trees with touching crowns (this also fully addresses scattered conifer tree direction for hardwood selection and shelterwood preparatory/regeneration cuts and partially addresses wildlife tree direction for clearcuts in Section 3.2.3.1)

Best management practices

- When identifying patches of **SWC** and **MWC** select patches that provide for a range of cover-to-cover distances (i.e. avoid selecting patches that are always the maximum distance distance apart).

- Where practical and feasible and consistent with applicable silvicultural ground rules, schedule harvest operations within stratum I and II for the winter season.

- Within stratum I and II, to the extent possible:
  - Maintain conifer canopy closure along known travel routes and in, or adjacent to, suitable night and day bedding areas, such as hemlock ridges and 'knobs' with south-facing slopes. In these areas, maintenance of conifer canopy closure of 80% is desirable, although 60% is often adequate when the conifer species are cedar or hemlock, and trees are 10 m or more in height; clusters of 3-5 conifers with branches touching is desirable.
  - Maintenance of conifer canopy closure along known travel routes and in, or adjacent to, suitable night and day bedding areas should be prioritized to areas in stratum II immediately adjacent to stratum I to account for shifts in deer use patterns (i.e., the area of the yard identified as stratum I will likely change over time).

Conditions on roads, landings, forestry aggregate pits, and wood storage yards

Standards

- New roads, landings, forestry aggregate pits, and wood storage yards will not be constructed within SWC or MWC if their construction will result in a contiguous patch area <5 ha (MWC) or <10 ha (SWC).

Guidelines

- When in alignment with short and long-term browse and habitat targets, new primary roads will not be constructed within stratum I.

ii) Non-winter deer emphasis areas

Description of value

Mapped non-winter deer emphasis areas (i.e., stratum III) identified by the planning team, following direction provided in strategic planning.

Conditions on regular operations

Guidelines

- To enhance access to forage, any point within planned clearcuts will be within 100 m of a patch of **security cover** ≥1 ha in size (i.e., maximum cover-to-cover distance of 200 m).

- In northwestern Ontario, if operations are proposed in bur oak stands, or in stands which contain bur oak trees, maintain the bur oak component. See sections 3.2.1 (rare vegetation communities) and 3.2.3.1 (wildlife trees).

Best Management Practices

- Old roads, landings, forestry aggregate pits, and wood storage yards should be maintained as semi-permanent openings valuable to deer. Seeding with a mixture of non-invasive (preferably native) grasses and forbs that provide cool-season forage will enhance value to deer.

- In selection cuts and shelterwood preparatory and regeneration cuts, preferentially retain hard mast-producing trees, especially red, white, and bur oaks as mast trees.

- In clearcuts and shelterwood removal cuts, preferentially retain hard mast-producing trees, especially red, white, and bur oaks, as large wildlife trees (conventional clearcuts) or veteran trees (seed tree clearcuts and shelterwood removal cuts).

Notes

Stratum I is the part of a deer concentration area (or yard) normally used during severe winter conditions. Stratum I is normally delineated when average snow depth exceeds 46-50 cm. Stratum I and stratum II comprise the winter DEA

Stratum II is the part of a deer concentration area (or yard) normally used during mild to severe winter conditions. Stratum II is delineated prior to snow depths reaching 20 cm. Stratum II along with stratum I, comprises the winter DEA

Stratum III is the area occupied by deer throughout the year. The area within stratum III comprises the non-winter DEA

Security cover is provided by any vegetation that conceals a standing or bedded deer from predators or humans and includes forest stands ≥2 m tall (or ≥sapling development stage), brush and alder (BSH), and treed wetlands (TMS)

Access cover is small patches of conifer trees (at least 3-5 stems) that are ≥10 m tall and retained at a minimum of 2-3 clumps with touching crowns that moderate snow depth, permitting deer to access surrounding browse

Severe winter cover (SWC) is generally used when deer are in snow depths that severely restrict movement (≥38 cm). SWC includes forest stands with ≥70-80% (70%; high value snow interception tree species, 80%; low value snow interception tree species) canopy closure and a height of ≥10 m. In order to improve the ability to map winter cover, ground truthing or comparable activities may be necessary. Local knowledge of habitat use may be used to adjust this definition.

- When accurate estimates of conifer canopy closure are not available in planning inventories, it may be assumed that SWC will be provided by:
    - Well-stocked stands (i.e., DEVSTAGE < PREPCUT or SEEDCUT or FIRSTCUT or LASTCUT) with ≥70% of the stocking comprised of conifers if the conifer component is dominated by **high value** snow interception tree species (i.e., % balsam fir + cedar + hemlock + white spruce ≥ % black spruce + jack pine + red pine + white pine) or with ≥ 80% of the stocking comprised of conifers if the conifer component is dominated by **low value** snow interception tree species (i.e., % balsam fir + cedar + hemlock + white spruce < % black spruce + jack pine + red pine + white pine)

- When accurate estimates of height are not available in planning inventories, stands ≥35 years old may be considered acceptable

Mild winter cover (MWC) is generally used when deer are in snow depths that moderately restrict movement (18-38 cm). MWC includes forest stands with at least 50-80% (minimum of 50%; high value snow interception tree species, minimum of 60%; low value snow interception tree species) conifer canopy closure and a height of ≥10 m. In order to improve the ability to map winter cover, ground truthing or comparable

activities may be necessary. Local knowledge of habitat use may be used to adjust this definition.

- When accurate estimates of conifer canopy closure are not available in planning inventories, it may be assumed that MWC will be provided by:
    - Well-stocked stands with 50-70% of the stocking comprised of conifers if the conifer component is dominated by **high value** snow interception tree species or 60-80% of the stocking comprised of conifers if the conifer component is dominated by **low value** snow interception tree species.
    - Moderately-stocked stands (e.g., DEVSTAGE = PREPCUT or SEEDCUT) with ≥70% of the stocking comprised of conifers if the conifer component is dominated by **high value** snow interception tree species or with ≥80% of the stocking comprised of conifers if the conifer component is dominated by **low value** snow interception tree species

- When accurate estimates of height are not available in planning inventories, stands ≥35 years old may be considered acceptable

High value snow interception tree species include hemlock, cedar, white spruce, and balsam fir

Low value snow interception tree species include white pine, red pine, jack pine, and black spruce.

3.3.2 Moose

Moose require a landscape that is a mosaic of browse and forage-producing habitats (early successional forest), aquatic feeding areas (shallow aquatic habitats with abundant submerged and emergent vegetation), summer thermal cover (treed and shrub wetlands, mid to late successional lowland conifer forest), and winter thermal cover (mid to late successional conifer and mixedwood forest). Application of the coarse filter direction in the Landscape Guides and this guide is assumed to produce a habitat mosaic with comparable suitability to landscapes arising from natural disturbance processes. However, to achieve moose habitat and socio-economic objectives, the fine filter direction described in this section may be applied in some portions of moose range.

The proportion of the forest management unit required to achieve moose habitat and social-economic objectives will be determined during the strategic planning phase of the development of the FMP. When selecting areas for application of the fine filter moose direction consider the following when available:

- Direction for moose habitat in the Cervid Ecological Framework;
- Moose population objectives* and estimates;
- Moose habitat availability and forest structure;
- Consultation recommendations

* When moose population objectives have not been formally developed (i.e., Algonquin Park) refer to the over-arching population guidance by cervid ecological zone in the Cervid Ecological Framework.

The following direction focuses on providing moose habitat both in amount and arrangement in identified areas by using a suite of tools that address both the amount and arrangement of seasonal habitat needs and addresses the pressure of renewal, tending, and access on moose populations. See Notes at the end of Section 3.3.2 for definitions of **bolded** terms.

Direction

Direction in this section will be applied in Large Landscape Patches (LLPs) specifically identified for the emphasis of moose habitat (moose emphasis areas; MEAs) during development of the management direction. Potential LLPs where moose habitat management will be emphasized will normally include those areas within forest management units:

- That overlap wildlife management units (WMUs) in moose range as defined in the cervid ecological framework (cervid ecological zones: B, C1, C2, D1, and D2). Focus selection in WMUs where the current population is below the population objective range, near the bottom of the range, or is trending downward

- That have the potential to support moose based on habitat carrying capacity modeling. For information on the moose model used; see Ontario's Landscape Tool (OLT), Science and Information Package "M" and Section 3.3.2 in the background and rationale document)

- That are generally ≥10,000 ha in size, smaller MEAs may be considered to a minimum of 2,000 ha

- Where the objective from the Landscape Guides is to maintain a fine-textured landscape

- With no existing access or low level of existing access relative to the management unit

- That do not have Crown Land Use Policy Atlas (CLUPA) restrictions that would conflict with MEA direction

- That do not overlap with deer emphasis areas or areas of the management unit where deer are the more established cervid due to the potential for parasite transmission

Potential MEAs will be identified and considered, and those selected based on achievement of moose objectives will be included in the strategic planning of the FMP. Applying the fine filter moose direction will not compromise achievement of the strategic

landscape pattern (i.e., mature and old forest texture) and landscape class composition targets.

Moose emphasis areas are large landscape patches typically associated with stable landscape features such as areas of productive soils and are not intended to shift entirely between planning cycles, however, to monitor the achievement of moose objectives identified in the FMP, it is recommended to re-evaluate selected MEAs at each planning term (i.e., 10-year planning cycle). When developing the management direction, it is recommended to model habitat objectives for a minimum of 40 years.

The operational planning direction in this section will be implemented using regular FMP products and conditions on operations applied to MEAs selected following the strategic direction during the strategic planning phase.

i) Strategic planning

Guidelines

- Within MEAs, manage the landscape to maintain an optimal mosaic of food and cover for moose and minimize access to promote moose populations. In addition to the strategic direction below, for each MEA, apply the operational planning direction, for harvest, renewal, tending, and roads as provided below.

- To maintain an optimal landscape-level mosaic for food and cover for moose, each MEA will be comprised of:
    - Within Boreal Landscape Guide regions:
        - 5-20% forest (all PFTs) <20 years old
        - 2.5-15% **hardwood forest** (PFT = POP, BWT, or TOL) ≥10 m tall
        - 10-30% **mixedwood forest** (PFT = MIX) ≥10 m tall
        - 10-20% **upland conifer forest** (PFT = MCU, PJK, or PWR) ≥10 m tall
        - 0.5-2.0% **lowland conifer forest** (PFT = MCL) ≥10 m tall
    - Within Great Lake-St. Lawrence Landscape Guide regions:
        - 0.5-10% forest (all PFTs) <20 years old
        - 20-50% **hardwood forest** (PFT = POP, BWT, or TOL) ≥10 m tall
        - 5-20% **mixedwood forest** (PFT = MIX) ≥10 m tall
        - 10-30% **upland conifer forest** (PFT = MCU, PJK, or PWR) ≥10 m tall
        - 0.5-5% **lowland conifer forest** (PFT = MCL) ≥10 m tall

  When accurate estimates of height are not available in planning inventories, stands ≥35 years of age may be considered acceptable as a replacement for 10 m in height. Stands that have received a recent partial harvest but still meet the definition of residual forest should contribute to either the hardwood forest, mixedwood forest, upland conifer forest, or lowland conifer forest habitat categories.

Strategic planning will maintain MEAs within these ranges (or show movement toward these ranges if currently outside the ranges). Modifications to these objectives based on current or desired future forest conditions, consideration of other forest objectives, or compelling socio-economic considerations will be rationalized within the FMP. For definitions of **hardwood**, **mixedwood**, **upland** and **lowland conifer forest**, see Notes section below. Definitions may be adjusted by planning teams and rationalized in the FMP to more appropriately reflect local conditions.

- To minimize access to promote moose populations, strategic planning will include objectives for road planning that are in alignment with direction provided in the operational prescriptions for harvest, renewal, tending, and roads in the operational planning direction (see below).

ii) Operational planning

Description of value

Mapped moose emphasis areas identified by planning team, following direction provided during strategic planning.

Conditions on regular operations

Guidelines

- Manage each MEA to maintain a preferred mosaic of food and cover for moose, and minimize access by implementing objectives identified during strategic planning.

- To enhance access to browse within MEAs, when forest structure permits, any point within planned clearcuts will be within 200 m of a mapped patch of **security cover** at least 2.5 ha in size (i.e., maximum cover-to-cover distance of 400 m).

- To maximize the amount of a MEA used by moose, when forest structure permits, any point within a MEA (excluding water) will be within 750 m of a mapped patch of **summer thermal cover (STC)** (i.e., maximum cover-to-cover distance of 1,500 m) that is at least 2.5 ha in size. At least 25% of the mapped patches retained as STC will be lowland conifer forest ≥10 m tall (or ≥35 years old if reliable estimates of height are not available).

- To maximize the area used by moose, when forest structure permits, any point within a MEA (excluding water) will be within 550 m of a mapped patch of **Winter Thermal Cover (WTC)** (i.e., 1,100 m cover-to-cover distance) that is at least 10 ha in size.

- Renewal and tending prescriptions will have regard for the availability of moose browse over the short and long term and will be consistent with creating future stand compositions that will maintain moose habitat categories within their optimal ranges.

Best management practices

- When selecting patches of security cover, summer thermal cover, and winter thermal cover, retain patches that provide for a range of cover-to-cover distances for the specific cover type (i.e., avoid selecting patches that are always the maximum distance apart by cover type).

- When identifying patches of winter thermal cover, avoid selecting narrow patches.

- Preferentially retain patches of **STC** that are at least 5 ha in size and within 200 m of moose aquatic feeding areas (MAFAs) (especially class 3 or 4 MAFAs (based on the methodology described by Ranta 1998) >4 ha in size).

- Develop silvicultural strategies for creating high-value feeding habitat along selected edges of operations such as cover patches and manage these sites as high-browse production sites.

- When vegetation management is desired to limit hardwood competition within recent harvest areas, consider implementing alternative vegetation management options.

- When applying herbicides on rich mixedwood sites, use hand application methods (i.e., backpack sprayer) to avoid spraying shrubs that are preferred by moose as browse (e.g., dogwood, willow, mountain ash) and are not directly competing for resources with crop trees.

Conditions on roads, landings, forestry aggregate pits, and wood storage yards

Standards

- New roads will not split stands retained as winter or summer cover (unless the remnant stands still meet minimum patch size requirements).

Guidelines

- During strategic planning, areas of no to low road density will be preferred in selection of MEAs.

- To facilitate the achievement of moose habitat objectives, the re-use of existing roads and roadbeds will be preferred. When not available, new branch and operational roads will be permitted within the MEA with road use management strategies that are consistent with maintaining low levels of access.

- During the use of roads required for harvest, renewal, and tending activities, access restrictions techniques will be identified based on local experience, considering access requirements needed to ensure forest operations are dispersed through space and time and to conduct post-harvest silviculture.

- Road use management strategies that align with MEA objectives will include decommissioning strategies and/or locally appropriate access restrictions. Road use management strategies will be documented in the FMP.

Best management practices

- To the extent practical and feasible, decommissioning opportunities of existing roads within MEAs will be documented in the road use management strategies.

- When existing road density (all roads) exceeds 0.2 km/km^2 within a MEA, to the extent practical and feasible, the density of existing roads should be decreased to <0.2 km/km^2 using locally appropriate access restrictions or decommissioning activities.

- To the extent practical and feasible, new roads should not be located within 100 m of class 3 or 4 MAFAs (based on the methodology described by Ranta 1998) that are ≥4 ha in size.

Notes

Hardwood forest is defined as productive forest dominated by hardwood tree species (normally the POP, BWT, and TOL provincial forest types (PFT); northwest region forest units: PODOM, BWDOM, OTHHD; northeast region forest units: PO1, BW1, LH1, TH1; GLSL forest units: PO, BW, BY, OAK, HDSL2, HDSL1, HDUS)

Mixedwood forest is defined as productive forest dominated by a mix of hardwood and conifer tree species (normally the MIX PFT, northwest region forest units: HRDOM, HRDMX, CONMX; northeast region forest units: MH1, MH2, MC1, MC2; GLSL forest units: LWMW, MWUS, MWD, MWR)

Upland conifer forest is defined as productive forest on upland sites dominated by conifer tree species (normally the MCU, PWR, and PJK PFT; northwest region forest units: PWDOM, PRDOM, PRWMX, UPLCe, SBDOM, SBMX1, PJMX1, BFDOM, PJDOM, northeast region forest units: PR1, PW1, PRW, PJ2, SP1, SF1, PJ1, UPCE; GLSL forest units: PR, PWUS4, PWOR, PWUSC, PWUSH, PWST, PJ2, HE, SP1, SF, PJ1)

Lowland conifer forest is defined as forest on moist to wet or organic soils on lowland sites dominated by conifer tree species (normally the MCL PFT; northwest region forest units: OCLOW, SBLOW; northeast region forest units: BOG, SB1, LC1; GLSL forest units: CE, SB, LC

Security cover (SC) is provided by any vegetation that conceals a standing or bedded moose from predators or humans and includes forest stands ≥2 m tall (or ≥10 years old if reliable estimates of height are not available), brush and alder (BSH), and treed wetlands (TMS)

Summer thermal cover (STC) is considered to be represented by:

- **Well-stocked** lowland conifer forest that is ≥10 m tall (or ≥35 years old if reliable estimates of height are not available).
- Wetlands identified as brush and alder (BSH) or treed wetland (TMS).
- If local knowledge of habitat is used to adjust this definition, rationale must be documented in the FMP

Well-stocked refers to stands that have not received a recent shelterwood regeneration (DEVSTAGE = SEEDCUT), release (DEVSTAGE = FIRSTCUT), or removal cut (DEVSTAGE = LASTCUT) or that are not otherwise identified as low stocking (DEVSTAGE = LOWNAT or LOWMGMT)

Winter thermal cover (WTC) is considered to be represented by:

- **Well-stocked** upland conifer forest that is ≥10 m tall (or ≥35 years old if reliable estimates of height are not available) with ≥60% canopy closure
- If local knowledge of habitat is used to adjust this definition, rationale must be documented in the FMP

3.3.3 Other species

Generally, special strategies and operational prescriptions to address unique objectives will be applied to areas that have been identified and delineated as LLPs through application of the Landscape Guide. Planning teams can then select the specific strategies and forest operation prescriptions that will apply to these LLPs or other identified areas with unique objectives.

Unique objectives regarding forest cover at the landscape scale will usually modify: the patterns of composition and structure of harvest and retention patches (Sections 3.2.1 and 3.2.2); maintenance and creation of structure within areas of operations (Section 3.2.3); and other operational considerations (Section 5).

Situations may arise when FMP planning teams identify areas of the forest management unit that require special and specific direction to address unique objectives. These areas may be for a species or community (wildlife or vegetation) and where use of operational prescriptions and conditions for an AOC is inadequate or

inappropriate because of scale. When existing forest management guides do not provide direction on how to manage forest cover to address such unique objectives, planning teams may choose to craft special strategic and operational strategies and prescriptions. For example, in areas where elk occur, planning teams may identify management objectives for elk habitat in some LLPs or emphasis areas.

For each LLP or other area identified as having unique management objectives, a brief synopsis of the effects of forest management on the feature, land use, or value being managed should be prepared and available as resource information.

4.0 CONSERVING BIODIVERSITY – Management of site-specific habitats

Section 4.0 provides direction designed to assist in the conservation of biodiversity by maintaining the suitability of habitats and habitat features that are used by numerous animal and plant species and that are associated with specific geographic locations. Aquatic and wetland habitats and associated shoreline forest are addressed in Section 4.1. Special habitat features such as birds' nests and dens are considered in Section 4.2. Section 4.3 provides direction for the habitat of species at risk that is not already covered by direction in the Landscape Guide or other sections of the Stand and Site Guide.

In Sections 4.1 to 4.3, when forest management activities may adversely affect a value or important ecological feature (as defined in the FMPM), mitigative direction is prescribed. For values, direction is addressed through operational prescriptions and conditions for areas of concern (AOCs). A value is considered to be a known value when sufficient information to describe its geographic location and its basic features exist. Direction for defining, collecting, reporting, confirming, verifying, updating, and providing values information for the preparation and implementation of an FMP is documented in the *Forest Information Manual* (FIM). To maintain or protect important ecological features or to implement specific operational direction, mitigation is addressed through conditions on operations (conditions on regular operations for harvest, renewal, and tending operations and conditions on roads, landings, forestry aggregate pits, and wood storage yards). With the exception of important ecological features related to species at risk, important ecological features addressed by conditions on operations do not have to be documented and reported following the process outlined in the FIM.

Values or important ecological features considered in this section may be identified and reported by the Ministry or other government staff, SFL holders and their operators, non-government organizations, third parties, other resource users, or the public. For values addressed through operational prescriptions and conditions for AOCs, it is the responsibility of the Ministry to confirm that the information about any new value is accurate and meets the standards outlined in the FIM before it is considered to be a known value and subject to the direction in this section. For important ecological features addressed through conditions on operations, it is the responsibility of operations staff that encounter the feature to confirm the identity of the feature and apply the appropriate direction in this section. In the case of species at risk important ecological features, it would also be the responsibility of the SFL holder to notify the Ministry following the process outlined in the FIM.

Many values, such as permanent streams and osprey nests, will be known in advance of operations and will be identified on values maps. Application of the direction in this section for these known values is relatively straightforward. However, many features and values, such as woodland pools and hawk nests, will typically be discovered during operations. In some cases, despite due diligence, these features and values may not be

identified until some operations have been conducted within their vicinity in a manner that may not be consistent with prescribed direction. In these cases, reasonable efforts will be made to ensure that subsequent activities comply with the direction in this section.

In some situations, multiple operational prescriptions and conditions for areas of concern and/or conditions on operations will overlap. In these cases, the most restrictive direction will be applied unless otherwise rationalized in the FMP and approved by the Ministry. In these instances, when a change from a standard or guideline is desired by the planning team an individual AOC prescription or condition on operations will be developed and will be documented as an exception in the FMP. The intent of the exception would be to allow for deviation from a standard or guideline to allow for a specific activity or activities while minimizing adverse effects on the value or feature.

Multiple known AOCs of the same or different values within a specific area may influence the achievement of management objectives for a given management zone. Planning teams may need to consider the impacts of these values when determining the strategic intent of management zones during the forest management planning process. Strategies to address potential conflicts may include changes to either the strategic direction or timing of the management zone in question.

Direction in Sections 4.1 to 4.3 frequently place restrictions on the construction of new roads. In the context of this guide, existing roads that are rebuilt so they can support an increased volume of traffic (e.g. a winter road upgraded to an all-season road, an operational road upgraded to a branch or primary road, a branch road upgraded to a primary road) are considered to be new roads.

Direction in Sections 4.1 to 4.3 frequently places restrictions on hauling or other forestry-related traffic. Unless otherwise specified, this direction applies to operational roads and any other roads that are used primarily by the forest industry. It is not intended to be applied to municipal roads or provincial highways.

Direction in Sections 4.1 to 4.3 often specifies the forest structure to be retained within AOCs to protect the associated value. Harvest, renewal, and tending operations used to generate this structure will, to the extent practical and feasible, emulate the natural dynamics of the forest type within the AOC while acknowledging silviculture limitations, the scale of application, and other overriding ecological considerations such as objectives for forest composition (see Section 3.2.1).

In some cases, direction requires the retention of mature or residual forest adjacent to permanent or enduring values or important ecological features including lakes and streams, and special habitat features (e.g. nests or dens) used by species showing site fidelity. Management of shoreline areas based on emulating a natural disturbance approach with creation of some early successional shoreline forest should continue to be promoted as an appropriate management strategy. Riparian forests can experience a loss of structural and functional heterogeneity without stand-replacing disturbances

which can result in reduced natural range of biodiversity than would otherwise exist. Thus, direction in Section 3.2.2 and 4.1.2 for riparian zones enables some modified harvest within shoreline habitat to maintain habitat suitability and productive capacity, assuming an FMP has incorporated this flexibility. For nest and den sites for which direction requires the retention of mature or residual forest immediately surrounding the value (e.g., bald eagle nest, wolf den), regular updating of values information (following the process outlined in the FIM) may determine when these features no longer exist or require protection and regular operations can be conducted in the area.

4.1 Maintaining ecological functions of aquatic and wetland ecosystems and shoreline forest including habitat suitability and productive capacity

Within the managed forest, lakes, ponds, rivers, streams, wetlands, and associated shoreline forest represent habitat for about 100 species of fish, more than 200 species of birds, mammals, reptiles, and amphibians, and thousands of species of invertebrates and vascular and nonvascular plants. Moreover, about two-thirds of all species at risk that occur within the managed forest use aquatic and/or wetland habitats. From a social and economic perspective, these ecosystems are especially significant because they, or the species that occupy them, support commercial, recreational, and Indigenous fisheries, trapping, waterfowl hunting, and other water-based recreation and tourism. For many Indigenous communities in Ontario, the protection and conservation of water is not only a matter of ecological importance, but a matter of preserving their cultural and spiritual identity. Their relationship with water is sacred as it sustains and connects all life.

Forest management operations can potentially change the composition or structure, and thus ultimately the function, of aquatic ecosystems, either through direct physical disturbance (e.g., installation of water-crossing structures) or by altering the linkage between terrestrial and aquatic ecosystems (e.g., altering the amount of, or pathways for, surface runoff). Such changes may reduce the suitability of aquatic and wetland ecosystems for a wide range of aquatic and semiaquatic plants and animals. At a watershed- or catchment-scale, forest management operations can influence the quantity and quality of water entering aquatic ecosystems. The extent to which these hydrological changes adversely affect the ecological function of aquatic ecosystems is quite variable, depending largely on the characteristics of individual catchments. Catchment-scale effects are addressed through the application of related coarse and fine filter direction (natural landscape pattern, minimizing site damage, retention of residual forest, protection of hydrological connections, etc.) see section 3.2.2.3. Groundwater is an important component of the hydrological cycle in forest ecosystems and has a significant effect on aquatic habitats and their biota, see section 4.2.1. At a finer scale, operations within or adjacent to aquatic and wetland ecosystems may potentially result in sediment entering aquatic features, damage to shorelines or stream banks, modification of the hydrological regime, changes to thermal regime,

obstruction of fish passage, or alteration of inputs of coarse and fine organic material, with subsequent effects on fish and other species.

Under section 35(1) of the *Fisheries Act (R.S.C., 1985, c. F-14)*, “No person shall carry on any work, undertaking or activity that results in the death of fish or the harmful alteration, disruption or destruction of fish habitat.” Moreover, under section 36(3) of the *Fisheries Act*, “no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water”. [The *Fisheries Act* (section 20) also prohibits the obstruction of fish passage. Section 5.1.2 provides direction on the design of water crossings to facilitate fish movement.]

While the following sections address a broad range of ecological functions, much of the focus is on mitigating potential effects of forest management operations in shoreline areas on water quality, fish, and fish habitat, especially those associated with input of sediment.

The *Fisheries Act* defines fish and fish habitat very broadly. 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.

Fish habitat means water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas.

This guide adopts a conservative approach and provides protection to all standing and flowing waters, as well as the features that provide hydrological connection to terrestrial habitats (i.e., linear features that channel ephemeral surface and/or shallow groundwater flows to lakes, ponds, rivers, or streams).

Forest management operations adjacent to aquatic and wetland ecosystems may also alter the composition or structure of associated shoreline forest. Harvesting may have negative consequences for wildlife species such as bald eagles, wood ducks, and moose that use mature shoreline forest that provides food, cover, or travel corridors. In contrast, harvesting may have positive consequences for wildlife species such as common yellowthroats, eastern kingbirds, and beavers that use early to mid-successional shoreline forest (dozens of other species also benefit from the wetlands created by beavers). Thus, at a landscape scale, the habitat requirements of the greatest number of shoreline-inhabiting species will be met when shoreline forest occurs in a variety of ages and patterns. Sections, 4.1.1, and 4.1.2 provide direction to create a mosaic of shoreline forest conditions that will sustain these many ecological functions.

Direction

The proposed direction continues to use a risk management approach to guide efforts to mitigate the effects of forest operations on fish and fish habitat. Under this approach, appropriate mitigation is a function of risk, where risk is defined by the scale of potential negative effects and the sensitivity of fish and fish habitats. Direction in Section 4.1 adopts these guiding principles. Direction is more restrictive when operations have a higher potential for negative effects or when fish or fish habitats are likely to be more sensitive to potential effects. The potential for negative effects is based largely on the amount of site disturbance (e.g., road construction normally has a greater potential for negative effects than timber harvesting) and the amount of canopy removal (e.g., clearcutting has a greater potential for negative effects than selection cutting) associated with operations.

Direction is generally more restrictive for large aquatic features (assumed to have more complex aquatic communities) and for those supporting fish more likely to be affected by changes in shoreline vegetation.

This guide not only permits, but encourages, management in shoreline areas, primarily to meet the ecological objectives noted above. However, in some situations, socio-economic considerations may override this direction and result in different prescriptions for shoreline areas. For example, archaeological sites and other areas of high cultural value are frequently associated with shorelines. These values may be protected by reserves up to 200 m in width (see the *Forest Management Guide for Cultural Heritage Values*). Moreover, large lakes and rivers are often associated with resource-based tourism. Planning teams may decide to retain unharvested forest along shorelines to maintain visual aesthetics (see the *Management Guidelines for Forestry and Resource-based Tourism*). Alternatively, planning teams may decide to not harvest shoreline forest in specific areas where an Indigenous community has traditionally collected medicinal plants.

The following sections provide direction for standing waters (lakes and ponds) (Section 4.1.1), flowing waters (rivers and streams) (Section 4.1.2), wetlands (Section 4.1.3), hydrological connections (Section 4.1.4), and self-sustaining lake and brook trout lakes (Section 4.1.5).

The following conditions on regular operations will be followed during any work around water features in the following sections including lakes, ponds, rivers, and streams and open water wetlands (woodland pools, mapped fens and marshes). See Notes at end of Section 4.1 for definitions of **bolded** terms.

Description of value

All lakes, ponds, rivers, and streams as defined in Sections 4.1.1, and 4.1.2.

Conditions on regular operations

Standards

- No harvest, renewal, or tending operations are permitted within the AOC associated with a water feature that will result in damage to littoral zones, shorelines, beds, banks and associated stabilizing vegetation, or deposition of sediment within lakes, ponds, rivers, or streams. Operations specifically prohibited within the AOC include:
    - Machine travel/site disturbance within the inner 3 m of the AOC
    - Felling of trees into water features or the inner 3 m of the AOC. Trees accidentally felled into water features will be left where they fall.
    - Disturbance of the forest floor that leaves ruts (especially those that channel water into a water feature) or a significant area of exposed mineral soil between the height of land and the water feature or within the inner 15 m of the AOC (see Section 5.2, Figure 4.1a), whichever is less. Ruts and significant patches of exposed mineral soil will be promptly rehabilitated to prevent sediment from entering a water feature. Patches of mineral soil exposed by natural events are excluded.

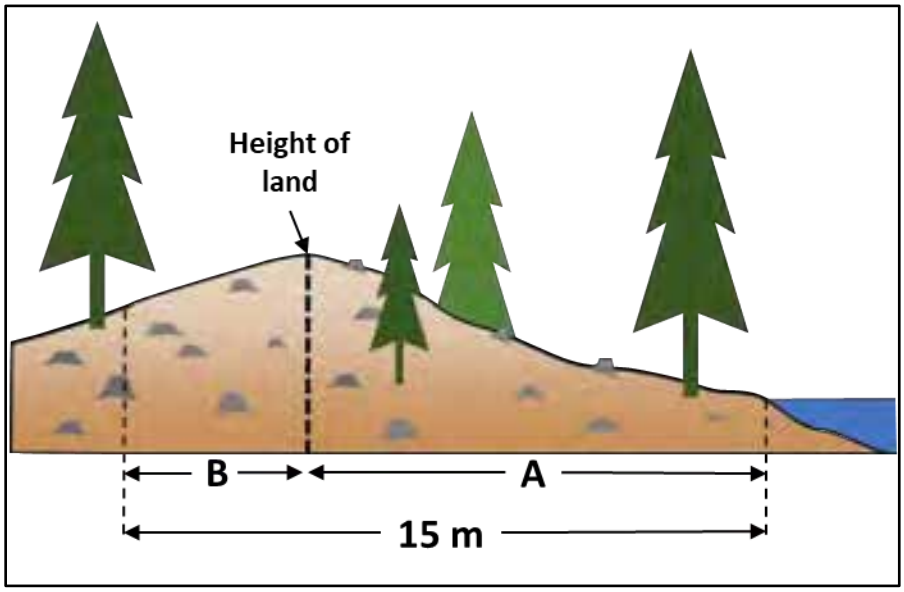

Figure 4.1a. Illustration depicting height of land. No ruts or exposed mineral soil would be permitted to be left in area A of the AOC. There is a lower risk of sediment entering the water feature in area B (back slope) of the AOC as it slopes away from the water feature.

- No contamination of lakes, ponds, rivers, or streams by a **deleterious substance** is permitted. Specifically, no equipment maintenance (e.g., washing or changing oil) is permitted within 30 m of HPS lakes, ponds, rivers, or streams and within 15 m of LPS ponds and streams.

- Application of pesticides is permitted (provided the product label permits) within the AOC as per the following:
    - Aerial application of pesticides for renewal, tending, or protection is permitted within the AOC but will follow the *Ontario Ministry of Environment/Ontario Ministry of Natural Resources Buffer Zone Guidelines for Aerial Application of Pesticides in Crown Forests of Ontario* (1992)
    - Machine-based ground application of herbicides for renewal, tending, or roadside brush control is permitted within the AOC; spray buffer zones will be 30 m for significant areas and 60 m for sensitive areas
    - Hand-based ground application of herbicides (e.g., backpack sprayers) is permitted within the AOC; by applying a 3 m spray buffer
    - All spray buffer zones will be measured from the edge of the water feature
    - If increased buffers are required as per product label direction, increased buffer distances will follow manufacturer's application requirements

Guidelines

- Within shoreline AOCs, the direction for retention of wildlife trees in harvest areas (see Section 3.2.3) will be followed with the specification to retain at least two living trees per 10 m of shoreline as a potential source of future aquatic coarse woody material preferably with the following characteristics:
    - Dominant or co-dominant crown position (generally ≥15 m tall)
    - Close to the shoreline (ideally within ½ the height of the tree)
    - Leaning toward the water
    - Not directly adjacent to other retained wildlife trees
    - Conifers are preferred (but a mix of conifers and hardwoods is acceptable)

- Additional wildlife tree retention will focus on living trees with preferential retention of windfirm trees that provide the following special habitat features for wildlife:
    - Supercanopy trees (all forest units) of value to eagles and ospreys such as white and/or red pine (and trembling aspen in the boreal forest)
    - Large living hardwood trees with existing cavities or the potential to develop cavities (all forest units)
    - Scattered coniferous trees (selection forest units) or veteran trees (clearcut and shelterwood forest units)

Best management practices

- Machine travel should be minimized within the inner 15 m of the AOC.

- Piling of felled trees should be minimized within the inner 15 m of the AOC.

- Removal or damage of sapling-sized trees (<10 cm dbh) and shrubs within the inner 3 m of the AOC should be minimized.

Notes

Deleterious substance: Any substance, as defined by the *Fisheries Act*, that if added to water, makes the water deleterious to fish or fish habitat; or any water containing a substance in such quantity or concentration or has been changed by heat or other means, that if added to water makes that water deleterious to fish or fish habitat. Note that sediment is considered a deleterious substance. Note that this is a summary of the definition from the *Fisheries Act*.

4.1.1 Standing waters: lakes and ponds

Standing waters include lakes and ponds. Lakes and ponds represent important habitat for thousands of species of aquatic and semiaquatic plants and animals. This includes more than 80 species of mammals, birds, reptiles, and amphibians, ranging from numerous species of turtles and waterfowl to aquatic furbearers, such as beavers and river otters, and more than 80 species of fish. Deep oligothrophic lakes are especially important for cold water fish such as lake trout. Because of their shallow depth, ponds are extremely productive habitats, especially for aquatic furbearers and waterfowl, including numerous species of conservation priority.

Direction

For operational simplicity, polygons in the OHN (Ontario Hydrological Network) (or most current data source) that are ≥8 ha in size are classified as lakes. Polygons in the OHN and unmapped bodies of open water (≤25% of surface area covered by emergent vegetation) encountered during operations that are ≥0.5 and <8 ha in size are classified as ponds.

All standing waters are important components of fish habitat and are addressed through the AOC planning process. Direction for maintaining habitat suitability and productive capacity of lakes and ponds and associated shoreline forest focuses on:

- Minimizing the risk of sedimentation
- Providing future inputs of coarse woody material
- Mitigating the effects of harvesting on water temperature, water circulation, and inputs of fine organic material
- Mitigating the effects of forest management operations on hydrological linkages between aquatic and terrestrial ecosystems
- Maintaining some shoreline forest as residual habitat and dispersal corridors
- Managing some shoreline forest to create some early to mid-successional riparian habitat

Description of value

Lakes are:

- Bodies of moderate-to-deep standing water typically characterized by relatively stable shorelines, limited deposition of sediments, low turbidity, stable water levels, and long flushing rates
- Defined by the *Ontario Wetland Evaluation System* as areas of open water greater than 8 ha in size and, at some point, greater than 2 m deep
- Mapped open water polygons (POLYTYPE = WAT) that are not rivers
- Considered to have a high potential sensitivity (HPS) to forest management operations.

Ponds are:

- Bodies of shallow (generally <2 m deep), open water (≤25% of surface area covered by emergent vegetation) between 0.5 - 8 ha in size.
- Considered shallow open water wetlands by the Canadian Wetland Classification System and marshes by the Ontario Wetland Evaluation System. The potential sensitivity to forest management operations of ponds ranges from high to low.
- Mapped open water polygons (POLYTYPE = WAT) or unmapped open water features (≤25% of surface area covered by emergent vegetation) encountered during operations that are not rivers
- Considered to have a low potential sensitivity (LPS) to forest management operations unless:
    - Known to contain trout (or other cold-water species) or fish that are species at risk, or
    - Connected to one or more HPS streams

  In these cases, ponds are considered HPS features.

Bodies of open water less than 0.5 ha that are connected to streams are treated as part of the streams (Section 4.1.2). Bodies of open water greater than 0.5 ha associated with mapped wetlands are treated as part of the mapped wetlands (Section 4.1.3).

Temporary bodies of open water less than 0.5 ha not associated with streams or mapped wetlands are considered to be woodland pools (Section 4.1.3).

The width of the AOC is based on potential sensitivity and slope as follows:

Lakes and HPS ponds:

- 30 m for 0 - 15% slopes
- 50 m for >15 - 30% slopes
- 70 m for >30 - 45% slopes
- 90 m for >45% slopes.

LPS ponds:

- 15 m for 0 - 15% slopes
- 25 m for >15 - 30% slopes
- 35 m for >30 - 45% slopes
- 45 m for >45% slopes.

The AOC is measured in the field from the edge of vegetation communities capable of providing an effective barrier to the movement of sediment. This will normally be those

communities dominated by trees (i.e., ≥25% canopy cover of trees), or tall (≥1 m high) woody shrubs such as alder or willow, or low woody evergreen shrubs such as Labrador tea or leatherleaf, or with a continuous mat of sphagnum mosses (i.e., not disjunct patches). For mapping purposes, the AOC may be measured from the edge of polygons identified as FOR, TMS, or BSH in the forest resources inventory. If the inner edge of the AOC will be ≥300 m from the shoreline of a lake or pond when these criteria are used, an AOC is not required adjacent to those sections of shoreline, unless the intervening wetland is known to provide components of fish habitat for which there is a high species' dependence (e.g., spawning habitat).

In some cases, the height of land (as defined in the glossary) may occur within the 30-90 m AOC for HPS lakes and ponds or the 15-45 m AOC for LPS ponds. In these instances, certain activities such as harvesting and road construction may occur within the AOC beyond the height of land, provided all other standards and guidelines for these features are followed.

Operational prescription for the area of concern

Standards (see Figures 4.1b and 4.1c)

- Harvest, renewal, and tending operations are permitted within the AOC subject to the following conditions:
    - Harvest, renewal, and tending operations will follow the conditions on regular operations for working around water (see Section 4.1)
    - ≥50% of the area of the AOC (based on delineation of the AOC around the entire water feature, both inside and outside the harvest area) associated with small lakes (≥8 and <100 ha) and HPS ponds, ≥75% of the area of the AOC associated with medium lakes (≥100 and <1,000 ha), and ≥90% of the area of the AOC associated with large lakes (≥1,000 ha) will be retained as forest that meets the definition of residual (see Section 3.2.2)
    - Harvest that retains forest that does not meet the definition of residual (e.g., conventional clearcutting) is permitted within the AOC:
        - Where slope to the water feature is ≤30%
        - Beyond the height of land (i.e., portion of the AOC that slopes away from the lake/pond) within the 30-90 m AOC for HPS lakes and ponds or the 15-45 m AOC for LPS ponds, provided all other standards and guidelines for these features are followed including the maintenance of at least 30 m of residual shoreline forest on sections of HPS lakes and ponds identified for the retention of forest that meets the definition of residual.

Guidelines

- Some or all of the requirements for the retention of residual forest within the AOC may be met by residual shoreline forest outside the harvest area, residual shoreline forest retained in overlapping AOCs, or residual shoreline forest

retained in areas with steep slopes (>30%). Additional requirements for residual shoreline forest may be met by retaining residual shoreline forest:

- To maintain the suitability of special habitats associated with lakes and ponds. For example, preferentially retaining residual shoreline forest:
  - Associated with recharge areas associated with brook trout spawning sites (see Section 4.2.1)
  - Adjacent to moose aquatic feeding areas (MAFAs) (see Section 4.2.4), especially in specific areas (e.g., LLPs) identified for enhanced moose management
- Where there is a high potential for hydrological connections between terrestrial and aquatic ecosystems that channel ephemeral surface and/or shallow groundwater flows to lakes, ponds, rivers, or streams (see Section 4.1.4). The Ministry's hydrological flow accumulation modelling spatial product, which identifies the potential locations of hydrological connections (flowpaths), is available for the managed forest.
- To maintain internal and external connectivity. Within the AOC, a relatively continuous corridor (average width of gaps <50 m; maximum width of gaps <200 m) of residual forest at least 30 m wide retained along at least 1 side of each HPS lake or pond to connect special habitat features (e.g., osprey nests, MAFAs) associated with the lake or pond and link with residual forest on connected lakes, ponds, rivers, and streams.
- To emulate natural disturbance patterns. For example, preferentially retaining residual shoreline forest:
  - On the leeward side of a lake or pond
  - Comprised of forest types with lower fire susceptibility (e.g., lowland conifer)
  - Where there is an opportunity to incorporate it into a larger patch of residual forest (see Section 3.2.2)
- That has the highest likelihood of being windfirm.

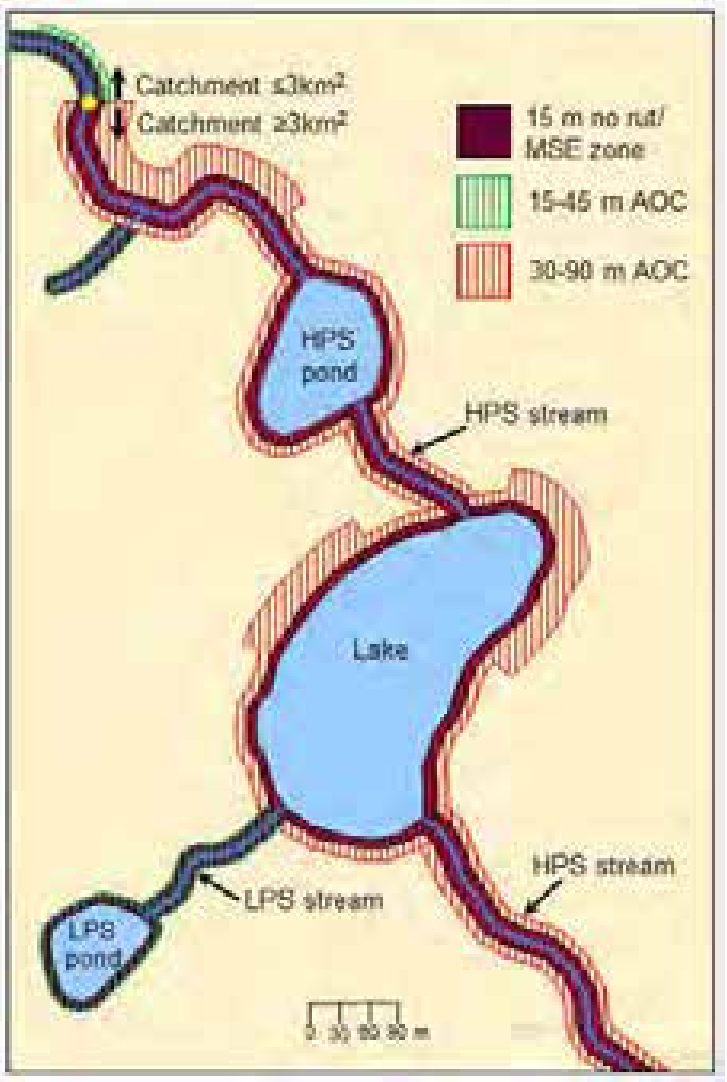

Figure 4.1b. Layout of areas of concern (AOC) and 15 m no rut or significant mineral soil exposure (MSE) zones around lakes, ponds, and streams. Ponds and streams with high (HPS) or low (LPS) potential sensitivity to forest management operations are identified (see Sections 4.1.1 and 4.1.2).

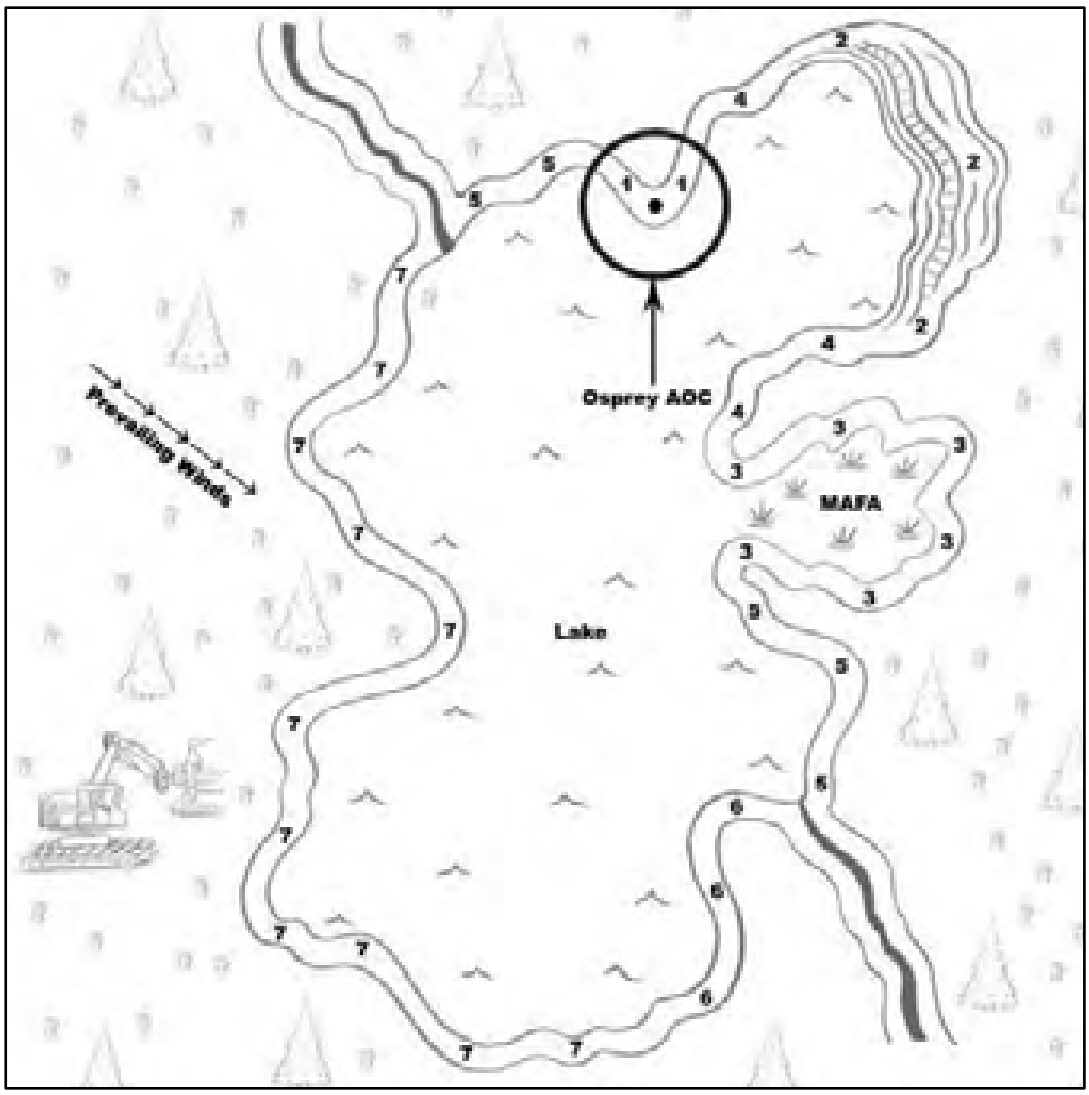

Figure 4.1c. Selecting shoreline forest for retention as residual. In this example, portions of the shoreline AOC labeled 1-6 would be preferentially retained in the following order of priority: include shoreline forest in overlapping AOCs (1); retain forest on steep slopes (2); retain forest adjacent to special habitats such as moose aquatic feeding areas (MAFAs) (3); retain forest to link (1), (2) and (3) (internal connectivity)(4); retain forest to link with other water features (external connectivity)(5); and retain forest along shorelines with the lowest likelihood of being disturbed by natural agents such as wildfire (6). On this lake, shoreline labeled '7' would be the preferable choice for harvest that does not retain residual forest. (illustration by Mandy Saille).

Best Management Practices

- Retain residual shoreline forest and preferentially connect unmapped residual patches (required to meet the direction in Section 3.2.2) adjacent to LPS ponds with moose aquatic feeding areas.

- Harvest, renewal, and tending operations will, to the extent practical and feasible, encourage perpetuation of the distinctive character of the shoreline forest while

emulating natural disturbances and/or succession (unless conversion is required to meet other ecological objectives).

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- Construction of new landings and use of existing landings are not permitted within the AOC.

Guidelines

- New roads that are not associated with an approved water crossing are not permitted within the AOC except:
    - In extraordinary circumstances and the road, including specific location, is identified and justified through the FMP AOC planning process
    - Where the road is constructed beyond the height of land and its construction does not compromise other standards and guidelines for the water feature

- New roads within the AOC that are not associated with an approved crossing will:
    - Use fill material that is erosion-resistant and/or protected from erosion for portions of the road built below the normal high-water mark
    - Limit grubbing to only that required to address engineering and safety concerns (e.g., remove hazards)
    - Have ditches designed to minimize the possibility of sediment entering the water feature

- When new roads traverse residual forest within the AOC, the width of the cleared corridor will be as narrow as practical and feasible, and will not exceed 20 m.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Construction of new forestry aggregate pits and wood storage yards and use of existing forestry aggregate pits and wood storage yards are not permitted within the AOC.

4.1.2 Flowing waters: rivers and streams

Flowing waters include rivers and streams. Rivers and streams are relatively shallow linear bodies of unidirectional flowing water typically characterized by constantly

changing shorelines, highly variable deposition of sediments, high and variable turbidity, large fluctuations in water level, and rapid flushing rates. Streams may flow throughout the year (permanent streams) or primarily during wet seasons (intermittent streams).

Rivers and permanent or intermittent streams provide habitat for a wide diversity of aquatic and semi-aquatic plants and animals. This includes more than 60 species of mammals, birds, reptiles, and amphibians, ranging from turtles to waterfowl to aquatic furbearers such as beavers, muskrats, and river otters. Rivers and streams also support about 40 and 50 species of fish, respectively. This list includes sport fish, such as brook trout, and species at risk, such as the American eel.

Direction

All flowing waters are important components of fish habitat and receive consideration. Habitat suitability and productive capacity of rivers and permanent or intermittent streams are maintained through the AOC planning process. Direction for maintaining habitat suitability and productive capacity of rivers, streams, and associated shoreline forest is described below and focuses on:

- Protecting beds, banks, and shorelines
- Minimizing the risk of sedimentation
- Mitigating the effects of harvesting on water temperature and inputs of fine organic material
- Providing future inputs of coarse woody material
- Maintaining some shoreline forest as residual habitat and dispersal corridors
- Managing some shoreline forest to create some early to mid-successional riparian habitat

See Notes at end of Section 4.1.2 for definitions of **bolded** terms.

Description of value

Rivers include:

- Mapped open water polygons (POLYTYPE = WAT).
- Mapped stream segments with catchment area ≥50 km^2. Catchment area is defined as the upstream contributing area at any point along a stream.

All rivers are considered to have a high potential sensitivity to forest management operations.

Streams include:

- Streams with high potential sensitivity to forest management operations (HPS streams) which include:
    - Mapped stream segments with catchment area ≥3 and <50 km^2
    - **Recognizable** unmapped stream segments with an average active channel width ≥0.5 m
    - **Stream segments known to support fish that are sensitive to changes in water temperature** or stream segments known to support fish that are species at risk

- Streams with low potential sensitivity to forest management operations (LPS streams) are streams that do not meet any of the criteria for HPS streams.

The width of the AOC is based on potential sensitivity and slope as follows:

Rivers and HPS streams:
- 30 m for 0 - 15% slopes
- 50 m for >15 - 30% slopes
- 70 m for >30 - 45% slopes
- 90 m for >45% slopes

LPS streams:
- 15 m for 0 - 15% slopes
- 25 m for >15 - 30% slopes
- 35 m for >30 - 45% slopes
- 45 m for >45% slopes

The AOC is measured in the field from the edge of vegetation communities capable of providing an effective barrier to the movement of sediment. This will normally be those communities dominated by trees (i.e., ≥25% canopy cover of trees), or tall (≥1 m high) woody shrubs such as alder or willow, or low woody evergreen shrubs such as Labrador tea or leatherleaf, or with a continuous mat of sphagnum mosses (i.e., not disjunct patches). For mapping purposes, the AOC may be measured from the edge of polygons identified as FOR, TMS, or BSH in the forest resources inventory. If the inner edge of the AOC will be ≥300 m from the edge of a river or stream when these criteria are used, an AOC is not required adjacent to those sections of the watercourse, unless the intervening wetland is known to provide components of fish habitat for which there is a high species' dependence (e.g., spawning habitat).

In some cases, the height of land (as defined in the glossary) may occur within the 30-90 m AOC for HPS rivers and streams or the 15 - 45 m AOC for LPS streams. In these instances, certain activities such as harvesting and road construction may occur within the AOC beyond the height of land provided all other standards and guidelines for these features are followed.

Operational prescription for the area of concern

Standards (see Figures 4.1a and 4.1c)

- Harvest, renewal, and tending operations are permitted within the AOC subject to the following conditions:
  - Harvest, renewal, and tending operations will follow the conditions on regular operations for working around water in Section 4.1
  - Forest that meets the definition of residual (see Section 3.2.2) must be retained within the AOC (based on delineation of the AOC along the entire

water feature, both within and outside the harvest area) on at least one side of rivers and HPS streams to provide a travel corridor.

- To provide shade, mature forest with relatively uniform canopy closure ≥60% (canopy openings not to exceed individual tree crowns) must be retained within the inner 15 m of the AOC on both sides of HPS and LPS **stream segments known to support fish that are sensitive to changes in water temperature** and **streams that are sensitive to changes in water temperature**, unless the inner boundary of the AOC is >15 m from the active channel. If forest is not mature or does not have an initial canopy closure ≥60%, no harvest is permitted
- Harvest that retains forest that does not meet the definition of residual (e.g., conventional clearcutting) is permitted within the AOC:
  - Where slope to the water feature is ≤30%
  - Beyond the height of land (i.e., portion of the AOC that slopes away from the river/stream) within the 30-90 m AOC for HPS rivers and streams or the 15-45 m AOC for LPS streams, provided all other standards and guidelines for these features are followed, including the maintenance of at least a 30 m width of residual forest along HPS rivers and streams to provide a travel corridor.

Guidelines

- Some or all of the requirements for the retention of residual forest within the AOC may be met by residual shoreline forest outside the harvest area, residual shoreline forest retained in overlapping AOCs, or residual shoreline forest retained in areas with steep slopes (>30%). Additional requirements for residual shoreline forest may be met by retaining residual shoreline forest:
  - To maintain the suitability of special habitats associated with rivers and streams as described in Section 4.2. For example, preferentially retaining residual shoreline forest:
    - Associated with recharge areas associated with brook trout spawning sites (see Section 4.2.1)
    - Adjacent to moose aquatic feeding areas (MAFAs) (see Section 4.2.4), especially in specific areas (e.g., LLPs) identified for enhanced moose management
  - Where there is a high potential for hydrological connections between terrestrial and aquatic ecosystems that channel ephemeral surface and/or shallow groundwater flows to lakes, ponds, rivers, or streams (see Section 4.1.4). The Ministry's hydrological flow accumulation modelling spatial product, which identifies the potential locations of hydrological connections (flowpaths), is available for the managed forest.
  - To maintain internal and external connectivity. Within the AOC, a relatively continuous corridor (average width of gaps <50 m; maximum width of gaps <200 m) of residual forest at least 30 m wide retained along at least 1 side of each river or HPS stream to connect special habitat features (e.g., osprey nests, MAFAs) associated with the river or stream and link with residual forest on connected lakes, ponds, rivers, and streams.

- To emulate natural disturbance patterns. For example, preferentially retaining residual shoreline forest:
  - On the leeward side of a river or stream
  - Comprised of forest types with lower fire susceptibility (e.g., lowland conifer)
  - Where there is an opportunity to incorporate it into a larger patch of residual forest (see Section 3.2.2)
- That has the highest likelihood of being windfirm

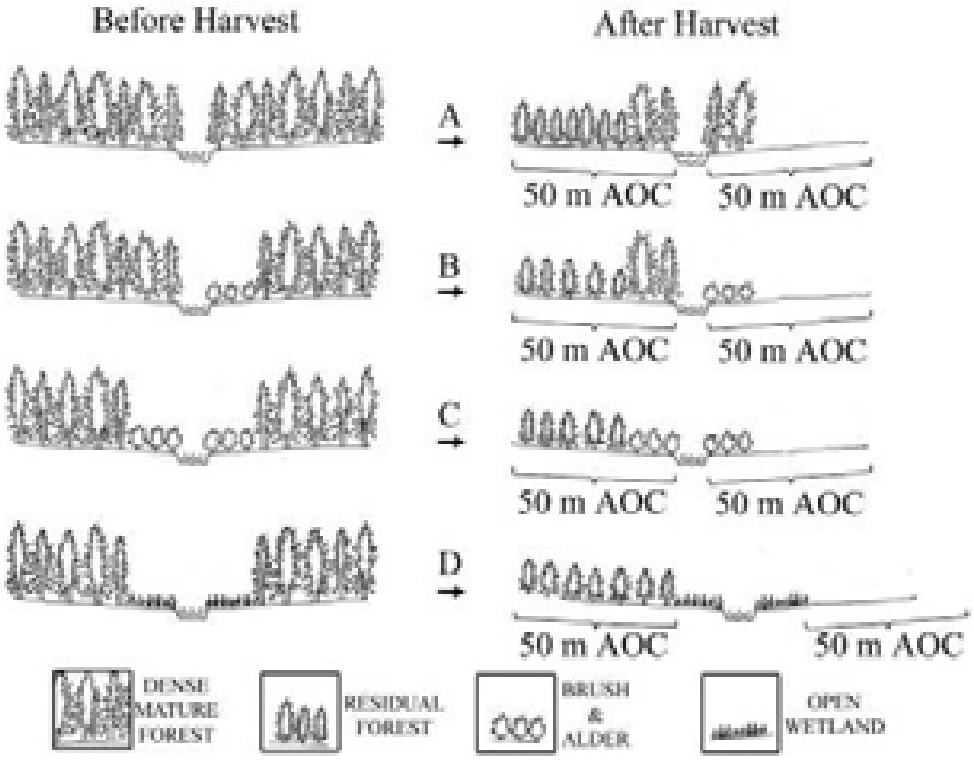

Figure 4.1c. Examples of shoreline forest retention around streams. All scenarios assume a 50 m wide AOC on both sides of the stream (slope not to scale). All scenarios retained residual forest as a travel corridor along the left side of the stream. In scenario A, mature forest occurred to the edge of the stream on both sides. During harvest, dense mature forest was retained within the inner 15 m of the AOC on both sides of the stream to provide shade. In scenario B, mature forest occurred to the edge of the stream on one side only, with 15 m of brush and alder on the other side. During harvest, dense mature forest was retained within the inner 15 m of the AOC on the left side of the stream to provide shade. No dense mature forest was retained on the right side of the stream because there was none within the inner 15 m of the AOC. In scenario C, brush and alder occurred within 15 m of the stream on both sides. During harvest, no dense mature forest was retained because none occurred within the inner 15 m of the AOC on either side of the stream. In scenario D, there was 15 m of open wetland separating the stream and mature forest on both sides. Although there was mature forest within the inner 15 m of the AOC on both sides of the stream, no dense mature

forest was retained during harvest because the closest mature forest was >15 m from the edge of the stream (and thus provided little shade). (illustration by Mandy Saille).

Best management practices

- Harvest, renewal, and tending operations will, to the extent practical and feasible, encourage perpetuation of the distinctive character of the shoreline forest while emulating natural disturbances and/or succession (unless conversion is required to meet other ecological objectives).

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- Construction of new landings and use of existing landings are not permitted within the AOC.

Guidelines

- New roads that are not associated with an approved water crossing are not permitted within the AOC except:
    - In extraordinary circumstances and the road, including specific location, is identified and justified through the FMP AOC planning process, or
    - Where the road is constructed beyond the height of land and its construction does not compromise other standards and guidelines for the water feature.

- New roads within the AOC that are not associated with an approved crossing will:
    - Use fill material that is erosion-resistant and/or protected from erosion for portions of the road built below the normal high-water mark
    - Limit grubbing to only that required to address engineering and safety concerns (e.g., remove hazards)
    - Have ditches designed to minimize the possibility of sediment entering the water feature

- When new roads traverse residual forest within the AOC, the width of the cleared corridor will be as narrow as practical and feasible, and will not exceed 20 m.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Construction of new forestry aggregate pits and wood storage yards and use of existing forestry aggregate pits and wood storage yards are not permitted within the AOC.

Notes

Recognizable unmapped stream segments are those that can reasonably be identified at the time of operations. During some seasons it may be difficult to accurately identify unmapped streams and/or determine their width. However, forest workers are expected to exercise due diligence in identifying and protecting these features. For example, distinct channels that are bordered by alders and that lead from lakes, ponds, or mapped wetlands likely contain streams. Forest workers should use their professional judgement to determine the likely location and characteristics of the stream and apply the appropriate course of action. Where there is significant uncertainty, a conservative approach should be used. For guidance on determining stream presence, refer to *The Stream Permanency Handbook for South-Central Ontario*. For guidance on methodology used to measure stream width, refer to the in the *Ontario Stream Assessment Protocol* (Section 4, Module 10).

Stream segments known to support fish that are sensitive to changes in water temperature are those with inventory data showing the presence of coldwater fish species such as brook trout, American brook lamprey, or slimy sculpin.

Streams that are sensitive to changes in water temperature are those identified to be cold or cold-cool transitional through review of available classification tools, as well as those within 500 m of self-sustaining brook trout lakes. Revisions to stream classification tool outputs may be considered when site specific information exists.

4.1.3 Wetlands

Wetlands are lands that are seasonally or permanently flooded by shallow water as well as lands where the water table is close to the surface; in both cases the presence of abundant water results in the formation of hydric soils that favor the dominance of either hydrophytic or water tolerant plants.

Wetlands provide many ecological services including regulating water flow, cycling of nutrients, and absorption of toxic compounds. Within a forest management context, wetlands may represent hydrological linkages between aquatic and terrestrial habitats, ‘hotspots’ for methylation of mercury, and may play a significant role in mitigating catchment-scale effects of harvesting on water quality. There are four main types of wetlands: marshes, swamps, bogs, and fens.

Non-forested wetlands are important habitats for a wide diversity of plants and animals. They provide spawning, nursery, or feeding habitat for at least 40 species of fish, and nest sites, breeding sites, or feeding habitat for over 30 species of reptiles and amphibians, more than 100 species of birds, and more than 40 species of mammals. They are especially important habitat for many species at risk, from the Blanding’s turtle and spotted turtle to the least bittern and eastern prairie fringed-orchid.

Forested wetlands (i.e., treed swamps) are also important habitats for a diversity of plants and animals. For example, black ash-dominated swamps support a diverse array of herbaceous plants, sedges, and bryophytes. These sites are also important components of the habitat of moose and black bears.

Some wetlands evaluated based on the Ontario Wetland Evaluation System, are identified as provincially significant wetlands (PSWs) because of the presence of outstanding biological, social, or hydrological values or other special features.

Woodland pools are small, isolated, temporary open-water wetlands and include ephemeral pools, vernal pools, and autumnal pools. They typically have hydrological regimes characterized by alternating periods of flooding and drying. At the extremes, woodland pools may contain water for only a few weeks during spring each year or may be continuously flooded through most years but then dry completely once every 5 to 10 years. They typically occur in, or next to, forests or other treed areas. When dry, they can be recognized as depressions with compacted leaves (often darkened by water stains) and watermarks on trees, downed woody material, rocks, or plants in the depression or along the edge.

Because woodland pools are seasonal and isolated (i.e., not connected to another aquatic or wetland feature) and typically have an intermittent hydrological regime, they generally do not support fish. However, because fish are absent, woodland pools provide unique habitats for a wide range of both vertebrates and invertebrates. The diversity of species using woodland pools is generally related to the length of the hydroperiod. Woodland pools with intermediate hydroperiods are especially important for pool-breeding amphibians. Alternating periods of flooding and drying in woodland pools also create unique growing conditions for a variety of organisms.

Forest management operations within, or adjacent to, wetlands can affect the composition, structure and/or function of wetlands, including their physical and chemical properties.

Direction

PSWs are addressed through operational prescriptions and conditions for AOCs. Each PSW is considered significant for a unique set of features and/or functions and therefore is to be addressed through an individual AOC developed locally by planning teams, unless the features/functions that make the wetland provincially significant are already addressed by other AOCs (e.g., AOC direction for aquatic features, species at risk turtles). These operational prescriptions and conditions will ensure no loss of natural features or ecological functions that make a specific wetland provincially significant and address the function of adjacent lands.

All wetlands (rich lowland hardwood-dominated forest, mapped forested and non-forested wetlands, and woodland pools) not addressed by operational prescriptions and conditions for AOCs are protected through conditions on roads, landings, forestry

aggregate pits, and wood storage yards. These conditions associated with the planning and constructing of roads, landings, forestry aggregate pits, and wood storage yards are focused on minimizing the risk of disrupting the hydrological function (e.g., hydrological flow) of wetlands.

Herb-rich, lowland, hardwood-dominated (black ash, green ash, red ash, silver maple, white elm) forest occurs as small inclusions within stands dominated by other forest types and is typically uncommon throughout the managed forest. These stands support a diverse array of plants and animals and are usually hydrologically sensitive. Potential effects of forest management operations within these communities are mitigated by conditions on operations. Similar direction for other locally rare, forested wetland types may be developed through application of direction in Section 3.2.1.

Non-forested wetlands capable of providing habitat for fish because they have substantial open water, will typically be defined as ponds and thus addressed by direction in Section 4.1.1. Those potentially providing fish habitat because they are directly connected to lakes, ponds, rivers, or streams will generally be encompassed by the AOCs for those aquatic features (see Sections 4.1.1 and 4.1.2). In the minority of cases, when not addressed by direction in Section 4.1, non-forested wetlands are addressed through conditions on operations.

Woodland pools are also addressed through conditions on operations. Because of their small size and temporary nature, woodland pools may be difficult to identify under certain operating conditions and during certain seasons. However, operators are expected to exercise due diligence in identifying these features and protecting those features that can be reasonably recognized.

Conditions on operations for rich lowland hardwood-dominated forest, mapped non-forested wetlands, and woodland pools focuses on minimizing:

- The risk of sedimentation in all wetlands
- The risk of disrupting the hydrological function of all wetlands
- The interruption of surface and groundwater inputs of all wetlands
- Changes to the composition and structure of wetland and riparian communities
- Disturbance of amphibian breeding activity in woodland pools
- Changes to canopy cover and light penetration in woodland pools.

i) Provincially significant wetlands

Description of value

Wetlands identified as provincially significant based on the *Ontario Wetland Evaluation System.*

Operational prescription and conditions for the area of concern

Guidelines

- Provincially significant wetlands (PSWs) will be addressed by individual AOC operational prescriptions and conditions developed by planning teams that will:
  - Result in no loss of natural features or ecological functions that make the wetland provincially significant.
  - May result in some loss of the natural features or ecological functions that make the wetland provincially significant, but the loss is deemed by the Ministry to be minimal and necessary to avoid undesirable ecological or socio-economic impacts of other feasible alternatives[1].

  Appendix 4.1a includes considerations for planning teams developing individual AOC operational prescriptions and conditions for PSWs and adjacent lands. It is recommended that the operational prescriptions and conditions for the AOC be developed with the assistance of Ministry regional or provincial staff with expertise in natural heritage features and areas.

ii) All wetlands (rich lowland hardwood-dominated forest, mapped forested and non-forested wetlands, and woodland pools) not addressed by operational prescriptions and conditions for AOCs

Description of value

All wetlands (rich lowland hardwood-dominated forest, mapped forested and non-forested wetlands, and woodland pools) not addressed by operational prescriptions and conditions for AOCs (e.g., aquatic features addressed in other sections of Section 4.1).

[1] Some thoughtfully planned and carefully implemented harvest, renewal, and tending operations may be used to emulate the natural disturbance dynamics of some PSWs to sustain important natural features or ecological functions (e.g., maintain habitat for species requiring early successional forested wetlands, rehabilitation of beaver-controlled wetlands). However, the appropriate scale of operations must be considered. For example, where mature and older forest is the natural feature, or contributes to the ecological functions, that make the wetland provincially significant, operations should occur at a small scale; small forested PSWs might best be avoided altogether.

In some cases, it may be acceptable to permit a road to cross a PSW if the impact is deemed to be minimal and other feasible alternatives would result in an undesirable ecological or socio-economic impact. For example, a crossing at the narrow point of a large PSW might avoid construction of many additional kilometers of road that might result in the construction of numerous new stream crossings, the crossing of other AOCs, or would be contrary to other objectives to minimize access (especially in woodland caribou range). In all cases, locations will be selected, and mitigation techniques will be employed, to minimize adverse effects.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- Construction of new landings is not permitted within wetlands or within 15 m of mapped marshes and fens or the high-water mark of woodland pools.

Guidelines

- When a road must cross a wetland, identify the associated type of surface and ground water flow to help determine the design and construction methods required to minimize the disruption of hydrological and wetland function. Hydrological function will be considered to have been disrupted if:
    - Surface water is not equalized on both sides of the road
    - Mortality of trees and vegetation has occurred on one side of the road due to prolonged inundation

  A good reference source is FPInnovations/Ducks Unlimited Canada's *Resource roads and wetlands: A guide for planning, construction and maintenance*.

- Construction of new roads is not permitted within 15 m of mapped marshes and fens or the high-water mark of woodland pools unless approved by the Ministry (see Appendix 1b).

Best management practices

- To the extent practical and feasible, when planning the location of roads, identify any wetland areas and minimize the amount of roads built across wetlands.

- If wetlands must be crossed to conduct forest operations, to the extent practical and feasible, consider using temporary winter crossings.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Construction of new forestry aggregate pits and wood storage yards and use of existing forestry aggregate pits and wood storage yards are not permitted within 15 m of mapped non-forested wetlands or the high-water mark of woodland pools.

iii) Herb-rich, lowland, hardwood-dominated (black ash, green ash, red ash, silver maple, white elm) forest

Description of value

Mapped stands of rich lowland hardwood-dominated forest (ecosites 130 - 133).

Pockets of rich lowland hardwood-dominated forest ≥0.5 ha in size encountered during operations.

Conditions on regular operations

Standards

- No harvest, renewal, or tending operations are permitted that exceed the rutting and compaction standards and guidelines for selection, shelterwood, and commercial thinning operations (see Section 5.2.1) or disrupt hydrological function. Hydrological function will be considered to have been disrupted if operations have:
    - Impeded water movement by restricting flow, creating pools of standing water (e.g., caused by deep ruts perpendicular to the flow path).
    - Accelerated water movement by channelizing flow (e.g., caused by long ruts parallel to the direction of flow).
    - Diverted water movement by changing the location of the path of flow (e.g., caused by ruts that create a new flow path).

- Harvest will follow direction for the lowland hardwood group found in the Ministry's Silviculture Guide.

Best management practices

- To the extent practical and feasible, extraction trails will be minimized and will follow the appropriate operating practices described in Section 4.1.4 to minimize potential disruption of hydrological function.

iv) Mapped non-forested wetlands

Description of value

Mapped polygons with the following polygon types (POLYTYPE) in the forest resources inventory and/or ecosites which generally correspond to one of four wetland types:

Polygon type	Ecosite	Wetland type
OMS (open wetland)	136, 139-152, 217, 218	Marshes, fens
TMS (treed wetland), BSH (brush and alder)	126, 134, 135, 137, 138	Bogs, swamps with <25% tree cover

Wetland type will be confirmed in the field. The boundary between non-forested wetlands and forest is defined where the canopy cover of trees ≥10 cm dbh is ≥25% or the canopy cover of trees ≥1.5 m tall is ≥30%.

Conditions on regular operations

Standards

Mapped marshes and fens

- No harvest, renewal, or tending operations are permitted that will result in significant damage to mapped fen or marsh vegetation or disruption of hydrological function. Operations specifically prohibited within 15 m of mapped fens or marshes include:
    - Machine travel/site disturbance during the frost-free period within 3 m of the mapped fen or marsh.
    - Felling of trees during the frost-free period into mapped fens or marshes or within 3 m of mapped fens or marshes. Trees accidentally felled into mapped fens and marshes will be left where they fall.
    - Disturbance that leaves ruts (especially those that channel water into a wetland) or a significant area of exposed mineral soil within 15 m of mapped fens or marshes (see Section 5.2.1). Ruts and significant patches of exposed mineral soil will be promptly rehabilitated to prevent sediment from entering mapped fens and marshes. Patches of mineral soil exposed by natural events are excluded.
    - Spills of deleterious substances (e.g., fuel, oil) that will contaminate mapped fens and marshes.

Mapped bogs and swamps

- No harvest, renewal, or tending operations are permitted that will result in:
    - Disturbance that leaves ruts or a significant area of exposed mineral soil within the mapped bog or swamp (see Section 5.2.1). Patches of mineral soil exposed by natural events are excluded.
    - Spills of deleterious substances (e.g., fuel, oil) that will contaminate mapped bogs or swamps.

Best management practices

- To the extent practical and feasible, extraction trails will be minimized within 15 m of mapped marshes and fens and within the boundary of mapped bogs and swamps and will follow the appropriate operating practices described in Section 4.1.4 to minimize potential disruption of hydrological function.

v) Woodland pools

Description of value

Recognizable temporary bodies of open water encountered during operations that have a surface area ≥500 m^2 (i.e., about 25 m in diameter if circular), are not ponds (i.e., <0.5 ha in size), and are not connected to another aquatic or wetland feature.

Conditions on regular operations

Standards

- No harvest, renewal, or tending operations are permitted that will result in deposition of sediment within, or reduction of the water-holding capacity of, woodland pools. Operations specifically prohibited include:
    - Machine travel within 3 m of the high-water mark of pools during the frost-free period.
    - Felling of trees into pools or within 3 m of the high-water mark of pools during the frost-free period. Trees accidentally felled into pools will be left where they fall.
    - Disturbance that leaves ruts (especially those that channel water into a woodland pool) or a significant area of exposed mineral soil (see Section 5.2.1) within 15 m of the high-water mark of pools. Ruts or significant patches of exposed mineral soil will be promptly rehabilitated.

- Prevent spills of deleterious substances (e.g., fuel, oil) from contaminating woodland pools.

Guidelines

- Retention of residual forest within and adjacent to pools will be based on silviculture system applied to the adjacent forest as follows:
    - Selection and shelterwood silviculture systems – Trees will be retained in, and within, 3 m of the high-water mark of pools to provide ≥70% canopy cover; residual forest will be retained within 15 m of the high-water mark of pools to provide amphibian cover.
    - Clearcut forest silviculture system – Unmapped residual patches required to meet the direction in Section 3.2.2 will preferentially be connected to pools. When connecting residual patches to pools, trees will be retained in and within 3 m of the high-water mark to provide overhead shade and residual forest will be retained within at least 15 m of the high-water mark to provide amphibian cover.

4.1.4 Hydrological connections

In hydrological connections between terrestrial and aquatic ecosystems, shallow subsurface groundwater from upland soils is discharged and transferred to surface flow in the last interface between the land and water. Groundwater and surface run-off in

hydrological connections are key sources of water, biogeochemical elements, and biological communities that support and sustain downstream streams, rivers, wetlands, ponds, and lakes. While these linear features rarely contain fish, they do support fish and fish habitat (e.g., they contribute cold water inputs to adjacent aquatic features).

Direction

Direction focuses on mitigating potential disruption of hydrological function from forestry operations, which may include changing the rates and/or patterns of surface and shallow groundwater flow (i.e., impeding, accelerating, or diverting water movement), within areas of hydrological connectivity. Mitigating potential disruption of hydrological function in these linear features is a key component of the Ministry's approach to mitigating potential effects of forest management operations on methylation of mercury and subsequent export to adjacent aquatic features.

Hydrological connections are addressed through conditions on regular operations.

Description of value

Hydrological connections between terrestrial and aquatic ecosystems are recognizable linear features that channel ephemeral surface and/or shallow groundwater flows to lakes, ponds, rivers, or streams are those that can reasonably be identified at the time of operations.

During some seasons it may be difficult to accurately identify these features. However, forest workers are expected to exercise due diligence in identifying and protecting these features in all seasons. The Ministry's hydrological flow accumulation modelling spatial product, which identifies the potential locations of hydrological connections (flowpaths) for the managed forest, can be used by forestry workers to identify the potential locations of hydrological connections. Alternatively, with use of a LiDAR-derived digital elevation model (DEM), sustainable forest licensees may choose to undertake flow accumulation modelling for their management unit. To be considered a hydrological connection, a flow initiation threshold of 3.2 ha (i.e., the upstream contributing area at which point flow initiation can reasonably be identified on the ground) would apply. Note: Predicted location of hydrological connections will vary in accuracy depending on the resolution of the DEM (e.g., 5 m versus 30 m) used in the flow accumulation modelling.

Conditions on regular operations

Guidelines

- Harvest, renewal, and tending operations will minimize disruption of hydrological function within recognizable linear features that channel ephemeral surface and/or shallow groundwater flow (i.e. springs, seeps) to lakes, ponds, rivers, or streams (i.e., hydrological connections between terrestrial and aquatic

ecosystems). Hydrological function will be considered to have been disrupted if operations:

- Impede water movement by restricting flow, creating long-term pools of standing water that exist for >1 year (e.g., caused by deep ruts perpendicular to the flow path that act to dam flow)
- Accelerate water movement by channelizing flow (e.g., caused by long ruts parallel to the direction of flow)
- Divert water movement by changing the location of the path of flow (e.g., caused by ruts that create a new flow path)

The natural "watering up" process associated with the removal of forest cover is not considered a hydrological disruption.

- Forestry workers will be vigilant for evidence suggesting the presence of hydrological connections throughout harvest areas (but especially near mapped predicted flow paths) such as changes in:
  - Topography – e.g., presence of a gully or other linear depression
  - Soil texture or moisture – e.g., presence of saturated mineral or organic soils
  - Vegetation structure – e.g., change in canopy height/presence of a linear canopy gap
  - Vegetation composition – e.g., presence of indicators of ephemeral surface and/or shallow groundwater flows such as alder, cedar, tamarack, black ash, and/or grasses/sedges

- Forestry workers will use their professional judgement to determine the likely location and characteristics of hydrological connections and apply the appropriate course of action. Where there is significant uncertainty, a conservative approach will be used.

Best management practices

- Movement of heavy equipment within hydrological connections (especially along extraction trails) should be avoided to the extent practical and feasible, especially during the frost-free period.

- When avoidance is not practical or feasible, heavy equipment should cross hydrological connections:
  - At as few locations as possible
  - At the narrowest point possible
  - As far from connected aquatic features as possible
  - At locations with the highest soil bearing capacity possible (look for indicators of drier soil conditions)
  - Using techniques to increase bearing capacity and avoid creating soil disturbance including use of corduroy mats, brush mats, or chipper debris

- Where restoring surface water flow will not further impact water movement and/or cause additional damage to the site:

- Remove material (e.g., displaced soil/organic matter, brush mats, corduroy) that may be impeding surface water flow so that natural drainage patterns are re-established.
- Any rehabilitation work should occur within one year of completion of operations using the appropriate equipment and during optimal conditions (e.g., summer).

- Train field staff, especially equipment operators, in the recognition and significance of disruption of hydrological function.

- Operations staff should use maps from hydrological modeling tools (e.g., flow accumulation, topographic index) prior to start-up of operations to help identify possible unmapped drainage, localized wet areas, mapped drainage that is misplaced or may not exist, or hydrological connections. Note: Accuracy of predicted locations of hydrological connections will vary depending on the DEM used in the hydrological modelling and the outputs of these tools should not replace normal field reconnaissance.

- Refer to Appendix 5.2b for a partial list of strategies and techniques that will minimize site disturbance (e.g., rutting) during operations and thereby indirectly minimize some of the risk of disrupting surface and subsurface water flow in areas of hydrological connection between terrestrial and aquatic ecosystems.

4.1.5 Self-sustaining brook and/or lake trout lakes and ponds with a high risk of threat to sustainability from new or improved access

Direction in Section 4.1, including restrictions on roads, focuses on maintaining various ecological functions of aquatic ecosystems, including the productive capacity that supports fish (i.e., protection of fish habitat). In addition to their potential effects on the productive capacity of aquatic ecosystems, forest access roads constructed during forestry operations may increase access to specific fisheries. In some cases, the risk associated with **new** or **improved** access may be acceptable given the specific management objectives of a fishery (see Notes at end of section for definitions of **bolded** terms). In other cases, the risk associated with new or improved access may not be acceptable given the management objectives of a fishery if there is a potential for over-harvest or introduction of **alien aquatic species**. New or improved access may increase angling which may facilitate intentional and unintentional dispersal of aquatic alien species across natural barriers into new lakes. Alien aquatic species introduction may be especially harmful to brook and lake trout that rely on littoral prey fish. In some circumstances, other planning exercises or policy documents (such as the *Crown Land Use Policy Atlas*, fisheries management plans, Ministry regional direction) may contain additional management objectives for the construction, use, or decommissioning of roads (as defined in the FMPM) around specific aquatic features that will be considered by planning teams.

Direction

When not specifically identified by other planning exercises or policy documents, direction in this section will be applied.

Self-sustaining trout lakes and ponds are addressed through operational prescriptions and conditions for AOCs. The AOC will apply if new or improved access from forest access roads is created to a lake or pond with a **self-sustaining** population of brook trout and/or lake trout and this access has a high risk of undermining the sustainability of that population due to increased **angler use** and/or introduction of alien aquatic species. Direction focuses on:

- Restricting construction of primary, branch, and operational roads that increases and/or improves access to lakes and ponds with self-sustaining populations of brook trout and/or lake trout that is likely to result in either unsustainable impacts from angler harvest and/or introduction of alien aquatic species, and
- Applying locally appropriate/effective access control measures.

Direction to mitigate other potential impacts to sustainability of these populations (e.g., change to fish habitat) from forestry operations can be found in Section 4.1.

Description of value

Self-sustaining brook trout and/or lake trout lakes and ponds are considered at high risk where new or improved access may facilitate unsustainable angler harvest and/or impacts from the introduction of alien aquatic species.

All lakes and ponds with self-sustaining brook trout populations will be identified by the Ministry prior to or during operations.

Self-sustaining lake trout lakes are those listed in the Ministry's *Inland Ontario Lakes Designated for Lake Trout Management* for lake trout management and designated as ‘natural’ lakes or identified by the Ministry prior to or during operations.

Determining whether a self-sustaining brook and/or lake trout lake is high risk will be assessed using the criteria provided in Appendix 4.1b.

The lake or pond and area within 1,000 m of the shoreline will comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to restrictions for lakes and ponds (Section 4.1 and 4.1.1).

Conditions on primary and branch roads and landings (planned or existing)

Guidelines

- **New** or **improved** primary and branch roads and landings are not permitted:
  - Within 400 m of the lake or pond except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process
  - Within 401-1,000 m of the lake or pond unless approved by the Ministry (see Appendix 1b)

- All **new** or **improved** primary/branch roads will be subject to locally appropriate/effective access control measures (i.e., the least restrictive approach that is likely to achieve the desired results).

Best management practices

- Existing primary and branch roads within the AOC should be subject to locally appropriate/effective access control measures when practical and feasible.

Conditions on operational roads and landings (planned or existing)

Standards

- **New** or **improved** operational roads must be decommissioned following completion of operations.

Guidelines

- **New** or **improved** operational roads and landings are not permitted within 400 m of the lake or pond unless approved by the Ministry (see Appendix 1b).

- When operations will be temporarily stopped for a period of greater than three months, **new** or **improved** operational roads within 1,000 m of the lake or pond will be subject to temporary and locally appropriate/effective access control measures (i.e., the least restrictive approach that is likely to achieve the desired results).

Best management practices

- Existing operational roads within the AOC should be subject to locally appropriate/effective access control measures where practical and feasible.

- To the extent practical and feasible, plan and construct operational roads to the minimal standard required to reduce future efforts and costs associated with decommissioning (e.g., construct winter roads and crossings, use temporary bridges).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Operations associated with new and existing forestry aggregate pits and wood storage yards are permitted within the AOC while operations are in progress.

- Forestry aggregate pits must be rehabilitated prior to or at the same as road decommissioning activities within the AOC.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 400 m of the lake or pond unless approved by the Ministry (see Appendix 1b).

Notes

Self-sustaining populations are lake or brook trout populations that persist from natural reproduction.

New forest access roads do not meet the definition of an existing road in the FMPM (e.g., are not impassable to licensed highway vehicles) or are not currently on the land base and are required to facilitate harvest. They are expected to increase angler use of a lake or pond if they reduce travel costs incurred by anglers by lessening travel time and/or effort compared to any existing access to a lake or pond.

Improved forest access roads are existing roads that are planned to be re-opened (e.g., brushing) and are expected to increase angler use of a lake or pond because of improved road quality.

Alien aquatic species of animals, plants, and micro-organisms are those introduced by human actions outside their natural past or present distribution.

Angler use is the angling effort intensity at a lake or pond that is measured by angler hours per ha of lake or pond over the course of a year.

4.2 Special habitat features

Section 4.2 provides direction for maintaining or enhancing the suitability of special habitat features. These include: groundwater recharge areas associated with brook trout spawning habitat; nest sites used by birds; beaver habitat; aquatic feeding areas and mineral licks used by moose; dens used by bears, cougars, and other furbearing mammals; and other species/habitat not previously covered.

4.2.1 Groundwater recharge areas associated with brook trout spawning sites

Groundwater is an important component of the hydrological cycle in forest ecosystems and has a significant effect on aquatic habitats and their biota. Groundwater provides a coldwater source critical to the life history and habitat of a number of fish species, especially thermally sensitive brook trout. For example, within lakes and streams on the Canadian Shield, female brook trout typically lay eggs in nests (redds) that are constructed in cobble-gravel-sand substrates associated with areas of groundwater discharge (upwelling). Suitable areas of groundwater discharge are frequently associated with lenses of coarse till that direct and accelerate groundwater flow. In bedrock-controlled landscapes, distinct sub-catchments (recharge areas) up to 10 ha in size may supply groundwater that maintains flow rates through brook trout spawning sites.

The main risks to recharge areas are hill-slope excavations and ditching associated with road construction or aggregate extraction that may intercept or redirect subsurface flow. Compaction associated with the creation of landings may also affect water infiltration.

Direction

Direction for the protection of groundwater recharge areas associated with known brook trout spawning sites focuses on minimizing risk of interrupting and redirecting groundwater flow and altering infiltration capacity.

Groundwater recharge areas associated with known brook trout spawning sites are addressed through operational prescriptions and conditions for AOCs, and may be mapped using field surveys or hydrological modeling tools. When operationally feasible, it is recommended to conduct field verifications of groundwater recharge areas that have been modeled in advance of forest operations to confirm presence.

Description of value

Groundwater recharge areas associated with known brook trout spawning sites identified by the Ministry prior to operations. Mapped recharge area is the AOC.

Operational prescription for the area of concern

Standards

- Regular harvest, renewal, and tending operations are permitted within the AOC.

- Extraction trail location and design will follow the operating practices described in Section 5.2 to minimize rutting that could disrupt shallow groundwater flow.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- New all-weather roads and landings are not permitted within the AOC except in extraordinary circumstances, appropriate mitigative measures are taken to minimize the risk of interrupting or redirecting shallow groundwater flow (e.g., no ditching or grubbing, appropriate cross drainage is provided; see Section 5.1), and the road, including specific location, is identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Forestry aggregate pits and wood storage yards are not permitted within the AOC.

4.2.2 Bird nest sites

Forest operations may inadvertently kill, harm, disturb, and/or destroy nesting birds, their eggs or young (effects are collectively known as incidental take). Nesting birds, eggs, and young of all wild species (except American crow, brown-headed cowbird, common grackle, house sparrow, red-winged blackbird, and European starling) are protected from incidental take by either the federal *Migratory Birds Convention Act, 1994* (MBCA) or the provincial *Fish and Wildlife Conservation Act, 1997* (FWCA).

Forestry operations may also inadvertently remove or destroy nesting structures used by breeding birds. When these structures are enduring features that are likely to be reused by breeding birds (e.g., bald eagle stick nests), their loss may also be considered incidental take.

Forestry operations may further alter the suitability of habitat used by individual pairs of breeding birds. However, the goal of the Ministry's coarse filter approach (see Section 1.3.1) is to maintain an adequate supply of habitat to support widely dispersed healthy populations of most native bird species addressed by this guide (for species at risk see section 4.3). In some cases, coarse-filter direction may need to be supplemented with species-specific direction to support widely dispersed healthy populations. Species-specific direction is generally included for species that are uncommon (and for which loss of individual nests or nesting areas may have population consequences), show strong fidelity to specific nesting structures or nesting areas, and are sensitive to habitat alteration.

The only way to completely eliminate the risk of inadvertently killing, harming, disturbing, and/or destroying nesting birds, their eggs, or young is to avoid all operations that may have adverse effects within habitats likely to be used by nesting birds during the breeding period. However, since some species may be nesting from mid-April until late August[2] in all types and ages of forest and in all types of non-forested habitats (e.g., wetlands, rock outcrops), complete avoidance is generally not practical or feasible.

Direction

Direction in Section 4.2.2 (and subsequent subsections) applies to all birds addressed by the MBCA or the FWCA and focuses on:

- Minimizing and mitigating the likelihood that forestry operations will inadvertently kill, harm, disturb, and/or destroy nesting birds, their eggs, or young.
- Minimizing and mitigating the likelihood that forest operations will inadvertently destroy enduring nest structures that are likely to be reused by breeding birds.
- Maintaining suitability of habitat for selected species.

Note: The direction in Section 4.2.2 is intended to minimize and mitigate the likelihood that forestry operations will inadvertently kill, harm, disturb, and/or destroy nesting birds, their eggs, or young. However, complete avoidance can only be assured if all operations with potential adverse effects are conducted outside the breeding period. It is the responsibility of forest workers to determine the level of risk regarding potential contravention of the MBCA or FWCA they are willing to accept.

The direction in Sections 4.2.2.1 to 4.2.2.8 is intended for application at nest sites located in relatively undeveloped situations where birds are likely to be intolerant of forestry operations. Birds that build nests in highly developed or disturbed situations (e.g., adjacent to a well-traveled road or human habitation) may be unusually tolerant of human activities. For these habituated birds, the direction in Sections 4.2.2.1 to 4.2.2.8 may be overly conservative and a planning team may choose to develop a unique, nest site-specific, AOC operational prescriptions and conditions that better reflect the tolerance of the birds. Since the direction in Sections 4.2.2.1 to 4.2.2.8 is not specifically intended for habituated birds, the new AOC operational prescriptions and conditions developed will not be considered an exception to the direction in this guide.

If at the time of operations, the status of a nest has changed or a new nest is located, the values map will be revised, and the appropriate direction applied. If the nest has fallen out of the tree, the nest tree has fallen down, or the tree or habitat has become otherwise unsuitable for nesting, treat as a value that no longer exists.

Refer to the glossary for definitions of terms (e.g., active nest, inactive nest, occupied nest) used in Sections 4.2.2.1 to 4.2.2.8.

The following direction will be included as conditions on regular operations within FMPs.

[2] See https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html#_fig01

Conditions on regular operations

Standards

- All forest workers will be aware of their legal obligation under the MBCA and the FWCA to avoid incidental take of nesting birds, their nests (including trees with pileated woodpecker nesting cavities), eggs, and young.

Guidelines

- When conducting any operations from mid-April to late August, all forest workers will be vigilant for nests of all protected bird species containing nesting birds, eggs, or young. This includes being alert for evidence of nesting activity such as birds flushing from nests, birds carrying food or nesting material, and birds behaving defensively. When encountered, these new values/important ecological features will be reported as per requirements in FIM, and the appropriate AOC direction or conditions on operations will be followed.

- When conducting any operations throughout the year, all forest workers will be vigilant for enduring nest structures that are likely to be reused. This includes stick nests and trees with large cavities that could be used by nesting or roosting birds such as chimney swifts, falcons, owls, or ducks (see also Section 3.2.3.1). When encountered, the appropriate AOC direction or conditions on operations will be followed.

Best management practices

- Whenever practical and feasible, operations that have a high potential to unintentionally kill, harm, disturb, and/or destroy nesting birds, their eggs or young (e.g., operations involving heavy equipment such as harvest, site preparation, and road building) will be scheduled outside the time period when birds may be nesting (generally mid-April to late August) and especially during the peak period of nesting (generally mid-May to late July).

- Minimize the ground covered by machine and extraction trails. Many species of birds (e.g., grouse, waterfowl, some songbirds) nest on or near the ground.

- Preferentially retain wildlife trees (3.2.3.1) with existing cavities (they may contain nests with eggs or young birds)

- Minimize operations within AOCs associated with ponds and wetlands. There is a high likelihood of encountering nesting waterfowl near these features.

4.2.2.1 Cliff-nesting birds

Direction is provided for natural nest sites that have been occupied by a pair of peregrines falcons. Direction is provided separately for cliffs versus other natural sites

(e.g., rock outcrops); cliff sites are considered more suitable for nesting and thus receive more restrictive direction.

Direction is also provided for natural nest sites that have been occupied by a pair of turkey vultures.

If operations that are not consistent with the direction occur within the normal radius of the AOC for an active peregrine falcon or turkey vulture nest site prior to its discovery, the AOC will be laid out to meet the intent of the direction as nearly as possible.

i) Active peregrine falcon nest site on cliffs

Description of value

A natural cliff face occupied by a pair of nesting peregrines falcons within the past 30 years (assuming the cliff face is still suitable for nesting).

The nest site extends vertically from the base to the top of the cliff face and horizontally across the cliff face to include ledges used for nesting and any part of the cliff face within 500 m of used ledges. The cliff face includes the talus slope at the base of the cliff and the rock barren at the top of the cliff (the outer edge of the top and bottom of the cliff will typically correspond to the point where the canopy cover of trees is ≥25%). If nest sites used by the same pair in different years are on distinct cliffs, each cliff face is a separate nest site.

The nest site and the area within 400 m of the front and back of the nest site comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 100 m of the top or bottom of nest sites.
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 101-200 m of the top or bottom of nest sites. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distances of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads and landings that provide increased access to nest sites are not permitted within 200 m of the top or bottom of nest sites.

Guidelines

- New primary and branch roads, and landings that provide increased access to nest sites are not permitted within 201-400 m of the top or bottom of nest sites unless approved by the Ministry (see Appendix 1b).

- Operations associated with primary and branch roads, and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings that provide increased access to nest sites are not permitted within 200 m of the top or bottom of nest sites except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with operational roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in

extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations.

However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- To the extent practical and feasible, new operational roads and landings will not be constructed within 201-400 m of the top or bottom of nest sites.

- When new operational roads are constructed within the AOC, temporary water crossings will be used whenever practical and feasible to limit future access and disturbance.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 200 m of the top or bottom of nest sites.

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
Peregrine falcon	Mar 15 – Aug 31	Mar 15 – Aug 31	Mar 1 – Aug 15

*Local knowledge of breeding chronology may be used to adjust these dates

ii) Active peregrine falcon nest site on other natural features

Description of value

Nests on natural features (other than cliffs) occupied at least once within the past 15 years.

The nest and the area within 400 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 100 m of active nests.
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 101-200 m of active nests. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 400 m for high potential impact operations
    - 200 m for moderate potential impact operations
    - 100 m of low potential impact operations

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads and landings that provide increased access to nests sites are not permitted within 200 m of active nests.

Guidelines

- New primary and branch roads and landings that provide increased access to nest sites are not permitted within 201-400 m of active nests unless approved by the Ministry (see Appendix 1b).

- Operations associated with primary and branch roads, and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings that provide increased access to nest sites are not permitted within 200 m of active nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with operational roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- To the extent practical and feasible, new operational roads and landings will not be constructed within 201-400 m of active nests.

- When new operational roads are constructed within the AOC, temporary roads and/or water crossings will be used whenever practical and feasible to limit future access and disturbance.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 200 m of active nests.

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 400 m for high potential impact operations
    - 200 m for moderate potential impact operations
    - 100 m of low potential impact operations.

iii) Active turkey vulture nests on natural features

Description of value

Turkey vulture nests on natural features (typically cliffs or rock outcrops) occupied at least once within the past 15 years.

The nest and the area within 150 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 75 m of active nests.
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 76-150 m of active nests. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 150 m for high potential impact operations
    - 75 m for moderate potential impact operations
    - 40 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads and landings are not permitted within 75 m of active nests.

Guidelines

- New all-weather primary and branch roads and landings are not permitted within 76-150 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical and feasible and does not exceed 20 m.

- Operations associated with primary and branch roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 150 m for high potential impact operations
  - 75 m for moderate potential impact operations
  - 40 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings are not permitted within 75 m of active nests unless approved by the Ministry (see Appendix 1b), or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical and feasible and does not exceed 15 m.

- New landings associated with operational roads are not permitted within 76-150 m of active nests unless approved by the Ministry (see Appendix 1b).

- Operations associated with operational roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 150 m for high potential impact operations

- 75 m for moderate potential impact operations
- 40 m of low potential impact operations.

However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 75 m of active nests.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 76-150 m of active nests except in extraordinary circumstances.

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 150 m for high potential impact operations
  - 75 m for moderate potential impact operations
  - 40 m of low potential impact operations.

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8	BCR 12	BCR 13
Turkey Vulture	Apr 15 – Sep 15*	Apr 1 – Sep 15*	Mar 15 – Sep 15*

*Local knowledge of breeding chronology may be used to adjust these dates.

4.2.2.2 Bald eagle and osprey nests

Direction is provided for active and inactive nests to be/have been occupied or built by the bald eagle or osprey.

If operations that are not consistent with the direction occurs within 400 m of an active bald eagle nest (or 300 m of an active osprey nest), or 30 m of an inactive bald eagle or osprey nest prior to its discovery, the AOC or patch of residual forest will be laid out so that equivalent sized reserves and modified areas are retained in patches that are as nearly circular as possible (to minimize edge).

i) Active bald eagle nests

Description of value

Active nests have been occupied at least once within the past 5 years, unless the nest has been documented as unoccupied for ≥3 consecutive years, in which case the nest is considered inactive.

When ≥2 active nests occur within AOC and are considered part of the nesting area of an individual pair, the nest with the most recent evidence of occupancy within this nesting area is the active nest; the other nest(s) is(are) considered inactive nests.

When inventory data are insufficient to determine which nest in a nesting area has been most recently occupied, the nest in good repair is considered the active nest. The tree containing the nest and the area within 400 m comprise the AOC.

Operational prescription for the area of concern

Standards (see Figure 4.2a)

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 100 m of primary nests.
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 101-200 m of active nests. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%.

Guidelines

- Within harvested portions of the AOC, wildlife trees that may function as potential nest, perch, and roost sites will be preferentially retained, based on the following order of priority: 1) supercanopy trees, 2) veteran trees, 3) cavity trees, and 4) other live dominant or codominant trees that are windfirm. White pine, red pine, and/or trembling aspen will be favoured when available.

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 400 m for high potential impact operations
    - 200 m for moderate potential impact operations

- 100 m for low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads and landings are not permitted within 200 m of active nests.

Guidelines

- New primary and branch roads and landings are not permitted within 201-400 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- Operations associated with primary and branch roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings are not permitted within 200 m of active nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 15 m.

- New operational roads and landings permitted within 201-400 m of active nests with Ministry notification (see Appendix 1b).

- Operations associated with operational roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in

extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:

- 400 m for high potential impact operations
- 200 m for moderate potential impact operations
- 100 m of low potential impact operations.

However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- New operational roads constructed within 201-400 m of active nests will have a cleared right-of-way width as narrow as practical/feasible which does not exceed 15 m.

- If roads are constructed within the AOC, temporary roads and/or water crossings will be used whenever practical and feasible to limit future access.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 200 m of active nests.

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 400 m for high potential impact operations
  - 200 m for moderate potential impact operations
  - 100 m of low potential impact operations.

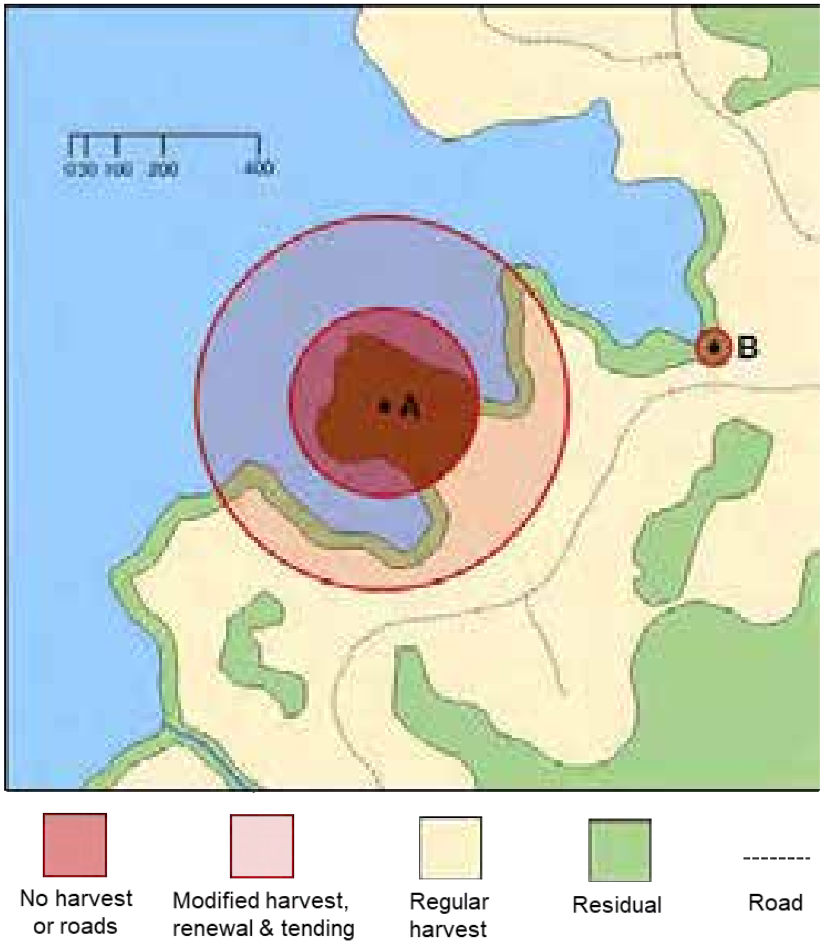

Figure 4.2a. Typical AOC layout for an active (A) and inactive (B) bald eagle nest in a boreal forest management unit (i.e., clearcut harvest). No clearcut harvest, roads, landings, forestry aggregate pits, or wood storage yards are permitted within 200 m of the primary and 30 m of the inactive nest at any time. No high impact operations are permitted within 400 m of the primary nest (if occupied) during the critical breeding period. Note: Some types of partial harvest, such as single tree selection, are permitted within 100-200 m of primary nests, but have not been included in this example – see text.

ii) Inactive bald eagle nests

Description of value

Nests not occupied at least once within the past 5 years.

Active nests documented as unoccupied for ≥3 consecutive years.

The tree containing the inactive nest and the area within 30 m comprise the AOC.

Operational prescription for the area of concern

Standards (see Figure 4.2a)

- Harvest, renewal, and tending operations are not permitted within 30 m of nest trees.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- New roads and landings are not permitted within 30 m of inactive nests unless with Ministry approval (see Appendix 1b).

- No timing restrictions on operations associated with roads and landings around inactive nests.

Conditions forestry aggregate pits and wood storage yards

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 30 m of inactive nests unless with Ministry approval (see Appendix 1b).

- No timing restrictions on operations associated with forestry aggregate pits and wood storage yards around inactive nests.

iii) Active osprey nests

Description of value

Active nests have been occupied at least once within the past 5 years, unless the nest has been documented as unoccupied for ≥3 consecutive years, in which case the nest is considered inactive.

When ≥2 active nests occur within the AOC and are considered part of the nesting area of an individual pair, the nest with the most recent evidence of occupancy within this nesting area is the active nest; the other nest(s) is(are) considered inactive nests.

When inventory data are insufficient to determine which nest in a nesting area has been most recently occupied, the nest in **good repair** is considered the active nest. The tree containing the nest and the area within 300 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 75 m of primary nests.
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 76-150 m of active nests. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%.

Guidelines

- Within harvested portions of the AOC, wildlife trees that may function as potential nest, perch, and roost sites will be preferentially retained, based on the following order of priority: 1) supercanopy trees, 2) veteran trees, 3) cavity trees, and 4) other live dominant or codominant trees that are windfirm. White pine, red pine, and/or trembling aspen will be favoured when available.

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 300 m for high potential impact operations
    - 150 m for moderate potential impact operations
    - 75 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads and landings are not permitted within 150 m of active nests.

Guidelines

- New primary and branch roads and landings are not permitted within 151-300 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- Operations associated with primary and branch roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 300 m for high potential impact operations
  - 150 m for moderate potential impact operations
  - 75 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings are not permitted within 150 m of active nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and ≤15 m.

- New operational roads and landings permitted within 151-300 m of active nests with Ministry notification (see Appendix 1b).

- Operations associated with operational roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 300 m for high potential impact operations
  - 150 m for moderate potential impact operations
  - 75 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- New operational roads constructed within 151-300 m of active nests will have a cleared right-of-way width is as narrow as practical/feasible which does not exceed 15 m.

- If roads are constructed within the AOC, temporary roads and/or water crossings will be used whenever practical and feasible to limit future access.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 150 m of active nests.

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 300 m for high potential impact operations
    - 150 m for moderate potential impact operations
    - 75 m of low potential impact operations.

iv) Inactive osprey nests

Description of value

Nests not occupied at least once within the past 5 years.

Active nests documented as unoccupied for ≥3 consecutive years.

The tree containing the inactive nest and the area within 30 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within 30 m of nest trees.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- New roads and landings are not permitted within 30 m of inactive nests unless with Ministry approval (see Appendix 1b).

- No timing restrictions on operations associated with roads and landings around inactive nests.

Conditions forestry aggregate pits and wood storage yards

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 30 m of inactive nests unless with Ministry approval (see Appendix 1b).

- No timing restrictions on operations associated with forestry aggregate pits and wood storage yards around inactive nests.

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
Bald eagle	Mar 1 – Aug 31	Feb 15 – Aug 31	Feb 1 – Aug 31
Osprey	Apr 15 – Aug 31	Apr 1 – Aug 31	Mar 15 – Aug 31

*Local knowledge of breeding chronology may be used to adjust these dates.

4.2.2.3 Colonial nesting birds

Direction is provided for colonies that have been used by the great blue heron or black tern.

i) Active great blue heron colonies

Description of value

Heron colonies with <20 nests occupied at least once within the past 10 years unless documented as unoccupied for ≥5 years, or with ≥20 nests occupied at least once within the past 20 years unless documented as unoccupied for ≥10 years.

The polygon connecting peripheral trees containing nests and the area within 300 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 75 m of the polygon connecting peripheral nests.
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 76-150 m of polygon connecting peripheral nests. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%.
    - Harvest that retains forest with ≥50% stocking comprised of trees ≥3 m tall is permitted within 151-300 m of the polygon connecting peripheral nests.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests within colonies during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 300 m for high potential impact operations
    - 150 m for moderate potential impact operations
    - 75 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads and landings are not permitted within 150 m of the polygon connecting peripheral nests.

Guidelines

- New primary and branch roads and landings are not permitted within 151-300 m of the polygon connecting peripheral nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- Operations associated with primary and branch roads and landings are not permitted within the following distance of occupied active nests within colonies during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 300 m for high potential impact operations
    - 150 m for moderate potential impact operations

- 75 m of low potential impact operations.

However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the colony.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings are not permitted within 150 m of the polygon connecting peripheral nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- New operational roads are permitted within 151-300 m of active nests with Ministry notification (see Appendix 1b).

- New landings associated with operational roads are not permitted within 151-300 m of active nests unless approved by the Ministry (see Appendix 1b).

- Operations associated with operational roads and landings are not permitted within the following distance of occupied active nests within colonies during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 300 m for high potential impact operations
  - 150 m for moderate potential impact operations
  - 75 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the colony.

Best management practices

- New operational roads constructed within 151-300 m of the polygon connecting peripheral nests will have a cleared right-of-way width is as narrow as practical/feasible which does not exceed 15 m.

- If roads are constructed within the AOC, temporary roads and/or water crossings will be used whenever practical and feasible to limit future access.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 150 m of the polygon connecting peripheral nests.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 151-300 m of the polygon connecting peripheral nests unless approved by the Ministry (see Appendix 1b).

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests within colonies during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 300 m for high potential impact operations
    - 150 m for moderate potential impact operations
    - 75 m of low potential impact operations.

ii) Inactive great blue heron colonies

Description of value

Colonies with ≥20 nests in suitable habitat not occupied at least once within the past 20 years or documented as unoccupied for 10 or more consecutive years.

Colonies with <20 nests in suitable habitat not occupied at least once within the past 10 years or documented as unoccupied for 5 or more consecutive years.

The polygon connecting peripheral trees containing nests and the area within 30 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within 30 m of the polygon connecting peripheral nests.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- Construction of new roads and landings is not permitted within 30 m of the polygon connecting peripheral nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- No timing restriction on operations associated with roads and landings within 30 m of the polygon connecting peripheral nests.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- Construction of new forestry aggregate pits and wood storage yards are not permitted within 30 m of the polygon connecting peripheral nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- No timing restriction on operations associated with forestry aggregate pits and wood storage yards within 30 m of the polygon connecting peripheral nests.

iii) Active black tern colonies

Description of value

Colonies occupied by breeding black terns at least once within the past 5 years.

The polygon connecting peripheral nests and the area within 100 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below).

- Operations that significantly alter hydrological regime within occupied wetlands to the extent that habitat is no longer suitable for nesting, are not permitted.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate potential impact operations
    - 25 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads, and landings are not permitted within 50 m of the polygon connecting peripheral nests.

Guidelines

- New primary and branch roads, and landings are not permitted within 51-100 m of the polygon connecting peripheral nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- Operations associated with primary and branch roads, and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate potential impact operations
    - 25 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the colony.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings are not permitted within 50 m of the polygon connecting peripheral nests except in extraordinary circumstances or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 15 m.

- Operations associated with operational roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate potential impact operations

- 25 m of low potential impact operations.

However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the colony.

Best management practices

- New operational roads and landings should not be constructed within 51-100 m of the polygon connecting peripheral nests unless there is no practical and feasible alternative or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 15 m.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 100 m for high potential impact operations
  - 50 m for moderate potential impact operations
  - 25 m of low potential impact operations.

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
Great blue heron	Apr 1 – Aug 31	Mar 15 – Aug 31	Mar 15 – Aug 15
Black tern	May 15 – Jul 31	May 15 – Jul 31	May 1 – Jul 31

*Local knowledge of breeding chronology may be used to adjust these dates.

4.2.2.4 Uncommon stick-nesting birds

Direction for uncommon stick-nesting birds is provided for active and inactive nests that have been occupied or built by the Bonaparte's gull, great gray owl, American goshawk, or red-shouldered hawk.

The following direction applies to all nest sites unless an alternate prescription has been identified and rationalized by the planning team as necessary to address beech bark disease. This new prescription will not be considered an exception to the guide.
If operations that are not consistent with this direction occurs within the normal radius of the AOC prior to discovery of an active nest, the AOC will be laid out so that equivalent sized reserves and modified areas are retained in patches that are as nearly circular as possible (to minimize edge).

i) Active Bonaparte's gull nest sites

Description of value

Nests occupied at least once within the past 5 years (unless documented as unoccupied for ≥3 consecutive years).

Trees containing nests and the area within 100 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 50 m of active nests.
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 51-100 m of active nests. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate potential impact operations
    - 25 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads, and landings are not permitted within 50 m of active nests.

Guidelines

- New primary and branch roads, and landings are not permitted within 51-100 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- Operations associated with primary and branch roads, and landings are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate potential impact operations
    - 25 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads and landings are not permitted within 50 m of active nests unless approved by the Ministry (see Appendix 1b).

- Operations associated with operational roads and landings are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate potential impact operations
    - 25 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- If roads are constructed within the AOC, temporary roads and/or water crossings will be used whenever practical and feasible to limit future access cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 50 m of active nests.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 51-100 m of active nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate potential impact operations
    - 25 m of low potential impact operations.

ii) Active great gray owl or American goshawk nest sites

Description of value

Active nests have been occupied at least once within the past 5 years, unless the nest has been documented as unoccupied for ≥3 consecutive years, in which case the nest is considered inactive.

When ≥2 active nests occur within AOC and are considered part of the nesting area of an individual pair, the nest with the most recent evidence of occupancy within this nesting area is the active nest; the other nest(s) is(are) considered inactive nests.

When inventory data are insufficient to determine which nest in a nesting area has been most recently occupied, the nest in good repair is considered the active nest.

The tree containing the nest and the area within a 400 m radius comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 50 m of active nests.
    - A total of 28 ha of suitable nesting habitat will be retained within the AOC. The 50 m radius (0.8 ha) patch of unharvested forest surrounding the active nest (and any inactive nests) contributes to the 28 ha patch of suitable nesting habitat.
    - 7 of the 28 ha of suitable nesting habitat will be retained within 200 m of the active nest and will be mature forest with a relatively uniform canopy closure ≥70% and canopy openings not to exceed individual tree crowns.
    - The remaining 21 ha of suitable nesting habitat may be located anywhere within the 400 m AOC and will be mature forest with a relatively uniform canopy closure ≥50% and a maximum size of canopy gaps ≤0.1 ha.
    - Harvest that changes development stage, reduces canopy closure below 50%, or creates canopy gaps >0.1 ha is not permitted within 200 m of the active nest.

Guidelines

- Suitable nesting habitat will be retained as a contiguous patch that encompasses the active nest and any inactive nests within the AOC.

- Suitable nesting habitat will be retained as a circular patch centred on the active nest (300 m radius circle) if the active nest occurs in a large patch of uniform block of habitat. Suitable nesting habitat will be retained as an irregularly-shaped patch (contained within the 400 m AOC) if this configuration better encompasses active and inactive nests.

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 200 m for high potential impact operations
    - 100 m for moderate potential impact operations
    - 50 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary roads and landings are not permitted within 200 m of active nests.

Guidelines

- New primary roads and landings are not permitted within 201-400 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- New branch roads and landings are not permitted within 400 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- New landings >0.1 ha in size associated with primary and branch roads are not permitted within 201-400 m unless approved by the Ministry (see Appendix 1b).

- Operations associated with primary and branch roads, and landings are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 200 m for high potential impact operations
    - 100 m for moderate potential impact operations
    - 50 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads are not permitted within 200 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 15 m.

- Operations associated with operational roads and landings are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 200 m for high potential impact operations
    - 100 m for moderate potential impact operations
    - 50 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- If roads are constructed within the AOC, temporary roads and/or water crossings will be used whenever practical and feasible to limit future access and the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 200 m of active nests.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 201-400 m of active nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 200 m for high potential impact operations
    - 100 m for moderate potential impact operations
    - 50 m of low potential impact operations.

iii) Active red-shouldered hawk nest sites

Description of value

Active nests have been occupied at least once within the past 5 years, unless the nest has been documented as unoccupied for ≥3 consecutive years, in which case the nest is considered inactive.

When ≥2 active nests occur within AOC and are considered part of the nesting area of an individual pair, the nest with the most recent evidence of occupancy within this nesting area is the active nest; the other nest(s) is(are) considered inactive nests.

When inventory data are insufficient to determine which nest in a nesting area has been most recently occupied, the nest in good repair is considered the active nest.

The tree containing the nest and the area within 300 m radius comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest is not permitted within 75 m of active nests.
    - Within the remainder of the AOC, mature forest with a relatively uniform canopy closure ≥70%, average size of canopy openings not to exceed individual tree crowns, and maximum size of canopy gaps ≤0.1 ha will be retained.

Guidelines

- Within 76-150 m of active nests, at least half the basal area retained will be comprised of trees ≥38 cm dbh (if available).

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 150 m for high potential impact operations
    - 75 m for moderate potential impact operations
    - 40 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary roads and landings are not permitted within 150 m of active nests.

Guidelines

- New primary roads and landings are not permitted within 151-300 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- New branch roads and landings are not permitted within 300 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- New landings >0.1 ha in size associated with primary and branch roads are not permitted within 151-300 m unless approved by the Ministry (see Appendix 1b).

- Operations associated with primary and branch roads and landings are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 150 m for high potential impact operations
    - 75 m for moderate potential impact operations
    - 40 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on operational roads and landings (planned or existing)

Guidelines

- New operational roads are not permitted within 150 m of active nests unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 15 m.

- Operations associated with operational roads and landings are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 150 m for high potential impact operations
    - 75 m for moderate potential impact operations
    - 40 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- If roads are constructed within the AOC, temporary roads and/or water crossings will be used whenever practical and feasible to limit future access and the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 150 m of active nests.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 151-300 m of active nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 150 m for high potential impact operations
    - 75 m for moderate potential impact operations
    - 40 m of low potential impact operations.

iv) Inactive nests of Bonaparte's gull, great gray owl, American goshawk, or red-shouldered hawk

Description of value

Nests of Bonaparte's gull, great gray owl, American goshawk, or red-shouldered hawk not occupied at least once within the past 5 years or documented as unoccupied for ≥3 consecutive years.

Conditions on regular operations, roads, landings, forestry aggregate pits, and wood storage yards

Standards

- Harvest, renewal, and tending operations are not permitted within 20 m of inactive nests.

Guidelines

- New roads, landings, forestry aggregate pits, and wood storage yards are not permitted within 20 m of inactive nests unless approved by the Ministry (see Appendix 1b).

- No timing restrictions on harvest, renewal, or tending operations or operations associated with roads, landings, forestry aggregate pits, and wood storage yards around inactive nests.

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
Bonaparte's gull	Apr 15 – Jul 31	Apr 15 – Jul 31	
Great gray owl	Mar 15 – Jul 15	Mar 15 – Jul 31	
American goshawk	Mar 15 – Jul 31	Mar 15 – Jul 31	Mar 1 – Jul 31
Red-shouldered hawk		Mar 15 – Jul 15	Mar 1 – Jul 15

*Local knowledge of breeding chronology may be used to adjust these dates.

4.2.2.5 Common stick-nesting birds

Direction for common stick-nesting birds is provided for nests occupied by the barred owl, broad-winged hawk, common raven, Cooper's hawk, great horned owl, long-eared owl, merlin, red-tailed hawk, or sharp-shinned hawk (active nests). Direction is also provided for stick nests that have been recently occupied but were built or last used by one of these species (inactive nests).

If a nest is no longer usable because it has fallen out of the tree, the tree has fallen down, or the tree has become otherwise unsuitable for nesting, treat as a value that no longer exists.

i) Active barred owl, broad-winged hawk, common raven, Cooper's hawk, great horned owl, long-eared owl, merlin, red-tailed hawk, or sharp-shinned hawk stick nests

Description of value

Active nests are occupied by the barred owl, broad-winged hawk, common raven, Cooper's hawk, great horned owl, long-eared owl, merlin, red-tailed hawk, or sharp-shinned hawk at least once within the past 5 years (not documented as unoccupied for ≥3 consecutive years).

The tree containing the nest and the area within the following radius comprise the AOC:

- Barred owl: 150 m
- Broad-winged hawk, Cooper's hawk, great horned owl, or red-tailed hawk: 100 m
- Common raven, long-eared owl, merlin, or sharp-shinned hawk: 50 m.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and:
    - Active nest trees will be retained
    - Harvest not permitted within 20 m of active nests of barred owl, Cooper's hawk, common raven, great horned owl, long-eared owl, or red-tailed hawk.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distances of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 100 m for high potential impact operations
    - 50 m for moderate and low potential impact operations.

Best management practices

- Nest trees used by broad-winged hawk, merlin, or sharp-shinned hawk that are a potential safety risk should be retained in an unharvested residual patch (≥20 m radius).

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- New roads and landings are not permitted within 20 m of active nests of the barred owl, Cooper's hawk, common raven, great horned owl, long-eared owl, or red-tailed hawk except in extraordinary circumstances or when constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- Operations associated with roads and landings are not permitted within the following distances of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - For barred owl:
        - 150 m for high potential impact operations
        - 75 m for moderate potential impact operations

        - 40 m of low potential impact operations.
    - For Cooper's hawk, broad-winged hawk, great horned owl, and red-tailed hawk:
        - 100 m for high potential impact operations
        - 50 m for moderate potential impact operations
        - 25 m of low potential impact operations.
    - For common raven, long-eared owl, merlin, and sharp-shinned hawk:
        - 50 m for high potential impact operations
        - 25 m for moderate and low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- To the extent practical and feasible, avoid constructing new roads and landings within 20 m of active nests of the broad-winged hawk, merlin, and sharp-shinned hawk.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- New forestry aggregate pits and wood storage yards will not be constructed within 20 m of active nests of the barred owl, Cooper's hawk, common raven, great horned owl, long-eared owl, or red-tailed hawk except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - For barred owl:
        - 150 m for high potential impact operations
        - 75 m for moderate potential impact operations
        - 40 m of low potential impact operations.
    - For Cooper's hawk, broad-winged hawk, great horned owl, and red-tailed hawk:
        - 100 m for high potential impact operations
        - 50 m for moderate potential impact operations
        - 25 m of low potential impact operations.
    - For common raven, long-eared owl, merlin, and sharp-shinned hawk:
        - 50 m for high potential impact operations
        - 25 m for moderate and low potential impact operations.

Best management practices

- To the extent practical and feasible, avoid constructing new forestry aggregate pits and wood storage yards within 20 m of active nests of the broad-winged hawk, merlin, and sharp-shinned hawk.

ii) Inactive barred owl, broad-winged hawk, common raven, Cooper's hawk, great horned owl, long-eared owl, merlin, red-tailed hawk, or sharp-shinned hawk stick nests

Description of value

Stick nests occupied by the barred owl, broad-winged hawk, common raven, Cooper's hawk, great horned owl, long-eared owl, merlin, red-tailed hawk, or sharp-shinned hawk, but not within the past 5 years.

Stick nests occupied by the barred owl, broad-winged hawk, common raven, Cooper's hawk, great horned owl, long-eared owl, merlin, red-tailed hawk, or sharp-shinned hawk within the past 5 years but unoccupied for ≥3 consecutive years.

Stick nests with no known history of occupancy but suspected to have been built by the broad-winged hawk, common raven, Cooper's hawk, red-tailed hawk, or sharp-shinned hawk.

Conditions on regular operations, roads, landings, forestry aggregate pits, and wood storage yards

Standards

- Harvest, renewal, and tending operations are permitted subject to the following restrictions:
    - Nest trees will be retained
    - Harvest, renewal, and tending operations are not permitted within 20 m of inactive nests of barred owl, Cooper's hawk, common raven, great horned owl, long-eared owl, or red-tailed hawk or other **large** inactive nests if species is uncertain.

Guidelines

- New roads, landings, forestry aggregate pits, and wood storage yards are not permitted within 20 m of inactive nests of the barred owl, Cooper's hawk, common raven, great horned owl, long-eared owl, or red-tailed hawk or other **large** inactive nests if species is uncertain unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is

predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- No timing restriction on harvest, renewal, or tending operations or on operations associated with roads, landings, forestry aggregate pits, and wood storage yards around inactive nests.

Best management practices

- Nest trees used by broad-winged hawk, merlin, or sharp-shinned hawk that are a potential safety risk should be retained in an unharvested residual patch (≥20 m radius).

- To the extent practical and feasible, avoid constructing new roads, landings, forestry aggregate pits, and wood storage yards within 20 m of inactive nests of the broad-winged hawk, merlin, and sharp-shinned hawk or other **small** inactive nests if species unknown.

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
Barred owl	Mar 15 – Jul 15	Mar 1 – Jul 15	Feb 15 – Jul 15
Broad-winged hawk	Apr 15 – Aug 15	Apr 15 – Aug 15	Apr 1 – Aug 15
Common raven	Mar 1 – Jun 30	Feb 15 – Jun 30	Feb 1 – Jun 30
Cooper's hawk	Apr 15 – Jul 31	Apr 1 – Jul 31	Mar 15 – Jul 31
Great horned owl	Mar 1 – Jun 30	Feb 15 – Jun 30	Feb 1 – Jun 30
Long-eared owl	Apr 15 – Jul 31	Apr 1 – Jul 31	Mar 15 – Jul 15
Merlin	Apr 15 – Aug 15	Apr 15 – Aug 15	Apr 1 – Aug 15
Red-tailed hawk	Apr 1 – Jul 31	Mar 15 – Jul 31	Mar 1 – Jul 31
Sharp-shinned hawk	Apr 15 – Aug 15	Apr 1 – Aug 15	Mar 15 – Aug 15

*Local knowledge of breeding chronology may be used to adjust these dates.

Large nest is about the size of a large pick-up truck tire.

Small nest is about the size of a compact car tire.

4.2.2.6 Common cavity-nesting raptors

Direction is provided for cavity nests that have been recently occupied by the American kestrel, barred owl, boreal owl, eastern screech-owl, great horned owl, northern hawk owl, northern saw-whet owl (active nests). Direction is also provided for cavity nests that have been recently occupied but were last used by one of these species (inactive nests).

If a cavity nest is no longer usable because the tree has fallen down or has become otherwise unsuitable for nesting, treat as a value that no longer exists.

i) Active American kestrel, barred owl, boreal owl, eastern screech-owl, great horned owl, northern hawk owl, or northern saw-whet owl cavity nests

Description of value

Active cavity nests occupied by the American kestrel, barred owl, boreal owl, eastern screech-owl, great horned owl, northern hawk owl, or northern saw-whet owl at least once within the past 5 years (not documented as unoccupied for ≥3 consecutive years).

The tree containing the cavity nest and the area within the following radius comprise the AOC:

- Barred owl: 100 m
- Great horned owl: 50 m
- American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl: 25 m.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and:
    - Cavity nest trees will be retained
    - Harvest not permitted within 20 m of active cavity nests of barred owl or great horned owl.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied cavity nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary

circumstances as specifically identified and justified through the FMP AOC planning process:
    - For barred owl and great horned owl:
        - 100 m for high potential impact operations
        - 50 m for moderate or low potential impact operations.
    - For American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl:
        - 25 m for high, moderate, and low potential impact operations.

Best management practices

- Cavity nest trees used by American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl that are a potential safety risk should be retained in an unharvested patch (≥20 m radius).

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- New roads and landings are not permitted within 20 m of active cavity nests of the barred owl or great horned owl except in extraordinary circumstances or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- Operations associated with roads and landings are not permitted within the following distance of occupied active cavity nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - For barred owl:
        - 100 m for high potential impact operations
        - 50 m for moderate potential impact operations
        - 25 m of low potential impact operations.
    - For great horned owl:
        - 50 m for high potential impact operations
        - 25 m for moderate and low potential impact operations.
    - For American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl:
        - 25 m for high, moderate, and low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- To the extent practical and feasible, avoid constructing new roads and landings within 20 m of active cavity nests of the American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 20 m of active cavity nests of the barred owl or great horned owl except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied cavity nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - For barred owl:
        - 100 m for high potential impact operations
        - 50 m for moderate potential impact operations
        - 25 m of low potential impact operations.
    - For great horned owl:
        - 50 m for high potential impact operations
        - 25 m for moderate and low potential impact operations.
    - For American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl:
        - 25 m for high, moderate, and low potential impact operations.

Best management practices

- To the extent practical and feasible, avoid constructing new forestry aggregate pits and wood storage yards within 20 m of active cavity nests of the American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl.

ii) Inactive American kestrel, barred owl, boreal owl, eastern screech-owl, great horned owl, northern hawk owl, or northern saw-whet owl cavity nests

Description of value

Cavity nests occupied by the American kestrel, barred owl, boreal owl, eastern screech-owl, great horned owl, northern hawk owl, or northern saw-whet owl, but not within the past 5 years.

Cavity nests occupied by the American kestrel, barred owl, boreal owl, eastern screech-owl, great horned owl, northern hawk owl, or northern saw-whet owl within the past 5 years but unoccupied for ≥3 consecutive years.

Conditions on regular operations, roads, landings, forestry aggregate pits, and wood storage yards

Standards

- Harvest, renewal, and tending operations are permitted subject to the following restrictions:
    - Cavity nest trees will be retained
    - Harvest not permitted within 20 m of inactive cavity nests of barred owl or great horned owl.

Guidelines

- New roads, landings, forestry aggregate pits, and wood storage yards are not permitted within 20 m of inactive cavity nests of the barred owl or great horned owl unless approved by the Ministry (see Appendix 1b) or constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical/feasible and does not exceed 20 m.

- No timing restriction on operations associated with roads, landings, forestry aggregate pits, and wood storage yards around unoccupied cavity nests/communal roosts.

Best management practices

- Cavity nest trees used by American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl that are a potential safety risk should be retained in an unharvested residual patch (≥20 m radius).

- To the extent practical and feasible, avoid constructing new roads, landings, forestry aggregate pits, and wood storage yards within 20 m of inactive cavity nests of the American kestrel, boreal owl, eastern screech-owl, northern hawk owl, or northern saw-whet owl.

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
American kestrel	Apr 15 – Mar 15	Apr 1 – Aug 15	Mar 15 – Aug 15
Barred owl	Mar 15 – Jul 15	Mar 1 – Jul 15	Feb 15 – Jul 15
Boreal owl	Apr 15 – Jul 15	Apr 15 – Jul 15	unlikely to be nesting in BCR 13
Eastern screech owl	unlikely to be nesting in BCR 8	Mar 15 – Jul 31	Mar 1 – Jul 31
Great horned owl	Mar 1 – Jun 30	Feb 15 – Jun 30	Feb 1 – Jun 30
Northern hawk owl	Apr 1 – Jul 31	Mar 15 – Jul 31	Mar 15 – Jul 31
Norther saw-whet owl	Apr 1 – Jul 31	Mar 5 – Jul 31	Mar 1 – Jul 31

*Local knowledge of breeding chronology may be used to adjust these dates.

4.2.2.7 Ground-nesting raptors

Direction is provided for ground nests that are occupied by the northern harrier or short-eared owl. Direction focuses on mitigating potential disturbance of nesting birds.

i) Active northern harrier or short-eared owl ground nests

Description of value

Ground nests occupied by the northern harrier or short-eared owl and the area within 50 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Regular harvest, renewal, and tending operations are permitted with timing restrictions (see below).

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied ground nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 50 m for high potential impact operations

- 25 m for moderate or low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- Operations associated with roads and landings are not permitted within the following distance of occupied ground nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 50 m for high potential impact operations
  - 25 m for moderate or low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied ground nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
  - 50 m for high potential impact operations
  - 25 m for moderate or low potential impact operations.

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
Northern harrier	May 1 – Jul 31	Apr 15 – Jul 31	Apr 1 – Jul 31
Short-eared owl	Apr 15 – Jul 15	Apr 1 – Jul 15	Mar 15 – Jul 15

*Local knowledge of breeding chronology may be used to adjust these dates.

4.2.2.8 Forest-nesting birds not covered by direction in previous sections

Direction is provided for occupied nests of protected species (i.e., those addressed by the MBCA or FWCA) that are not covered in Sections 4.2.2.1 to 4.2.2.7.

Direction largely focuses on protecting occupied nests from destruction and mitigating disturbance of nesting birds.

i) Active trumpeter swan nests

Description of value

Active nests occupied at least once within the past 10 years.

The nest and the area within 400 m comprise the AOC.

Operational prescription for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted subject to timing restrictions (see below) and the following condition: residual forest will be retained within portions of the shoreline AOC associated with the HPS or LPS water feature containing the nest site that fall within the nest site AOC.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 400 m for high potential impact operations
    - 200 m for moderate potential impact operations
    - 100 m of low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- New roads and landings are not permitted within 200 m of active nests except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 400 m for high potential impact operations
    - 200 m for moderate potential impact operations
    - 100 m of low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Best management practices

- When practical and feasible, avoid constructing new roads and landings within 201-400 m of active nests.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 200 m of active nests.

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 400 m for high potential impact operations
    - 200 m for moderate potential impact operations
    - 100 m of low potential impact operations.

Best management practices

- When practical and feasible, avoid constructing new forestry aggregate pits and wood storage yards within 201-400 m of active nests.

ii) Active Canada goose or sandhill crane nests

Description of value

Nests occupied by Canada goose or sandhill crane and the area within 50 m radius comprise the AOC.

Operational prescription for the area of concern

Standards

- Regular harvest, renewal, and tending operations are permitted with timing restrictions (see below).

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 50 m for high potential impact operations
    - 25 m for moderate or low potential impact operations.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- Operations associated with roads and landings are not permitted within the following distance of occupied nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 50 m for high potential impact operations
    - 25 m for moderate or low potential impact operations.

  However, there is no timing restriction on hauling or low potential impact road maintenance operations (e.g., grading) if the road predates the nest.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the following distance of occupied active nests during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process:
    - 50 m for high potential impact operations
    - 25 m for moderate or low potential impact operations.

iii) Active barn swallow nests

The following direction is provided for barn swallow and its nest sites. Other components of barn swallow habitat are addressed by the coarse filter direction in the Boreal and Great Lakes – St. Lawrence Landscape Guides (see discussion in Background and Rationale for Direction). Barn swallows are found in open areas throughout the managed forest. Nesting sites may include bridges and culverts.

See *Best Management Practices for Excluding Barn Swallows and Chimney Swifts from Buildings and Structures* (OMNRF 2017).

Description of value

Nests **known** or **suspected** to be or have been occupied by barn swallows and the area within a radius of 20 m comprise the AOC.

Nests are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the AOC.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- If operations that will remove, damage, or destroy nests or adversely alter the supporting structure are planned to take place during the **critical breeding period**, the following condition applies:
    - Measures must be in place before the **critical breeding period** to prevent barn swallows from accessing existing nests and/or any part of the supporting structure that is being altered by the planned operations.

- Any moderate or high impact operations (see Appendix 4.2) associated with existing roads are not permitted during the **critical breeding period** if nests are occupied**,** except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process. However, there is no timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading).

Notes

Nests **known** to be or have been occupied are those at which breeding activity has been confirmed. Nests **suspected** to be or have been occupied are those at which breeding activity has not been confirmed, but for which there is compelling evidence of current or previous use (e.g., presence of recognizable barn swallow nests).

The **critical breeding period** is May 1-August 31. Local knowledge of breeding chronology may be used to adjust these dates.

iv) Active eastern whip-poor-will nests

Description of value

A 12.5 ha polygon of suitable habitat OR suitable habitat within a 200 m radius of reliable observations of eastern whip-poor-will breeding evidence reported within the past 10 years comprises the AOC, unless documented as unoccupied for 4 consecutive years, in which case the nest is considered inactive.

The Ministry will situate the AOC to encompass a mosaic of habitats suitable for nesting, roosting, and foraging. The AOC shall encompass all known or suspected whip-poor-will nesting, roosting sites and foraging area within a single breeding territory. Suitable habitat typically includes forest with sparse (<25%) to moderate tree cover (25-75%) and open habitat. Whip-poor-will have an affinity for rocky barren areas and open wetlands for foraging habitat. For roosting and nesting habitat, they prefer patches of forest cover such as closed canopy with open understory.

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
  - Retain a minimum of 20% residual forest to provide nesting and roosting habitat. Harvest that retains residual forest is generally restricted to commercial thinning, shelterwood preparatory and regeneration cuts, and single tree selection harvest. No harvest is permitted if initial canopy closure is <50%.
  - In clearcuts and final shelterwood cuts, retain a minimum of 20% residual forest in patches ≥30 m in radius that will provide nesting and roosting habitat
  - Wildlife trees and downed woody material will be retained as per direction in Sections 3.2.3.1 and 3.2.3.2, respectively
  - Nests encountered during operations will be retained in an unharvested residual patch ≥50 m in radius

- Non-mechanical renewal operations are permitted during the **critical breeding period** (e.g., hand planting).

Guidelines

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following condition:
  - Mechanical renewal and tending operations are only permitted outside of the critical breeding period, except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process Harvest operations are not permitted during the **critical breeding period,** except in extraordinary circumstances as specifically identified and justified through the FMP AOC approval process.

Best management practices

- When local populations (e.g., more than one singing male) are detected, blocks should be deferred and additional surveys should be conducted.

Conditions on primary and branch roads and landings (planned or existing) Conditions on operational roads and landings (planned or existing)

Standards

- Operations associated with existing roads or landings that result in the removal of vegetation are not permitted during the **critical breeding period**.

Guidelines

- New roads and associated landings are not permitted within the AOC, unless with Ministry approval (see Appendix 1b), subject to the following condition:
  - New roads and landings will be constructed outside the **critical breeding period.**

Best management practices

- To the extent practical and feasible, operations associated with existing roads or landings will be conducted during daylight during the **critical breeding period**. Check local sunrise and sunset times.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Operations associated with existing forestry aggregate pits and wood storage yards that result in the removal of vegetation or increasing the footprint are not permitted during the **critical breeding period**.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the AOC, unless with Ministry approval (see Appendix 1b), subject to the following condition:
  - New forestry aggregate pits will be constructed outside the **critical breeding period.**

Best management practices

- To the extent practical and feasible, operations associated with existing forestry aggregate pits and wood storage yards will be conducted during daylight during the **critical breeding period**. Check local sunrise and sunset times.

Notes

The **critical breeding period** is May 15-July 31. Local knowledge of breeding chronology may be used to adjust these dates.

v) Active nests occupied by other protected birds

Description of value

Nests occupied (i.e., to contain adults, eggs, or young) by birds (except American crow, brown-headed cowbird, common grackle, house sparrow, red-winged blackbird, and European starling) not already addressed by AOC direction.

Conditions on regular operations, roads, landings, forestry aggregate pits, and wood storage yards

Standards

- Harvest, renewal, and tending operations are not permitted within the following distance of occupied nests:
  - Nest not in cavity:
    - 10 m for species robin-sized and larger
    - 5 m for species smaller than a robin.
  - Nest in cavity:
    - 5 m for species robin-sized and larger
    - 0 m (but retain tree with cavity) for species smaller than a robin.

Guidelines

- Operations associated with roads, landings, forestry aggregate pits, and wood storage yards are not permitted within similar distances of occupied nests unless

the operation will not physically disturb the nest and its contents and there is compelling evidence to suggest habituation to the activity (e.g., nest built next to an existing road with existing traffic flow).

Notes

The **critical breeding period** is defined by Bird Conservation Region (BCR):

Species	BCR 8*	BCR 12*	BCR 13*
Canada goose	Apr 15 – June 30	Apr 1 – June 30	Mar 15 – June 30
Sandhill crane	Apr 15 – Jul 15	Apr 1 – Jul 15	Mar 15 – Jul 15
Trumpeter swan	Apr 1 – Jul 15	Mar 15 – Jul 15	Mar 1 – Jul 15

*Local knowledge of breeding chronology may be used to adjust these dates.

4.2.3 Beaver habitat

The Beaver is widely considered to be a keystone species; the mosaic of habitat conditions (newly flooded ponds, stagnant ponds, de-watered ponds, and beaver meadows) it creates across watersheds leads to increased species richness of both plants and animals. Beaver ponds are especially important habitat for a variety of dabbling ducks of conservation concern, such as American black ducks. While beaver activity is often viewed as detrimental to cold water sport fish, beaver ponds may actually provide important fish habitat; research suggests that the productivity and diversity of fish communities in headwater streams is associated with the mosaic of beaver ponds found in various stages of succession.

Beavers feed on a wide range of herbaceous and woody vegetation, but the supply of preferred woody vegetation that can be cached for winter feeding may be limiting. As beavers feed selectively on woody vegetation in the riparian zone, they remove preferred forage species such as trembling aspen, gradually causing an increase in the amount of less palatable and more shade tolerant woody plants such as balsam fir. As food supply is exhausted, beavers may abandon a pond, beginning the phase of pond de-watering and beaver meadow creation. Abandoned ponds may eventually be reoccupied but since preferred forage species are shade intolerant, some significant disturbance such as fire or timber harvest may be required to rejuvenate food supply. However, fire suppression activities and past practices that routinely retained unharvested forest around beaver ponds have led to a growing concern that beavers and beaver pond habitats may be declining, at least in some parts of the province.

Direction

Direction in Section 4.1.1 promotes some management of shoreline forest adjacent to all lakes and ponds and is thus generally beneficial for beavers. Additional direction for beaver ponds or beaver meadows requiring special management (as identified by the

Ministry or local trappers) focuses on managing shoreline forest to maximize regeneration of beaver food supply (primarily trembling aspen).

Beaver ponds and beaver meadows requiring special management to regenerate food supply are addressed through operational prescriptions and conditions for AOCs.

Direction (i.e., operational prescription and conditions on roads, landings, forestry aggregate pits, and wood storage yards) for the aquatic features associated with these values apply (see Section 4.1).

Description of value

Beaver ponds and beaver meadows identified by the Ministry or local trappers that require special management to regenerate food supply.

Operational prescription for the area of concern

Guidelines

- Harvest, renewal, and tending operations within the AOC will promote establishment or perpetuation of intolerant hardwood or mixedwood forest units, to the extent practical and feasible, unless inconsistent with other ecological objectives.

Best management practices

- For clearcut silviculture system:
    - In the AOC, as much of the shoreline forest should be clearcut to the edge of water as is practical and feasible, considering residual forest requirements in Section 4.1. Clearcut portions of the AOC should ideally be ≥200 m long and within 50 m of water.
    - When clearcutting, shoreline forest with >10% trembling aspen (or other intolerant hardwoods) in the overstory, limited conifer advanced regeneration in the understory, and on low slopes should be targeted.
    - Conifer advanced regeneration (especially balsam fir) should be removed to the extent practical and feasible. Use of prescribed fire should be considered.
    - Aerial or machine-based ground application of herbicides should not be conducted within 50 m of the beaver pond or beaver meadow (applies to shorelines where regenerating hardwoods will be accessible to beavers).

- For selection and shelterwood silviculture systems:
    - In the AOC, small clearcuts or large group openings in patches of intolerant hardwood, mixedwood, other conifer, or poor quality pine or hardwood shoreline forest should be created whenever practical and

feasible, considering residual forest requirements in Section 4.1. Openings should be >0.1 ha in size (ideally >0.2 ha) and within 50 m of the pond.

4.2.4 Moose aquatic feeding areas and mineral licks

In early summer, moose frequent aquatic habitats where they forage on submerged and floating aquatic plants that are rich in sodium. These moose aquatic feeding areas (MAFAs) are typically associated with shallow lakes, slow-moving rivers, shallow bays of deep lakes, and beaver ponds. Moose may also meet some of their annual sodium requirements by consuming muddy water found in mineral-rich springs, called mineral licks.

Mineral licks and MAFAs are important components of habitat for moose. Forest management practices have the potential to alter shoreline forest that provides access routes, thermal cover, and visual screening.

Direction

MAFAs are typically associated with lakes, ponds, rivers, or streams; standards and guidelines for these aquatic feature associated with the MAFA apply (Section 4.1.1 or 4.1.2). There is no additional AOC associated with MAFAs. However, direction in Sections 4.1.1 and 4.1.2 specifies that residual shoreline forest will be retained preferentially adjacent to MAFAs, especially in specific areas (e.g., LLPs) identified for enhanced moose management (see Section 3.3.2) (preferential retention of residual shoreline forest adjacent to MAFAs is not required in areas managed for woodland caribou; see the Boreal Landscape Guide for direction related to woodland caribou). MAFAs are also discussed in Section 3.3.2; their presence may be used to select for retention of habitat providing summer thermal cover within areas of enhanced management for moose. Direction for selecting residual forest with the greatest effect on the suitability of MAFAs is provided below and focuses on maintaining residual shoreline forest adjacent to MAFAs to provide access routes and visual screening.

Mineral licks are addressed through operational prescriptions and conditions for AOCs. Direction to maintain suitability of mineral licks is described below and focuses on restricting operations around mineral licks to protect the hydrological integrity of the lick, provide thermal cover, and screen moose from disturbance.

i) Moose aquatic feeding areas

Description of value

Known class 2, 3, and 4 MAFAs (based on the methodology described by Ranta 1998) identified prior to operations.

Operational prescription for the area of concern

Best management practices

- Residual shoreline forest should be retained preferentially when it:
    - Is adjacent to higher quality MAFAs (i.e., class 4 MAFAs are better than class 3 MAFAs which are better than class 2 MAFAs),
    - Is adjacent to larger MAFAs (i.e., MAFAs >8 ha are better than MAFAs 4-8 ha which are better than MAFAs <4 ha),
    - Is adjacent to MAFAs without features that restrict access such as steep terrain,
    - Will provide screening from roads,
    - Connects MAFAs to other residual forest (especially identified patches of summer thermal shelter; see Section 3.3.2) and/or travel corridors, or
    - Minimizes the distance between the aquatic vegetation and cover.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Best management practices

- Roads should be planned and constructed to avoid high quality MAFAs (e.g. roads should be ≥100 m away from MAFAs ranked 3 or 4 that are ≥4 ha in size).

ii) Mineral licks

Description of value

Natural mineral licks known or encountered during operations. Excludes mineral licks created by salt accumulation along roadways.

The mineral lick and the area within 120 m (measured from the edge of woody vegetation averaging at least 2 m tall and with ≥25% canopy cover) comprise the AOC.

Operational prescription for the area of concern

Standards

- No harvest, renewal, or tending operations are permitted within the AOC.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- Operations associated with existing roads are permitted within the AOC.

Guidelines

- New roads and landings are not permitted within the AOC except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Operations associated with existing forestry aggregate pits and wood storage yards are permitted within the AOC.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the AOC except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

4.2.5 Dens

Within the managed forest, a variety of species utilize dens as sites for reproduction and/or hibernation. For example, black bears use dens as hibernation sites. Cubs are also born within dens during the hibernation period. Black bears may use a wide variety of structures as dens, from hollow trees and logs to caves. However, throughout most of the managed forest, dens are excavated into a mound or brush pile or under the root-mass of a fallen tree. Dens are rarely reused.

Other furbearing mammals that use dens for reproduction include the beaver, American marten, bobcat, coyote, fisher, least weasel, long-tailed weasel, lynx, mink, muskrat, raccoon, red fox, red squirrel, river otter, short-tailed weasel, and striped skunk. There is very little information on the effects of forest management operations on dens or their use. However, human activities within the vicinity of dens have been shown to affect use by some species. Moreover, the FWCA prohibits intentional damage or destruction of dens of black bears and other furbearing mammals, other than foxes (the gray fox is a species at risk), and skunks.

Direction for dens used by species at risk, including the gray fox, eastern wolf, and wolverine can be found in Section 4.3. The direction for grey wolf, which is not a species at risk, is the same as the direction for the eastern wolf and can be found in a single prescription for wolves in Section 4.3.

Direction

Dens known or suspected (with a high degree of certainty) to be or have been occupied by black bears are addressed through an AOC operational prescription and conditions because dens belonging black bears are explicitly protected by the FWCA. An AOC operational prescription and conditions are also provided around cougar den sites to minimize disturbance. Dens of other furbearing mammals (excluding red foxes and skunks) are addressed by conditions on operations. Direction for dens of black bears and other furbearing mammals (excluding red foxes and skunks) is described below and focuses on:

- Minimizing disturbance of animals using dens
- Maintaining den structures
- Maintaining suitability of habitat immediately surrounding dens for those sites likely to be traditionally used.

Direction applies to occupied dens known before, or found during, operations.

i) Black bear dens

Description of value

- Dens known or suspected to contain one or more hibernating black bears.

- The den and the area within 100 m (centred on the den entrance) comprise the AOC.

Operational Prescription for the area of concern

Standards

- Regular harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below).

Guidelines

- Harvest, renewal, and tending operations involving heavy equipment are not permitted within the AOC during the **denning period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Other harvest, renewal, and tending operations that might potentially disturb denning bears are not permitted within the AOC during the first 4 weeks of the **denning period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- Road construction is not permitted within the AOC during the **denning period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Hauling and road maintenance operations are not permitted within the AOC during the **denning period**, unless the road predates the den, is required for safety reasons or environmental protection, or except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- Aggregate extraction and operations associated with wood storage yards are not permitted within the AOC during the **denning period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

ii) Cougar den sites

Description of value

Den sites known or **suspected** (with a high degree of certainty) to have been occupied by cougars and the area within a radius of 200 m comprise the AOC.

Dens are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within 20 m of the den entrance.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the AOC during the **denning period** if dens are **occupied**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are permitted within the AOC subject to the following condition:
    - New roads and landings are not permitted within 20 m of the den entrance

Guidelines

- New roads and landings are permitted within the AOC subject to the following condition:
    - Construction of new roads and landings is not permitted within the AOC during the **denning period** if dens are **occupied**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Forestry-related traffic and road maintenance operations are not permitted within 100 m of **occupied** dens during the **denning period** unless the road predates the den or except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are permitted within the AOC subject to the following condition:
    - New forestry aggregate pits and wood storage yards are not permitted within 20 m of the den entrance

Guidelines

- New forestry aggregate pits and wood storage yards are permitted within the AOC subject to the following condition:
    - Construction of new forestry aggregate pits and wood storage yards is not permitted within the AOC during the **denning period** if dens are **occupied**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **denning period** if dens are **occupied**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Notes

Kittens are typically born between April and September, but **occupied** dens may be located at any time of year. Thus, the **denning period** is potentially different for each **occupied** den encountered and is considered to extend for 8 weeks from the date an **occupied** den is located, or until a den is known to be no longer **occupied**.

Den sites **suspected** to be or have been occupied, are those at which animal presence has not been confirmed, but for which there is compelling evidence of current or previous use (e.g., presence of scat, gnawed bones, hair).

iii) Dens of furbearing mammals in enduring features

Description of value

Dens in caves, excavated burrows, under large piles of coarse woody material, or other enduring features that are known to have been occupied by furbearing mammals (other than red foxes, skunks, wolves, and wolverines) at least once within the past 5 years.

Conditions on regular operations

Standards

- Harvest, renewal, and tending operations are not permitted within 20 m of the den entrance.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within 20 m of the den entrance.

Guidelines

- Road construction is not permitted within 20 m of occupied dens, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Hauling and road maintenance operations are not permitted within 20 m of occupied dens unless the road predates the den, is required for safety reasons or environmental protection, or except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 20 m of the den entrance.

Guidelines

- Aggregate extraction and operations associated with wood storage yards are not permitted within 20 m of occupied dens, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

iv) Dens of furbearing mammals in transitory features

Description of value

Dens in tree cavities, hollow logs, brush piles, or other transitory features that are known to be occupied by furbearing mammals (other than red foxes, skunks, wolves, and wolverines) and that are encountered during operations.

Conditions on regular operations

Standards

- Known occupied dens encountered during operations will not be **destroyed**.

Guidelines

- Minimize **disturbance** of furbearers occupying known dens encountered during operations.

Best management practices

- Harvest, renewal, and tending operations should be avoided within 3 m of dens known to be occupied. Specifically,
    - Trees should be retained within 3 m of dens known to be occupied (patch may be counted as a clump of wildlife trees)
    - Trees should not be felled into the area within 3 m of dens known to be occupied

- Heavy equipment should not travel within 3 m of dens known to be occupied.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Best management practices

- New roads and landings should not be constructed within 3 m of dens known to be occupied.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Best management practices

- New forestry aggregate pits and wood storage yards should not be constructed within 3 m of dens known to be occupied.

Notes

Denning period for black bears generally lasts from October 15 to April 30, but exact dates vary depending on a variety of factors including latitude and weather. Local knowledge of denning chronology may be used to adjust these dates.

Destroyed in this context, means the complete or partial damage of the den structure or its contents (i.e., adults or young).

Disturbance in this context, means the incidental interference with significant life history activities associated with the den (e.g., whelping or raising of young).

4.2.6 Other species/habitat not covered by direction in previous sections

Direction for maintaining or enhancing the suitability of species-specific habitat for the West Virginia white and five-lined skink is provided in this section. The West Virginia white is a butterfly of mature, moist, rich hardwood forest with broad-leaved toothwort in the understory (critical for larval development). Primary threats appear to be loss or fragmentation of suitable habitat and loss of toothwort to competition from invasive garlic mustard. Selection harvesting may be acceptable as long as toothwort is not negatively affected by soil disturbance and roads do not create movement barriers. Species-specific direction is prescribed below.

Direction is also included for Ontario's only lizard, the five-lined skink, and.focuses on minimizing impacts on the five-lined skinks and known nesting sites. The five-lined skink is found along the southern edge of the managed forest. However, it typically inhabits non-forested habitats; main threats are thought to be cottage and shoreline development.

i) West Virginia white

Description of value

Suitable habitat occupied by the West Virginia white at least once within the past 10 years and either:

- The area within a distance of 30 m above the high-water mark of permanent streams or 10 m above the high-water mark of intermittent streams, as delineated through field survey, or
- As delineated through field survey.

Delineated habitat comprises the AOC.

Occupied habitats are considered polygonal features.

Operational prescription and conditions for the area of concern

Standards

- Selection harvest is permitted within the AOC subject to timing restrictions (see notes below); other types of harvest are not permitted within the AOC (see also direction in Section 4.1.2).

- Renewal and tending operations are permitted within the AOC subject to timing restrictions (see notes below).

- All equipment will be thoroughly washed before use in the AOC when there is a risk of introducing garlic mustard.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the AOC during the **frost-free period** except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on primary roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within the AOC.

Guidelines

- No timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading).

Best management practices

- Use water as a dust suppressant on roads and landings.

Conditions on branch and operational roads and landings (planned or existing)

Guidelines

- New roads and landings are not permitted within the AOC, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process provided the cleared right-of-way will not exceed 15 m for operational roads and 20 m for branch roads.

- No timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading).

Best management practices

- Use water as a dust suppressant on roads and landings.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Notes

Frost-free period is defined as April 1-December 31. Local knowledge may be used to adjust these dates to ensure operations will not be conducted when there is a significant risk of soil disturbance.

ii) Five-lined skink nesting sites

Description of value

Nesting sites known to have been used by five-lined skink within the past 5 years and the area within a radius of 30 m comprise the AOC.

Nesting sites are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the AOC.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within the AOC.

Guidelines

- Operations associated with existing roads and landings are not permitted within the AOC during the **active season** unless with Ministry approval (see Appendix 1b), including the following conditions:
    - During road maintenance operations, roads within the AOC will be clearly identified using flagging tape, signs, or other visual markers
    - Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **active season** unless with Ministry approval (see Appendix 1b).

Notes

Active season is April 15-October 15. Local knowledge may be used to adjust these dates.

4.3 Protection of species at risk

There are over 60 species (or species' populations) inhabiting the managed forest that are currently listed as species at risk.

In Ontario, species at risk are protected under the provisions of several pieces of legislation and policies. The *Crown Forest Sustainability Act* was amended in 2025 to include S. 47.1 which excludes persons conducting forest operations, in a Crown forest in accordance with an approved forest management plan, from subsection 16 (1) or (2) of the *Species Conservation Act, 2025*, provided they are conducted on behalf of the Crown or under the authority of a forest resource licence.. As well, many species are either listed as Specially Protected Wildlife in schedules under the *Fish and Wildlife Conservation Act, 1997*, or are directly or indirectly addressed by the federal *Species at Risk Act, 2002, Fisheries Act, 1985*, or *Migratory Birds Convention Act, 1994*.

In the following sections, direction is provided for species at risk that occur within the managed forest, that may be negatively affected by forest management operations, and may not be fully addressed by direction within the Landscape Guides, or other sections of this guide. There are some species at risk that occur in the managed forest for which there is no species-specific direction in this guide, see Background and Rationale document.

The direction applies to reliable observations and in some cases known or suspected occurrences (with a high degree of certainty). Historical sightings and those with low positional accuracy should be a high priority for resurvey and confirmation.

With respect to forest management operations, this guide provides science-based information and direction for species within the managed forest that have been designated as endangered or threatened species at risk under the *Species Conservation Act, 2025* of the federal *Species at Risk Act, 2002*. The direction in this guide is intended to minimize the risk that forest management operations may incidentally impact species at risk.

The Committee on the Status of Species at Risk in Ontario (COSSARO) assesses and classifies species based on the best available scientific information (including community knowledge and Indigenous knowledge). The priority list of species to be assessed and classified by COSSARO is available through their website (https://cossaroagency.ca/stay-informed). A report reflecting new classifications is submitted annually by COSSARO, to the Minister of Environment Conservation and Parks,. The Protected Species in Ontario List is amended at the discretion of the government.

The Species Conservation Act, 2025 removed duplication with the federal *Species at Risk Act* by not listing or protecting fish species and migratory birds, as they are protected federally.

The federal *Species at Risk Act*, 2002, established the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as an advisory body. Each year it meets to assign risk categories for all native species included in its mandate. There is a subcommittee to ensure the inclusion of Aboriginal Traditional Knowledge into the COSEWIC status assessment process. The government of Canada takes COSEWIC designations into consideration when establishing the official list of wildlife species at risk. The candidate wildlife species to be assessed and classified by COSEWIC is available through their website (https://cosewic.ca/index.php/en/reports/candidate-wildlife-species.html).

Planning teams may choose to identify other species classified as at risk or some rare species (e.g., those classified as S1 to S3 by the Natural Heritage Information Centre) that are not listed as species at risk, or otherwise addressed in this guide, as locally featured if forest management operations have the potential to adversely affect population viability. Direction for these species (see Section 3.2.1) should be developed in consultation with regional or provincial species experts as per the FMPM.

4.3.1 Non-woody plants

There are a number of species of non-woody plants listed at risk which occur within the managed forest. Direction is provided below for American ginseng, found within the Great Lakes-St. Lawrence forest region, and wetland plants including branched bartonia, small white lady's-slipper, and eastern prairie fringed-orchid.

American ginseng is an at risk plant that inhabits rich, moist areas in relatively undisturbed mature tolerant hardwood forest in the southern portions of the Great Lakes-St. Lawrence forest region. Illegal harvesting of the plants themselves is a principal threat. New roads may increase access and thus vulnerability to illegal plant harvest. Tree harvest operations that change canopy cover or disturb the forest floor may negatively alter habitat.

A number of the non-woody plants are generally not found in forested habitats but could be affected by some forest management operations (primarily road construction). Three species are found in wetland habitats such as fens and bogs (branched bartonia, eastern prairie fringed-orchid), or marshes (small white lady's-slipper) within the managed forest. Direction below focuses on minimizing disturbance to the ecosystems containing these species. Forest management practices that encourage a natural cycle of beaver pond establishment, abandonment, and renewal are likely beneficial to these species. Branched bartonia, small white lady's-slipper, and/or eastern prairie fringed-orchid and their habitats are frequently components of provincially significant wetlands.

Section 4.1.3 provides direction for provincially significant wetlands to minimize adverse effects on these species, in addition to direction that addresses road construction.

Natural grasslands may also provide habitat for eastern prairie fringed-orchid and small white lady's-slipper orchid. The supply of natural grassland habitats is much reduced from the period prior to European settlement, and accounts for a very small percentage of the managed forest. Small remnant patches remain scattered across the southern portion of northwestern Ontario and in a few isolated locations along the edge of the managed forest in southern Ontario. The natural grassland areas are not generally impacted by forest management activities.

Direction

Direction for American ginseng focuses on identifying and protecting patches known before, or encountered during, operations in tolerant hardwood forest in the southern portion of the managed forest. Plants separated by no more than 20 m constitute a 'patch'. Patches are addressed through operational prescriptions and conditions for AOCs. Direction is described below and focuses on:

- Minimizing access for illegal collectors (for American ginseng)
- Maintaining high canopy cover
- Minimizing disturbance of the forest floor.

Since harvest of plants is a principal threat to American ginseng populations, information on the location and population status will remain confidential. See the FIM and the associated technical specifications for a discussion of the treatment of classified values information.

Direction is provided for large and small patches of American ginseng and its habitat.

i) American ginseng large patches

Description of value

American ginseng patches are considered polygonal features.

AOC is comprised of a patch of ≥30 American ginseng plants and the area within a distance of 100 m from the patch boundary.

American ginseng patches and modified management zones to be delineated by the Ministry, include individual American ginseng plants separated by ≤20 m.

The delineated patch is a reserve.

The area within:

- 0-10 m of a large ginseng patch comprises Modified Management Zone 1 (MMZ1)
- 11-60 m of a large ginseng patch comprises Modified Management Zone 2 (MMZ2)
- 61-100 m of a large ginseng patch comprises Modified Management Zone 3 (MMZ3).

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the delineated ginseng patch.

- Trees will not be felled into the patch. Trees accidentally felled into the patch will be left where they fall.

- Can reach into MMZ1 from outside and remove trees, felling them away from the patch with the following conditions:
  - No machine travel or cable skidding within MMZ1
  - Single tree selection harvesting only
  - Maintain ≥70% (dominant and co-dominant trees) uniform canopy cover within MMZ1.

- Harvest, renewal, and tending operations within MMZ2 are subject to the following conditions:
  - Harvest, renewal, and tending operations will be conducted in a manner that minimizes site disturbance. Operations within MMZ2 will not:
    - Exceed 2% coverage of ruts
    - Exceed 10% coverage of extraction trails
    - Leave ruts or a significant area of exposed mineral soil. Ruts and significant areas of exposed mineral soil will be promptly rehabilitated without adversely affecting ginseng plant habitat suitability
    - Mechanical site preparation is not permitted within MMZ2.
  - Only hand-based application of herbicides is permitted in MMZ2 following ginseng senescence.

- Markings associated with the delineation of large patches of American ginseng plants that might attract illegal collectors will be removed or hidden upon completion of operations.

Guidelines

- Harvest, renewal, and tending operations within MMZ2 are subject to the following conditions:

- Harvest that retains a relatively uniform canopy cover of ≥70% (dominant and co-dominant trees) is permitted within MMZ2. Harvest will normally be restricted to single tree selection.
- Harvest operations will be conducted during the winter, unless with Ministry approval (see Appendix 1b).

Best management practices

- Follow the *Clean Equipment Protocol for Industry* (Halloran et al 2013) when moving equipment from areas where an invasive plant species is known to occur to minimize the risk of transporting and introducing the species to harvest areas adjacent to known American ginseng patches.

Conditions on primary roads and landings (planned or existing)

Standards

- New primary roads and associated landings are not permitted within MMZ1.

- No new landings permitted within MMZ2.

- Forestry-related traffic and maintenance of existing roads are permitted within the AOC subject to the following condition:
  - The footprint of the road will not be increased.

Guidelines

- New primary roads are not permitted within MMZ2 or MMZ3, except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process subject to the following condition:
  - New primary roads are only permitted within MMZ2 or MMZ3 when constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical and feasible and does not exceed 20 m to result in less impact on American ginseng or its habitat.

- Forestry-related traffic and maintenance of existing roads are permitted within the AOC subject to the following condition:
  - Road maintenance is restricted to surface grading or other **low risk** road maintenance operations necessary to maintain safe travel conditions.

- When there are no practical or feasible alternatives within MMZ2, **old landings** may be reused subject to the following conditions:
  - The footprint of the landing will not be increased
  - Gaps associated with landings will be included in the estimation of canopy closure (see above).

- Reuse of **old landings** is permitted within MMZ3.

- In the absence of reusable landings in the AOC, wood may be piled and processed on the road right-of-way (if consistent with Ministry conditions on corridor width and worker and public safety considerations).

Conditions on branch and operational roads and landings (planned or existing)

Standards

- New branch and operational roads and associated landings are not permitted in MMZ1.

- Forestry-related traffic and maintenance of existing roads are permitted within the AOC subject to the following condition:
  - The footprint of the road will not be increased

- No new landings within MMZ1.

Guidelines

- New branch and operational roads are permitted in MMZ2 or MMZ3 with Ministry approval (see Appendix 1b) subject to the following conditions:
  - Canopy gaps associated with new roads will be included in the estimation of canopy closure in MMZ2 (see above)
  - Construct new roads on an existing roadbed (where the vegetation is predominantly <8 m tall) to result in less impact on ginseng or its habitat
  - Construct winter roads unless there is no practical or feasible alternative
  - Roads will be built to minimum standards to mitigate potential impact on ginseng habitat and potential for illegal collection (e.g., right-of-way <10 m, no grubbing, no disruption of hydrological flow, no ditching, locate road as far from ginseng patch as possible)
  - New roads will be promptly decommissioned upon completion of operations unless with Ministry approval (see Appendix 1b).

- Forestry-related traffic and maintenance of existing roads are permitted within the AOC subject to the following conditions:
  - Road maintenance is restricted to surface grading or other **low risk** road maintenance operations necessary to maintain safe travel conditions.

- When there are no practical or feasible alternatives, **old landings** in MMZ2 may be reused subject to the following conditions:
  - The footprint of the landing will not be increased
  - Gaps associated with landings will be included in the estimation of canopy closure (see above).

- Construction of new landings and reuse of **old landings** are permitted within MMZ3.

- In the absence of reusable landings in the AOC, wood may be piled and processed on the road right-of-way (if consistent with Ministry conditions on corridor width and worker and public safety considerations).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within MMZ1 or MMZ2.

Guidelines

- New forestry aggregate pits and wood storage yards are permitted within MMZ3, with Ministry approval (see Appendix 1b) and under the following condition:
    - Cannot be located within suitable habitat (normally includes mature or older deciduous or mixed forest with <50% of the overstory basal area comprised of tolerant or mid-tolerant hardwoods).

- Existing forestry aggregate pits and wood storage yards within MMZ2 or MMZ3 may be reused as long as the footprint of the forestry aggregate pit or wood storage yard will not be increased.

Notes

An **old landing** is any clearly recognizable landing with dominant vegetation generally comprised of shrubs and/or saplings that is predominantly <8 m tall (i.e., not contributing to the overall canopy closure).

Low risk road maintenance operations do not involve machine travel off the roadbed and include grading the travelled portion of the road, topdressing, removal of woody material, and dust suppression.

ii) American ginseng small patches

Description of value

American ginseng patches are considered polygonal features.

AOC is comprised of a patch of <30 American ginseng plants and the area within a distance of 30 m from the patch boundary comprise the AOC.

American ginseng patches and modified management zones to be delineated by the Ministry, include individual American ginseng plants separated by ≤20 m.

The delineated patch is a reserve.

The area within:

- 0-10 m of a small ginseng patch comprises Modified Management Zone 1 (MMZ1).
- 11-30 m of a small ginseng patch comprises Modified Management Zone 2 (MMZ2).

Operational prescription and conditions for the area of concern

Standards

- Trees will not be felled into the patch. Trees accidentally felled into the patch will be left where they fall.

- Can reach into MMZ1 from outside and remove trees, felling them away from the patch with the following conditions:
  - No machine travel or cable skidding within MMZ1
  - Single tree selection only
  - Maintain 70% (dominant and co-dominant trees) uniform canopy cover within the delineated patch.

- Harvest, renewal, and tending operations within MMZ2 are subject to the following conditions:
  - Harvest, renewal and tending operations will be conducted in a manner that minimizes site disturbance. Operations within MMZ2 will not:
    - Exceed 2% coverage of ruts.
    - Exceed 10% coverage of extraction trails.
    - Leave ruts or a significant area of exposed mineral soil. Ruts and significant areas of exposed mineral soil will be promptly rehabilitated without adversely affecting ginseng plant habitat suitability.
    - Mechanical site preparation is not permitted.
  - Only hand-based application of herbicides is permitted in MMZ2 following ginseng senescence.

- Markings associated with the delineation of small patches of American ginseng plants that might attract illegal collectors will be removed or hidden upon completion of operations.

Guidelines

- Harvest, renewal, and tending operations within MMZ2 are subject to the following conditions:
    - Harvest that retains a relatively uniform canopy cover of ≥70% (dominant and co-dominant trees) is permitted within MMZ2. Harvest will normally be restricted to single tree selection
    - Harvest operations will be conducted during the winter, unless with Ministry approval (see Appendix 1b).

Best management practices

- Follow the *Clean Equipment Protocol for Industry* (Halloran et al 2013) when moving equipment from areas where an invasive plant species is known to occur to minimize the risk of transporting and introducing the species to harvest areas adjacent to known American ginseng patches.

Conditions on primary roads and landings (planned or existing)

Standards

- New primary roads and associated landings are not permitted within the AOC.

- Forestry-related traffic and maintenance of existing roads are permitted within the AOC subject to the following condition:
    - The footprint of the road will not be increased.

Guidelines

- Forestry-related traffic and maintenance of existing roads are permitted within the AOC subject to the following condition:
    - Road maintenance is restricted to surface grading or other **low risk** road maintenance operations necessary to maintain safe travel conditions.

Conditions on branch and operational roads and landings (planned or existing)

Standards

- New branch and operational roads are not permitted within MMZ1.

- Forestry-related traffic and maintenance of **existing roads** are permitted within the AOC subject to the following condition:
    - The footprint of the road will not be increased.

- No new landings within AOC.

Guidelines

- New branch and operational roads are permitted in MMZ2 with Ministry approval (see Appendix 1b) subject to the following conditions:
  - Canopy gaps associated with new roads will be included in the estimation of canopy closure (see above)
  - Construct new roads on existing roadbeds (where the vegetation is predominantly <8 m tall) to result in less impact on ginseng or its habitat
  - Construct winter roads unless there is no practical or feasible alternative
  - Roads will be built to minimum standards to mitigate potential impact on ginseng habitat and potential for illegal collection (e.g., right-of-way <10 m, no grubbing, no disruption of hydrological flow, no ditching, locate road as far from ginseng patch as possible)
  - New roads will be promptly decommissioned upon completion of operations unless with Ministry approval (see Appendix 1b).

- Forestry-related traffic and maintenance of **existing roads** are permitted within the AOC subject to the following condition:
  - Road maintenance is restricted to surface grading or other **low risk** road maintenance operations necessary to maintain safe travel conditions.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

- No operations allowed in existing forestry aggregate pits and wood storage yards within the AOC.

Notes

Low risk road maintenance operations do not involve machine travel off the roadbed and include grading the travelled portion of the road, topdressing, removal of woody material, and dust suppression.

iii) Wetland plants (branched bartonia, small white lady's-slipper, and eastern prairie fringed-orchid)

Direction for wetland plants focuses on:

- Maintaining the integrity of the wetland
- Minimizing the disturbance of the wetland vegetation community containing the listed wetland plants.

Description of value

Wetland vegetation communities (WVCs) known to have been occupied by branched bartonia, small white lady's-slipper, or eastern prairie fringed-orchid (i.e., occupied WVCs) within the past 20 years and an adjacent 120 m wide modified management zone (MMZ) comprise the AOC.

Occupied WVCs to be delineated by the Ministry based on methodology for mapping vegetation communities described within the Ontario Wetland Evaluation System.

WVCs are considered polygonal features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within occupied WVCs.

- Harvest, renewal, and tending operations are permitted within the MMZ if they retain **residual forest** and will not result in direct damage to vegetation or deposition of sediment within occupied WVCs. Operations are subject to the following conditions:
  - Machine travel is not permitted through upland habitats within 3 m of occupied WVCs or through wetland habitats within 15 m of occupied WVCs
  - Removal or damage of sapling-sized trees (<10 cm dbh) and shrubs is not permitted in **upland habitats** within 3 m of occupied WVCs or in wetland habitats within 15 m of occupied WVCs
  - Felling of trees into occupied WVCs or into **upland habitats** within 3 m of occupied WVCs or into wetland habitats within 15 m of occupied WVCs is not permitted. Trees accidentally felled into WVCs will be left where they fall
  - Operations that leave ruts, significant areas of exposed mineral soil or disrupt hydrological function (see Sections 4.1.4 and 5.2.1) within 15 m of occupied WVCs is not permitted. Ruts or significant patches of exposed mineral soil will be promptly rehabilitated.

- Contamination of occupied WVCs by foreign materials is not permitted. Specifically,
  - No equipment maintenance (e.g., washing or changing oil) is permitted within 30 m of occupied WVCs
  - Aerial application of herbicides is not permitted within the AOC. Machine-based ground application of herbicides (e.g., air-blast sprayers mounted on skidders) is not permitted within 60 m of occupied WVCs. Hand-based ground application of herbicides (e.g., back-pack sprayers) is not permitted within 3 m of occupied WVCs.

Guidelines

- If there is a risk of introducing invasive species to AOCs occupied by plants listed as species at risk (e.g., equipment is coming from an area known or suspected to contain invasive species), all equipment will be thoroughly inspected by operators and, as required, cleaned following the methods described in the *Clean Equipment Protocol for Industry* (Halloran et al 2013) before operating within these AOCs.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New all-weather roads and landings are not permitted within the AOC.

Guidelines

- Winter roads are not permitted within the AOC except in extraordinary circumstances, as specifically identified and justified, including road location, through the FMP AOC planning process. The road is not permitted within occupied WVCs and must be >20 m from WVC. Appropriate mitigative measures will be taken to minimize the risk of disruption of hydrological flow (see Section 4.1.4).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits are not permitted within the AOC.
- Operations associated with existing forestry aggregate pits are permitted within the MMZ. However aggregate extraction is not permitted below the water table.

Notes

See definition of **residual forest** in the glossary and section 3.2.2.1.

Upland habitats include any habitats not considered to be aquatic features or wetlands.

4.3.2 Woody plants

Direction is provided for one woody plant listed as a species at risk (butternut) which occurs within the managed forest.

Butternut typically inhabits rich, moist sites in tolerant hardwood forest in the southern portions of the Great Lakes-St. Lawrence forest region. It is threatened by an introduced pathogen, the butternut canker. Because butternut is intolerant of shade, forest harvesting can be used to regenerate the species, but indiscriminate harvesting may remove potentially resistant genetic material.

Black ash is also listed as an at risk woody plant. The *Species Conservation Act, 2025,* O. Reg. 61/26 s.17 applies to the area south of the managed forest and forestry on Crown land is exempt as long as they are operating under an approved forest management plan prepared under the CFSA.

Direction

Direction focuses on maintaining healthy individual trees.

Pockets of healthy trees, and even individual healthy trees, should be reported to the Forest Gene Conservation Association (www.fgca.net).

Tree species not listed as species at risk may be locally rare or uncommon in specific portions of the managed forest (e.g., red spruce in the Great Lakes-St. Lawrence forest region, white pine in the boreal forest). Direction for maintaining populations of these species may be found in other Ministry guides such as *The Forest Management Guide to Silviculture in the Great Lakes – St. Lawrence and Boreal Forests of Ontario*.

i) Butternut

Direction applies to all recognizable living butternut trees of any size encountered during forest operations and their habitat. This direction does not apply to butternut trees that have been assessed as Category 1.

Living butternut trees may not be harvested (or otherwise killed) unless assessed by a qualified butternut professional as per the Butternut Assessment Guidelines. Living butternut trees are classified by a qualified butternut professional as follows:

- Category 1 - The butternut tree is affected by butternut canker to such an advanced degree that retaining the tree would not support the protection or recovery of butternut trees in the area in which the tree is located.

- Category 2 - The butternut tree is not affected by butternut canker, or the butternut tree is affected by butternut canker but the degree to which it is affected is not too advanced and retaining the tree could support the protection or recovery of butternut trees in the area in which the tree is located.

- Category 3 - The butternut tree may be useful in determining sources of resistance to butternut canker.

Harvest (or killing) of living butternut trees assessed as Category 1 by a qualified butternut professional is permitted.

Description of value

Butternut trees are considered point features.

Living butternut trees (stems of any size), that have been assessed by a qualified butternut professional as Category 2 or 3 trees (or unassessed trees), and the area within 50 m comprise the AOC.

Direction applies to butternut trees and their habitat known before, or found during, operations.

Operational prescription and conditions for the area of concern

Standards

- Herbicide application (other than hand-based ground application) is not permitted within the AOC. Herbicide application will avoid Category 2 or 3 (or unassessed) butternut trees.

Guidelines

- Harvest, renewal, and tending operations are permitted within the AOC and are subject to the following conditions:
    - Harvest must retain shade on at least 2 sides of dominant, co-dominant, or intermediate Category 2 or 3 (or unassessed) butternut trees
    - Harvest, renewal, and tending operations will follow careful logging practices to ensure that the crown, stem, and roots of Category 2 or 3 (or unassessed) butternut trees are not damaged. Specifically,
        - Felling of trees that could damage Category 2 or 3 (or unassessed) butternut trees (e.g., trees leaning into butternut trees or into which butternut trees are leaning, trees whose crowns are interconnected with the crowns of butternut trees) is not permitted
        - No extraction trails within the dripline of the tree during the frost-free period unless approved by the Ministry (see Appendix 1b)
        - No ruts within the dripline of the tree

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- New roads or associated landings are not permitted within the critical rooting zone (CRZ) of Category 2 or 3 butternut trees (or unassessed) butternut trees, except in extraordinary circumstances, as specifically identified and justified through the

FMP AOC planning process. The CRZ is considered to extend the following distance from the stem of butternut trees:

- 5 m for butternut trees <10 cm dbh
- 10 m for butternut trees 10-24 cm dbh
- 15 m for butternut trees 25-35 cm dbh
- 20 m for butternut trees ≥36 cm dbh.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the CRZ of Category 2 or 3 (or unassessed) butternut trees. The CRZ is considered to extend the following distance from the stem of butternut trees:
  - 5 m for butternut trees <10 cm dbh
  - 10 m for butternut trees 10-24 cm dbh
  - 15 m for butternut trees 25-35 cm dbh
  - 20 m for butternut trees ≥36 cm dbh.

4.3.3 Lichens

Direction is provided below for the pale-bellied frost lichen, found within the Great Lakes-St. Lawrence forest region, and the white-rimmed shingle lichen which is found within the boreal forest region.

The pale-bellied frost lichen mainly grows on the trunks of ironwood in southeastern Ontario. The white-rimmed shingle lichen has only been found on eastern white cedar in northwestern Ontario. Forest management operations that remove trees surrounding the host tree or along the edge of pools, or alter hydrological processes within pools, could potentially affect habitat. Lichens are sensitive to changes in microclimate such as alterations to humidity levels, wind hydrology, and light conditions.

Direction

Direction for lichens focuses on:

- Maintaining the host tree
- Minimizing impacts to the microclimate/habitat of the lichen
- Minimizing impacts to potential host trees within the AOC.

i) Pale-bellied frost lichen

Description of value

Host trees (live, dead, or downed) that support the pale-bellied frost lichen and the area within a radius of 100 m comprise the AOC.

The area within:

- 0-50 m of a host tree is a reserve
- 51-100 m of a host tree is an MMZ.

Host trees known to support the pale-bellied frost lichen are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within 50 m of known host trees.

- Trees will not be felled into the reserve. Trees accidentally felled into the reserve will be left where they fell.

- Herbicide application (other than hand-based ground application) is not permitted within the AOC.

Best management practices

- Follow normal silviculture practices OR follow the principles of the *Ontario Tree Marking Guide*.

Conditions on primary roads and landings (planned or existing)

Standards

- New primary roads or associated landings are not permitted within 50 m of known host trees.

- Operations associated with existing roads and landings that increase their footprint are not permitted within the AOC.

Guidelines

- New primary roads and associated landings are not permitted within the MMZ, except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

Conditions on branch and operational roads and landings (planned or existing)

Standards

- New branch and operational roads and associated landings are not permitted within 50 m of host trees.

- Operations associated with existing roads and landings that increase their footprint are not permitted within the AOC.

Guidelines

- New branch and operational roads and associated landings are permitted in the MMZ subject to the following conditions:
    - New roads will be promptly decommissioned upon completion of operations unless with Ministry approval (see Appendix 1b).

Best management practices

- Construct new roads on existing roadbeds (where the vegetation is predominantly <8 m tall) whenever practical and likely to result in less impact on pale-bellied frost lichen or its habitat.

- Construct new roads to the minimum standards practical.

- Make the right-of-way associated with new roads as narrow as practical (e.g., 15 m wide).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 50 m of known host trees.

- Operations associated with existing forestry aggregate pits and wood storage yards that increase their footprint are not permitted within the AOC.

- Aggregate extraction within the AOC is not permitted below the water table.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the MMZ, except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

Best management practices

- Rehabilitate forestry aggregate pits in a manner that encourages future habitat for the species (i.e., woody vegetation that supports host tree species and provides a barrier to wind/direct sunlight).

ii) White-rimmed shingle lichen

Description of value

Host trees (live, dead, or downed) that support the white-rimmed shingle lichen and the area within a radius of 100 m comprise the AOC.

Host trees known to support the white-rimmed shingle lichen are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within 0-50 m of known host trees.

- Herbicide application (other than hand-based ground application) is not permitted within the AOC.

Guidelines

- Harvest, renewal and tending operations are not permitted within 51-100 m of known host trees, unless with Ministry approval (see Appendix 1b) and subject to the following condition:
    - Harvest, renewal, and tending operations will be conducted in a manner that minimizes site disturbance and extraction trails will not exceed 10% coverage within the AOC.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary and branch roads and associated landings are not permitted within 50 m of known host trees.

- New primary roads and associated landings are not permitted within 51-100 m of known host trees.

- Operations associated with existing roads and landings that increase their footprint are not permitted within the AOC.

Guidelines

- New branch roads and/or associated landings are not permitted within 51-100 m of a known host tree except in extraordinary circumstances as justified through the AOC planning process and subject to the following conditions:
  - Construct new roads on an existing roadbed (where the vegetation is predominanty <8 m tall).
  - Ensure appropriate mitigative measures are taken to minimize the risk of disruption of hydrological flow (see Section 4.1.4 and 5.1.1)
  - New roads will be promptly decommissioned upon completion of operations unless with Ministry approval (see Appendix 1b).

Conditions on operational roads and landings (planned or existing)

Standards

- New operational roads and/or associated landings are not permitted within 50 m of known host trees.

- New operational roads and/or associated landings are permitted within 51-100 m of known host tree subject to the following conditions:
  - Ensure appropriate mitigative measures are taken to minimize the risk of disruption of hydrological flow (see section 4.1.4 and 5.1.1)

- Operations associated with existing roads and landings that increase their footprint are not permitted within the AOC.

Guidelines

- New operational roads will be promptly decommissioned upon completion of operations unless with Ministry approval (see Appendix 1b).

Best management practices

- Construct new roads on existing roadbeds (where the vegetation is predominantly <8 m tall) whenever practical and likely to result in less impact on white-rimmed shingle lichen and its habitat.

- Construct new roads to the minimum standards practical.

- Make the right-of-way associated with new roads as narrow as practical (e.g., 15 m wide).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within AOC.

- Operations associated with existing forestry aggregate pits and wood storage yards that increase their footprint are not permitted within the AOC.

- Aggregate extraction within the AOC is not permitted below the water table.

Best management practices

- Rehabilitate forestry aggregate pits in a manner that encourages future habitat for the species (i.e., woody vegetation that supports host tree species and provides a barrier to wind/direct sunlight).

4.3.4 Invertebrates

There are a number of insects found within the managed forest which are listed as species at risk. The threats, to at risk insects, include pesticide use, mainly neonicotinoids, and habitat loss, mainly due to agricultural intensification.The Suckley's cuckoo bumble bee is an obligate social parasite (cannot survive independent of the host species), and is threatened by the loss of its host, the yellow-banded bumble bee. The habitat for this species is along the edges of forests, such as roadside or along the edges of forestry aggregate pit openings.

Species-specific direction is prescribed in this section for the bogbean buckmoth and its habitat. The bogbean buckmoth is restricted to open, chalky, low shrub fens containing large amounts of bogbean, an emergent wetland flowering plant. Forest management practices that encourage a natural cycle of beaver pond establishment, abandonment, and renewal are likely beneficial to these species. Bogbean buckmoth and its habitat are frequently components of provincially significant wetlands (see Section 4.1.3).

Direction

Direction is provided below and focuses on:

- Maintaining suitable stand structure/vegetation communities in occupied habitat
- Minimizing soil disturbance
- Minimizing creation of barriers to movement.

Best Management Practices

- The Suckley's cuckoo bumble bee (as well as special concern species including the monarch, American bumble bee and yellow-banded bumble bee) may benefit from:

- Seeding of specific native plant species (e.g., milkweed, nectar producing plants) when rehabilitating forestry aggregate pits and landings
- Avoiding the use of *Bacillus thuringiensis* (Bt) and glyphosate near forest edges, clearings, and roads.

i) Bogbean buckmoth

Description of value

Wetland vegetation communities (WVCs) known to have been occupied by bogbean buckmoth (i.e., occupied WVCs) within the past 3 years and an adjacent 120 m wide modified management zone (MMZ) comprise the AOC.

Occupied WVCs to be delineated by the Ministry based on methodology described in the Ontario Wetland Evaluation System.

WVCs are considered polygonal features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within occupied WVCs.

- Harvest, renewal, and tending operations are permitted within the MMZ if they retain **residual forest** and will not result in direct damage to vegetation or deposition of sediment within occupied WVCs. Operations are subject to the following conditions:
  - Machine travel is not permitted through **upland habitats** within 3 m of occupied WVCs or through wetland habitats within 15 m of occupied WVCs
  - Removal or damage of sapling-sized trees (<10 cm dbh) and shrubs is not permitted in **upland habitats** within 3 m of occupied WVCs or in wetland habitats within 15 m of occupied WVCs
  - Felling of trees into occupied WVCs or into **upland habitats** within 3 m of occupied WVCs or into wetland habitats within 15 m of occupied WVCs is not permitted. Trees accidentally felled into WVCs will be left where they fall
  - Operations that leave ruts, significant areas of exposed mineral soil or disrupt hydrological function (see Sections 5.2.1 and 4.1.4) within 15 m of occupied WVCs is not permitted. Ruts or significant patches of exposed mineral soil will be promptly rehabilitated.

- Contamination of occupied WVCs by foreign materials is not permitted. Specifically,

- o No equipment maintenance (e.g., washing or changing oil) is permitted within 30 m of occupied WVCs.
- o Aerial application of herbicides is not permitted within the AOC. Machine-based ground application of herbicides (e.g., air-blast sprayers mounted on skidders) is not permitted within 60 m of occupied WVCs. Hand-based ground application of herbicides (e.g., back-pack sprayers) is not permitted within 3 m of occupied WVCs.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New all-weather roads and landings are not permitted within the AOC.

Guidelines

- Winter roads are not permitted within the AOC except in extraordinary circumstances, as specifically identified and justified, including road location, through the FMP AOC planning process. The road is not permitted within occupied WVCs and must be >20 m from WVC. Appropriate mitigative measures will be taken to minimize the risk of disruption of hydrological flow (see Section 4.1.3).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

- Operations associated with existing forestry aggregate pits and wood storage yards are permitted within the MMZ. However, aggregate extraction is not permitted below the water table.

Notes

See definition of **residual forest** in the glossary and section 3.2.2.1.

Upland habitats include any habitats not considered to be aquatic features or wetlands.

4.3.5 Fish

There are a number of species or subspecies of fish listed as species at risk that inhabit standing or flowing waters within the managed forest. Some of the main threats to these species are, or have been:

- Lake acidification (aurora trout)
- Commercial over-fishing (American eel, lake sturgeon, shortjaw cisco)
- Movement barriers created by dams (American eel, lake sturgeon)
- Loss of spawning habitat (lake sturgeon)
- Competition from introduced species (lake sturgeon, shortjaw cisco, lake whitefish (Opeongo Lake large and small-bodied populations)).

Forest management operations are generally not viewed as contributing to the decline of these species or as a principal threat to their persistence. Thus, general direction for maintaining suitability of aquatic and wetland habitats (Section 4.1) is considered sufficient and no species-specific direction is prescribed. However, in Section 4.1, aquatic features containing fish that are species at risk are considered to have high potential sensitivity to forest management operations and receive the highest level of protection.

In addition to the direction in Section 4.1, all operations around water must adhere to the *Fisheries Act*. Moreover, the *Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings* requires review by DFO for all water crossings associated with habitat occupied by species at risk.

Forest access roads may potentially increase the risk of introducing fish species that may prey upon or compete with fish that are species at risk. Thus, planning teams may choose to place additional restrictions on the construction, use, or decommissioning of roads around aquatic features that support fish that are species at risk, such as lake sturgeon, that may be adversely affected by introduced species (see discussion on strategic road planning in Section 5.1.1).

4.3.6 Amphibians and reptiles

No amphibians that occur within the managed forest are listed as species at risk at the time of publication of this guide. Amphibians generally benefit from the direction for the protection of aquatic and wetland habitats (Section 4.1), especially woodland pools (Section 4.1.3), and the retention of downed woody material (Section 3.2.3.2).

There are a number of species of reptiles, including snakes and turtles, known to inhabit the managed forest which are listed as species at risk. Many of these species benefit from or are protected by general direction for aquatic and wetland habitats (Section 4.1).

Direction

Section 4.3.6.1 provides direction for listed snakes. Known snake hibernation and nesting/gestation/basking/shedding sites are addressed by operational prescriptions and conditions for AOCs.

Direction is described below and focuses on:

- Prohibiting physical disturbance of known snake hibernation and nesting/gestation/basking/shedding sites.
- Minimizing operations involving heavy equipment around known hibernation sites during the fall entrance and spring emergence periods for species that show fidelity to communal hibernation sites and/or exhibit staging behavior.

Direction for eastern foxsnake, eastern hog-nosed snake, gray ratsnake, eastern massasauga, and eastern ribbonsnake is provided for special habitat features including nesting sites, gestation sites, communal shedding or basking sites, and hibernation sites (eastern hog-nosed snake, gray ratsnake, eastern massasauga, and eastern ribbonsnake).

Section 4.3.6.2 includes direction for listed turtles. The Blanding's turtle, spotted turtle, and wood turtle are terrestrial, or semi-terrestrial (and thus most likely to be directly affected by road traffic and forest management operations), and potentially threatened by illegal collection. Species-specific direction is provided for the Blanding's turtle spotted turtle, and wood turtle and focuses on:

- Reducing access to populations by illegal collectors
- Minimizing risk of direct mortality from forestry-related traffic and forest management operations
- Mitigating potential effects of forest management operations on special habitat features, especially known or suspected nesting sites and hibernation sites.

The other turtle species are addressed by direction that focuses on protecting known nesting sites, both natural and anthropogenic, and hibernation sites from unacceptable habitat alteration and harm to turtles.

Since illegal collection is one of the principal threats to turtle populations, especially wood turtle, information on the location and population status will remain confidential. See the *Forest Information Manual* and the associated technical specifications for a discussion of the treatment of classified values information.

4.3.6.1 Snakes

There are a number of snakes listed as species at risk which occur within the Great Lakes-St. Lawrence forest region in the managed forest: eastern foxsnake eastern hog-nosed snake, gray ratsnake, and eastern massasauga rattlesnake. All species may be found in the forest but generally prefer non-forested habitats (e.g., wetlands), forest openings, or forest edges. Main threats to these species are habitat loss resulting from human development, persecution, and traffic-related mortality. However, forest

management operations have the potential to affect two significant components of habitat for these species: hibernation sites and nesting/gestation/basking/shedding sites.

These snakes overwinter singly or communally in traditionally used hibernation sites. Hibernation sites are typically animal burrows, rock crevices, caverns, fissures, or subterranean spaces in wetlands. Hibernation sites permit snakes to move below the frost line to avoid freezing and have sufficient moisture to prevent desiccation. The gray ratsnake and eastern massasauga show the greatest fidelity to communal hibernation sites and may also be found concentrated (staging) in the vicinity of hibernation sites for several days to weeks when snakes are entering or emerging from hibernation sites. The other species are typically less likely to use communal hibernation sites, show less fidelity, or exhibit less staging behavior.

The eastern massasauga rattlesnake and eastern ribbonsnake give birth to live young. Gravid eastern massasaugas restrict their activities to specific locations, known as gestation sites, during summer. Gestation sites are small (<1 ha), are generally found in forest openings (often rock outcrops), and are typically associated with enduring features such as large flat rocks (‘table rocks’) that provide basking sites and cover. Individual gestation sites may be used over many years, frequently by multiple females. Gravid eastern ribbonsnakes do not appear to have special habitat requirements.

The other species lay eggs at locations termed oviposition sites. Oviposition sites include large logs and stumps, decaying leaf piles, sandy areas, rocks, and rock crevices. Because warm temperatures are critical for successful incubation of eggs, oviposition sites almost always occur in areas with open canopies. Sites may be used by more than one female over multiple years.

Standards

- Awareness and driver training are required for any individuals working in habitat potentially occupied by threatened or endangered snakes. This training must provide information about the species (e.g., identification, timing restrictions, habitat), including the distribution of educational materials (e.g., species identification cards) and the actions that operators are expected to take to minimize threats (e.g., reducing speed, speed control devices).

- A local protocol will be developed that describes how threatened or endangered snakes will be protected from injury if encountered during operations (i.e., how they should be handled, temporarily held, and/or relocated). See the Ministry’s *Ontario Species at Risk Handling Manual* for suggestions.

i) Eastern hog-nosed snake or eastern ribbonsnake hibernation sites

Description of value

Hibernation sites known to have been used within the past 5 years and the area within a radius of 30 m comprise the AOC.

Hibernation sites are considered point features.

Operational prescription and conditions for the area of concern

Guidelines

- Harvest, renewal, and tending operations are not permitted during the **entrance and emergence periods** unless with Ministry approval (see Appendix 1b).

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within the AOC.

Guidelines

- Operations associated with existing roads and associated landings during the **entrance and emergence periods** will include the following conditions:
  - During road maintenance operations, roads and landings within the AOC will be clearly identified using flagging tape, signs, or other visual markers
  - Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **entrance and emergence period**.

Notes

Entrance and emergence periods are September 1-October 31 and April 1-May 31, respectively. Local knowledge may be used to adjust these dates.

ii) Gray ratsnake hibernation sites

Description of value

Hibernation sites known to have been used within the past 20 years and the area within a radius of 150 m comprise the AOC.

The area within 0-50 m of a hibernation site is a reserve.

The area within 51-150 m of a hibernation site comprises the Modified Management Zone (MMZ).

Hibernation sites are considered point features.

Operational prescription and conditions for the area of concern

Guidelines

- Harvest, renewal, and tending operations are permitted within the MMZ subject to timing restrictions and the following conditions:
    - Harvest, renewal and tending operations involving heavy equipment (e.g., skidders, mechanical harvesters) are not permitted in the MMZ during the **entrance and emergence periods** unless with Ministry approval (see Appendix 1b)
    - Harvest will retain forest that meets the definition of residual and retains wildlife trees and downed woody material as per Section 3.2.3.2, and ≥50% canopy closure
    - Renewal and tending operations will leave a residual stand structure that meets the minimum described above; all other renewal and tending operations are permitted within the MMZ.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary roads, branch roads and associated landings are not permitted within the AOC.

Guidelines

- Operations associated with existing roads and landings during the **entrance and emergence periods** will include the following conditions:

- During road maintenance operations, roads and landings within the AOC will be clearly identified using flagging tape, signs, or other visual markers
- Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Conditions on operational roads and landings (planned or existing)

Standards

- New operational roads and landings are not permitted within 0-50 m of the hibernation site.

- New operational winter roads and new all-weather operational roads, including those built on existing roadbeds (where the vegetation is predominantly <8 m tall), will be built to minimum standards (e.g., maximum right-of-way width 15 m).

- No new landings permitted within the MMZ.

Guidelines

- New all-weather operational roads are not permitted within the MMZ, unless with Ministry approval (see Appendix 1b). If there is no practical or feasible alternative, construct winter roads, as approved by the Ministry (see Appendix 1b).

- Operations associated with existing roads and landings during the **entrance and emergence periods** will include the following conditions:
  - During road maintenance operations, roads within the AOC will be clearly identified using flagging tape, signs, or other visual markers.
  - Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Best management practices

- Where possible new operational winter roads and new all-weather operational roads will be built on **existing roadbeds**.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the MMZ during the **entrance and emergence periods**.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the MMZ unless approved by the Ministry (see Appendix 1b).

Notes

Entrance and emergence periods are September 1-October 31 and April 1-May 31, respectively. Local knowledge may be used to adjust these dates.

iii) Eastern massasauga hibernation sites

Description of value

Hibernation sites known to have been used by eastern massasauga within the past 20 years and the area within a radius of 100 m comprise the AOC.

The area within 0-30 m of a hibernation site is a reserve.

The area within 31-100 m of a hibernation site comprises the Modified Management Zone (MMZ).

Hibernation sites are considered point features.

Operational prescription and conditions for the area of concern

Guidelines

- Harvest, renewal, and tending operations are not permitted within the MMZ during the **entrance and emergence periods** unless with Ministry approval (see Appendix 1 b).

Conditions on primary and branch roads and landings (planned or existing)

Standards

- New primary roads, branch roads and landings are not permitted within the AOC.

Guidelines

- Operations associated with existing primary and branch roads and landings during the **entrance and emergence periods** will include the following conditions:

- During road maintenance operations, roads and landings within the AOC will be clearly identified using flagging tape, signs, or other visual markers
- Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Conditions on operational roads and landings (planned or existing)

Standards

- New operational roads and landings are not permitted within 0-50 m of the hibernation site.

- New operational winter roads and new all-weather operational roads, including those built on existing roadbeds (where the vegetation is predominantly <8 m tall), will be built to minimum standards (i.e., maximum right-of-way width 15 m).

- No new landings permitted within the MMZ.

Guidelines

- New all-weather operational roads are not permitted within the MMZ unless with Ministry approval. If there is no practical or feasible alternative, construct winter roads as approved by the Ministry (see Appendix 1b).

- Operations associated with existing operational roads and landings during the **entrance and emergence periods** will include the following conditions:
  - During road maintenance operations, roads and landings within the AOC will be clearly identified using flagging tape, signs, or other visual markers
  - Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Best management practices

- Where possible, new operational winter roads and all-weather operational roads will be built on **existing roadbeds**.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the MMZ during the **entrance and emergence periods**.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the MMZ unless with Ministry approval (see Appendix 1b).

Notes

Entrance and emergence periods are September 1-October 31 and April 1-May 31, respectively. Local knowledge may be used to adjust these dates.

iv) Eastern foxsnake, eastern hog-nosed snake, gray ratsnake, or eastern massasauga nesting sites, gestation/oviposition sites, and communal shedding or basking sites

Description of value

Nesting sites, and communal (i.e., used by two or more snakes) shedding or basking sites known to have been used by eastern foxsnake, eastern hog-nosed snake, or gray ratsnake within the past 5 years and the area within a radius of 30 m comprise the AOC.

Gestation/oviposition sites, and communal shedding or basking sites known to have been used by eastern massasauga within the past 20 years and the area within a radius of 30 m comprise the AOC.

Nesting sites, gestation/oviposition sites, and communal shedding or basking sites are considered point features.

Eastern foxsnake and gray ratsnake nesting sites and communal basking and shedding sites may be more transient than other habitat features, and their suitability should be verified over time.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the AOC.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within the AOC.

Guidelines

- Operations associated with existing roads and landings are not permitted within the AOC during the **gestation/oviposition, nesting, incubation and juvenile dispersal period** (nesting and gestation sites) or the **active season** (communal shedding and basking sites), unless with Ministry approval (see Appendix 1b), including the following conditions:
    - During road maintenance operations, roads and landings within the AOC will be clearly identified using flagging tape, signs, or other visual markers
    - Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **gestation/oviposition, nesting, incubation and juvenile dispersal period** (nesting and gestation sites) and/or during the **active season** (communal shedding and basking sites), unless with Ministry approval (see Appendix 1b).

Notes

Active season is April 15-October 15. Local knowledge may be used to adjust these dates.

Gestation, nesting, incubation and juvenile dispersal period is June 15-October 15. Local knowledge may be used to adjust these dates.

4.3.6.2 Turtles

Most turtle species listed as species at risk are found in the managed forest; Blanding's turtle, spotted turtle, and wood turtle are found primarily within the Great Lakes-St. Lawrence forest region. Seven of eight turtle species found in Ontario are classifed as at risk by COSSARO and all but one species are found within the managed forest. The eastern musk turtle (formerly known as stinkpot), northern map turtle, and snapping turtle are classified as at risk and included in the nesting sites and hibernation sites direction.

All species are aquatic during some portion of the year, inhabiting lakes, ponds, rivers, streams, and permanent or seasonal wetlands. Main threats are traffic-related mortality, shoreline development, recreational use of shorelines, wetland drainage, water level control, environmental contaminants, or illegal collection. Harvest, renewal and tending operations rarely affect the habitat of most species, except potentially at nest sites or hibernation sites.

Nests are typically excavated in coarse soils, but eggs may also be laid in moss, decaying vegetation, or rotting wood, depending on the species. Nest sites are generally located in open habitats typically close to water, such as beaches and sand bars. However, some nest sites may be up to a few hundred meters from water. Nest sites may be used by several females; fidelity to nest sites varies among species. It is not well studied for all species but has been documented for Blanding's turtle, snapping turtle, northern map turtle and wood turtle.

Turtles typically hibernate in wetlands, ponds, or deep pools in rivers or streams. Hibernation sites are usually occupied by numerous individuals. Fidelity to individual hibernation sites is commonly reported.

The wood turtle is the most terrestrial of the turtle species. During spring and fall, it is largely aquatic and is primarily associated with rivers and large streams. During summer, it becomes increasingly terrestrial, wandering hundreds of meters from watercourses used in spring and fall. Thus, it is the species most likely to be directly affected by forest management operations. The Blanding's turtle and spotted turtle are semi-terrestrial. They may be found in upland habitats when nesting, basking, aestivating, moving between wetlands, or moving to or from hibernation sites, and thus may also be directly affected by forest management operations. The main effect of forest management operations on these species is likely increased potential for traffic-related mortality and illegal collection associated with increased access.

Direction

The Blanding's turtle, spotted turtle, and wood turtle are terrestrial, or semi-terrestrial (and thus most likely to be directly affected by road traffic and forest management operations), or potentially threatened by illegal collection. Species-specific direction is provided for the Blanding's turtle, spotted turtle and wood turtle and focuses on:

- Reducing access to populations by illegal collectors.
- Minimizing risk of direct mortality from forestry-related traffic and forest management operations.
- Mitigating potential effects of forest management operations on special habitat features, especially known or suspected nesting sites and hibernation sites.

Standards

- Awareness and driver training are required for any individuals working in habitat potentially occupied by at risk turtles. This training must provide information about the species (i.e., identification, timing restrictions, habitat), including the

distribution of educational materials (e.g., species identification cards) and the actions that operators are expected to take to minimize threats (e.g., reducing speed, speed control devices).

- A local protocol will be developed that describes how at risk turtles will be protected from injury if encountered during operations (i.e., how they should be handled, temporarily held, and/or relocated). See the Ministry's *Ontario Species at Risk Handling Manual* for suggestions.

i) Turtle natural nesting sites

Description of value

Natural nesting sites known to have been used by spotted turtle, wood turtle, or snapping turtle within the past 40 years and eastern musk turtle or northern map turtle (both species classified as at risk) within the past 10 years and the area within a radius of 30 m and nesting sites known to have been used by Blanding's turtle during the current year and the area within a radius of 10 m comprises the AOC.

Nesting sites are considered point features.

Operational prescription and conditions for the area of concern

Guidelines

- Harvest, renewal, and tending operations are not permitted within the AOC unless with Ministry approval (see Appendix 1b).

Conditions on primary and branch roads and landings (planned or existing)
Conditions on operational roads and landings (planned or existing)

Standards

- New roads or landings are not permitted within the AOC.

Guidelines

- Maintenance operations associated with existing roads or operations associated with existing landings are not permitted within the AOC during the **nesting, incubation, and juvenile dispersal period** unless with Ministry approval (see Appendix 1b), including the following conditions:
    - During road maintenance operations, roads and landings within the AOC will be clearly identified using flagging tape, signs, or other visual markers

- Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **nesting, incubation, and juvenile dispersal period** unless with Ministry approval (see Appendix 1b).

Notes

Natural nesting sites include roads or landings not actively used or maintained.

Nesting, incubation, and juvenile dispersal period is June 1-October 31. Local knowledge may be used to adjust these dates.

ii) Turtle anthropogenic nesting sites

Direction

Direction for turtle anthropogenic nesting sites focuses on:

- Mitigating negative impacts on the viability of nesting sites.
- Minimizing disturbance of nesting sites.
- Minimizing material being deposited on nesting sites.

Description of value

Nesting sites or areas known to have been used by species listed as at risk (Blanding's turtle, spotted turtle, wood turtle) or species classified as at risk (eastern musk turtle, northern map turtle, snapping turtle) within the past 40 years and the following comprise the AOC:

- Nesting sites on roads and the road surface 50 m either direction
- Areas delineated by the Ministry along roads and the road surface known to have been used for nesting by turtles

- Nesting sites in forestry aggregate pits or wood storage yards and the area within a 50 m radius
- Nesting sites in forestry aggregate pits or wood storage yards delineated by the Ministry.
- The entire landing where nest sites are found.

Nesting sites are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the AOC.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- Maintenance operations that disturb the roadbed (except those required for safety or environmental protection and accompanied mitigation) associated with existing roads or operations associated with existing landings are not permitted within the AOC during the **nesting, incubation, and juvenile dispersal period** unless with Ministry approval (see Appendix 1b), including the following conditions:
    - During road maintenance operations, roads and landings within the AOC will be clearly identified using flagging tape, signs, or other visual markers
    - Forestry-related traffic and operations will be accompanied by steps to reduce speed within the AOC (e.g., reduced speed limits) and measures to increase awareness (e.g., training, signage).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **nesting, incubation, and juvenile dispersal period** unless with Ministry approval (see Appendix 1b), including the following condition:
    - During aggregate extraction, the AOC will be clearly identified using flagging tape, signs, or other visual markers.

Notes

Nesting, incubation, and juvenile dispersal period is June 1-October 31. Local knowledge may be used to adjust these dates.

iii) Turtle hibernation sites

Description of value

Suitable hibernation sites and associated aquatic features known to have been used by species classified as at risk including the eastern musk turtle, northern map turtle or snapping turtle at least once within the past 10 years.

The associated aquatic features are defined as either:

- the river segment 200 m above and below a hibernation site, or
- the wetland polygon containing a hibernation site.

Direction applies to suitable hibernation sites and associated aquatic features identified by the Ministry prior to, or during, operations.

Hibernation sites are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the AOC.

Conditions on primary roads and landings (planned or existing)

Standards (See also appropriate aquatic and wetland ecosystem direction in Section 4.1)

- New roads or landings are not permitted within the AOC.

- Water drawdowns or other activities that significantly alter hydrological regime are not permitted.

Guidelines

- Reconstruction of water crossings within the AOC will be conducted with Ministry approval (see Appendix 1b).

Conditions on branch and operational roads and landings (planned or existing)

Standards

- Water drawdowns or other activities that significantly alter hydrological regime are not permitted.

Guidelines

- New roads or landings are not permitted within the AOC except in extraordinary circumstances as identified and justified through the FMP AOC planning process.

- Reconstruction of water crossings within the AOC will be conducted with Ministry approval (see Appendix 1b).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Water drawdowns or other activities that significantly alter hydrological regime are not permitted.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the AOC except in extraordinary circumstances as identified and justified through the FMP AOC planning process.

iv) Blanding's turtle foraging, thermoregulation, hibernation, and movement habitat

Direction for Blanding's turtle and its foraging, thermoregulation, hibernation, and movement habitat is combined with direction for turtle nesting sites.

Description of value

Identified large aquatic habitats and the area within a distance of 200 m that are within 2 km of reliable observations and identified small aquatic habitats and the area within 30 m that are within 2 km of reliable observations within the past 40 years comprise the AOC (see Figure 4.3a).

Aquatic habitats include:

- Aquatic features that have a high potential to be used by Blanding's turtle during the **active season** and **hibernation period**
- Large aquatic habitats, ≥0.5 ha known to be used during the **active season**
- Isolated small aquatic habitats, <0.5 ha, known to be used during the **active season** and the **staging period.**

Direction applies to habitat identified by the Ministry prior to, or during operations, based on field surveys or other reliable methods.

For large aquatic habitats, the area within:

- 0-30 m of large aquatic habitats comprises Modified Management Zone 1 (MMZ1)
- 31-100 m of large aquatic habitats comprises MMZ2
- 101-200 m of large aquatic habitats comprises MMZ3.

Small aquatic habitats, the area within:

- 0-15 m of small aquatic habitats is a reserve
- 16-50 m of small aquatic habitats comprises MMZ4.

Observations are considered point features.

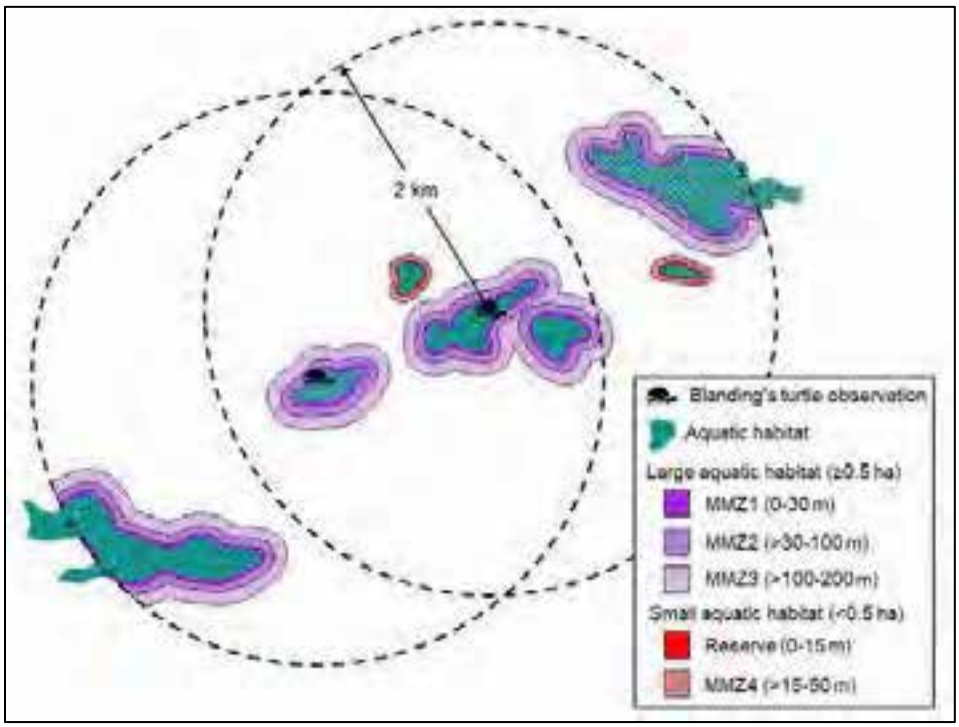

Figure 4.3a. Blanding's turtle AOC showing reserves and modified management zones for large and small aquatic habitats.

Operational prescription and conditions for the area of concern

Standards

- In aquatic habitats, operations involving heavy equipment (e.g., mechanical harvesters, skidders, bulldozers) or otherwise representing a potential injury risk to turtles are not permitted:
    - In MMZ1 during the **active season**
    - In MMZ2 during the **terrestrial period**
    - In MMZ3 during the **nesting period**
    - In MMZ4 during the **terrestrial period** and **staging period.**

Conditions on primary roads and landings (planned or existing)

Standards

- Only operations associated with **low risk** road maintenance necessary to maintain safe travel conditions on existing primary roads within MMZ1 are allowed during the **active season** (see also turtle nesting site direction).

- Materials accumulated through road maintenance (e.g., brush, gravel) will not be deposited into small aquatic habitats (e.g., borrow pits, roadside ditches, vernal pools).

Guidelines

- New primary roads (including winter roads) and associated landings are not permitted within MMZ1 or MMZ4 except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

- New all-weather primary roads or associated landings within MMZ2 and MMZ3 will be constructed with Ministry approval (see Appendix 1b) to ensure roads are built in areas with the least potential impact on turtles and their habitat.

- Operations associated with existing landings are not permitted within MMZ1 during the **active season** unless with Ministry approval (see Appendix 1b).

- Forestry-related traffic and operations on existing primary roads within MMZ1 during the **active season** or within MMZ2 and MMZ3 during the **nesting period** will be accompanied by measures to reduce traffic speed (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

- Temporary water drawdowns that negatively impact hibernation habitat are not permitted but may be allowed subject to a timing restriction and with Ministry approval (see Appendix 1b).

- Road maintenance activities that will result in permanent changes to water levels within large aquatic habitats are not permitted except where beaver activity has affected a water crossing and the resulting water levels are likely to create a safety or environmental concern and the activity will not lower water levels below what was present before the beaver activity.

Best management practices

- Construct new roads on existing roadbeds (where the vegetation is predominantly <8 m tall) whenever practical.

- Reuse **old landings** whenever practical.

Conditions on branch and operational roads and landings (planned or existing)

Standards

- Construction of new branch roads, operational roads and associated landings is not permitted:
    - In MMZ1 during the **active period**
    - In MMZ4 during the **terrestrial period** or the **staging period.**
    - In MMZ2 during the **terrestrial period**
    - In MMZ3 during the **nesting period.**

- Only operations associated with **low risk** road maintenance necessary to maintain safe travel conditions on existing branch roads and operational roads within MMZ1 are allowed during the **active season** (see also turtle nesting site direction).

- Materials accumulated through road maintenance (e.g., brush, gravel) will not be deposited into small aquatic habitats (e.g., borrow pits, roadside ditches, vernal pools).

Guidelines

- New branch roads, operational roads and associated landings are not permitted within MMZ1 or within MMZ4, unless with Ministry approval (see Appendix 1b).

- New branch roads, operational roads and associated landings within MMZ2 and MMZ3 will be constructed with Ministry approval (see Appendix 1b) to ensure roads are built in areas with the least potential impact on turtles and their habitat.

- Operations associated with existing landings are not permitted within MMZ1 during the **active season**, unless with Ministry approval (see Appendix 1b).

- Forestry-related traffic and operations on branch roads and operational roads within MMZ1 and MMZ4 during the **active season** or within MMZ2 and MMZ3

during the **nesting period** will be accompanied by measures to reduce traffic speed (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

- Temporary water drawdowns that negatively impact hibernation habitat are not permitted but may be allowed with Ministry approval (see Appendix 1b) and subject to timing restrictions.

- Road maintenance activities that will result in permanent changes to water levels within large aquatic habitats are not permitted except where beaver activity has affected a water crossing and the resulting water levels are likely to create a safety or environmental concern and the activity will not lower water levels below what was present before the beaver activity.

Best management practices

- Construct new roads on existing roadbeds (where the vegetation is predominantly <8 m tall) whenever practical.

- Reuse **old landings** whenever practical.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within MMZ1.

Guidelines

- New forestry aggregate pits and wood storage yards within MMZ2, MMZ3 and MMZ4 will be constructed with Ministry approval (see Appendix 1b).

Best management practices

- During operations associated with existing aggregate pits and wood storage yards operators should walk the aggregate pit or yard immediately (i.e., less than one hour) before operations within MMZ1 during the **active season** or within MMZ2 and MMZ3 during the **nesting period**.

Notes

Active season is April 15-October 15.
Terrestrial period is April 15-July 7.
Nesting period is June 1-July 7.
Staging period is August 21-October 15.

Local knowledge may be used to adjust these dates.

An **old landing** is any clearly recognizable landing with dominant vegetation generally comprised of shrubs and/or saplings that is predominantly <8 m tall (i.e., not contributing to the overall canopy closure).

Low risk road maintenance operations include grading localized areas of the travelled portion of the road such that the shoulders and edges of the road (first 30 cm of the roadbed) remain unaltered, topdressing in the traveled portion of the road (again ensuring that shoulders and edges of the road remain unaltered), removal of woody material, and dust suppression.

v) Spotted turtle hibernation, foraging, thermoregulation, and movement habitat

Direction for spotted turtle and its hibernation, foraging, thermoregulation, and movement habitat is combined with direction for nesting sites.

Description of value

Permanent mapped aquatic features of suitable aquatic habitat (SAH) and the area within a distance of 130 m from the boundary of SAH that are within 1 km of reliable observations of spotted turtles reported within the past 40 years comprise the AOC.

SAH includes a variety of permanent mapped aquatic features such as marshes, bogs, fens, swamps, deep ponds and small lakes within bog areas. SAH should have soft substrate with abundant aquatic and floating vegetation, with shallow areas (<2 m in depth). These features provide habitat for foraging, cover and thermoregulation.

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to the following conditions:
    - Harvest, renewal, and tending operations (including extraction trails) are not permitted within **known** or **suspected** hibernation sites or in SAH
    - Harvest, renewal and tending operations are not permitted within 30 m of SAH during the **active season.**

Best management practices

- Minimize operations involving heavy equipment (e.g., mechanical harvesters, skidders, bulldozers) or otherwise representing a potential injury risk to turtles within the AOC during the **active season**.

Conditions on primary and branch roads and landings (planned or existing)

Standards

- Only operations associated with **low risk** road maintenance necessary to maintain safe travel conditions on existing primary and branch roads within 30 m of SAH are allowed during the **active season**.

Guidelines

- New primary and branch roads are permitted within the AOC subject to the following conditions:
    - New primary and branch roads are not permitted within 30 m of SAH, except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process
    - New primary and branch roads are not permitted within 130 m of significant communal hibernation sites, as defined by the Ministry
    - New all-weather primary and branch roads or associated landings within 31-130 m of SAH will be constructed with Ministry approval (see Appendix 1b) to ensure roads are built in areas with the least potential impact on turtles and their habitat.

- Forestry-related traffic and operations on primary and branch roads within 30 m of SAH during the **active season**, within 130 m of SAH during the **nesting period** will be accompanied by measures to reduce speeds (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training and signage).

Best management practices

- Minimize operations associated with primary and branch roads and landings within 130 m of SAH during the **active season.**

- Where feasible, activities that will potentially alter water levels in SAH will occur within the **active season**. However, road maintenance activities that will result in permanent changes to water levels within SAH are not permitted except where beaver activity has affected a water crossing and the resulting water levels are likely to create a safety or environmental concern and the activity will not lower water levels below what was present before the beaver activity.

Conditions on operational roads and landings (planned or existing)

Standards

- Only operations associated with **low risk** road maintenance necessary to maintain safe travel conditions on existing operational roads within 30 m of SAH are allowed during the **active season**.

Guidelines

- New operational roads are permitted within the AOC subject to the following conditions:
    - New operational roads are not permitted within 30 m of SAH, unless approved by the Ministry (see Appendix 1b)
    - New operational roads are not permitted within 130 m of communal hibernation sites, as defined by the Ministry
    - New all-weather operational roads or associated landings within 31-130 m of SAH will be constructed with Ministry approval (see Appendix 1b) to ensure roads are built in areas with the least potential impact on turtles and their habitat.

- New operational roads will be promptly decommissioned when operations are done unless with Ministry approval (see Appendix 1b).

- Forestry-related traffic and operations on operational roads within 30 m of SAH during the **active season**, within 130 m of SAH during the **nesting period** will be accompanied by measures to reduce speeds (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training and signage).

Best management practices

- Minimize operations associated with operational roads and landings within 130 m of SAH during the **active season.**

- Where feasible, activities that will potentially alter water levels in SAH will occur within the **active season**. However, road maintenance activities that will result in permanent changes to water levels within SAH are not permitted except where beaver activity has affected a water crossing and the resulting water levels are likely to create a safety or environmental concern and the activity will not lower water levels below what was present before the beaver activity.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 30 m of SAH.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within 130 m of significant communal hibernation sites, as defined by the Ministry.

- New forestry aggregate pits and wood storage yards within 31-130 m of SAH will be constructed with Ministry approval (see Appendix 1b).

Best management practices

- During operations associated with existing aggregate pits and wood storage yards, operators should walk the aggregate pit or yard immediately (i.e., less than one hour) before operations within 30 m of SAH during the **active season** or within 130 m of SAH during the **nesting period**.

Notes

Active season is April 15-October 31.
Nesting period is June 1-30.
Local knowledge may be used to adjust these dates.

Low risk road maintenance operations include grading localized areas of the travelled portion of the road such that the shoulders and edges of the road (first 30 cm of the roadbed) remain unaltered, topdressing in the traveled portion of the road (again ensuring that shoulders and edges of the road remain unaltered), removal of woody material, and dust suppression.

vi) Wood turtle foraging, thermoregulation, hibernation, and movement habitat

Direction for wood turtle and its hibernation, foraging, thermoregulation, and movement habitat is combined with direction for nesting sites.

Description of value

Suitable aquatic habitat (SAH) within 2 km of reliable observations of wood turtles reported within the past 40 years and the area within a distance of 200 m from the boundary of SAH comprise the AOC.

SAH to be identified by the Ministry will normally include rivers and/or streams with moderate current, sand or gravel substrates, deep pools (generally >1 m deep in the

winter), and nearby nesting sites (e.g., sand and gravel bars). SAH may also have undercut banks, log jams, and beaver dams. SAH includes the aquatic feature up to the high-water mark. Local knowledge may be used to refine the definition of SAH.

The AOC is divided into two zones:

- **Zone A** consists of SAH within 2 km of reliable observations of wood turtles within the past 40 years and the area within 0-30 m
- **Zone B** consists of the area within 31-200 m of SAH described in **Zone A.**

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within **Zone A**.

- Harvest, renewal, and tending operations are permitted within **Zone B** subject to timing restrictions (see notes below) and the following condition:
  - Within **Zone B**, ensure ≥30% **mature forest** is retained.

Guidelines

- Operations involving heavy equipment or otherwise representing a significant risk to turtles are not permitted in **Zone B** during the **terrestrial period.**

Conditions on primary roads and landings (planned or existing)

Standards

- Construction of new primary roads or associated landings are not permitted in **Zone A** during the **active season** and in **Zone B** during the **terrestrial period**.

- Only operations associated with **low risk** road maintenance necessary to maintain safe travel conditions on existing primary roads within **Zone A** and **Zone B** are allowed during the **active season.**

Guidelines

- New primary roads are not permitted in **Zone A** or **Zone B**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Temporary water drawdowns that negatively impact hibernation habitat are not permitted but may be allowed subject to timing restrictions and with Ministry approval (see Appendix 1b).

- Road maintenance activities that will result in permanent changes to water levels are not permitted except where beaver activity has affected a water crossing and the resulting water levels are likely to create a safety or environmental concern and the activity will not lower water levels below what was present before the beaver activity.

- Operations within existing landings are not permitted in **Zone A** and **Zone B** during the **terrestrial period**, unless with Ministry approval (see Appendix 1b).

- Forestry-related traffic on primary roads in **Zone A** and **Zone B** during the **active season** will be accompanied by measures to reduce traffic speed (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Best management practices

- Construct new roads on existing roadbeds (where the vegetation is predominantly <8 m tall) whenever practical.

- Reuse **old landings** whenever practical.

Conditions on branch and operational roads and landings (planned or existing)

Standards

- Only operations associated with **low risk** road maintenance necessary to maintain safe travel conditions on existing branch roads and operational roads within **Zone A** and **Zone B** are allowed during the **active season.**

- New branch roads, operational roads and associated landings are permitted within the AOC subject to the following condition:
  - Construction of new branch roads, operational roads or associated landings is not permitted in **Zone A** during the **active season** and in **Zone B** during the **terrestrial period.**

Guidelines

- New branch roads, operational roads and associated landings are permitted within the AOC subject to the following conditions:
  - New branch roads, operational roads and associated landings will be constructed with Ministry approval (see Appendix 1b) to ensure roads are built with the least potential impact on turtles and their habitat
  - New branch roads and operational roads will be constructed to conditions that restrict traffic flow and road longevity (e.g., maximum 10 m wide cleared corridor, roads built to minimum standards) unless with Ministry approval (see Appendix 1b).

- New branch and operational roads will be promptly decommissioned when operations are done unless with Ministry approval (see Appendix 1b).

- Temporary water drawdowns that negatively impact hibernation habitat are not permitted but may be allowed subject to timing restrictions and with Ministry approval (see Appendix 1b).

- Road maintenance activities that will result in permanent changes to water levels are not permitted except where beaver activity has affected a water crossing and the resulting water levels are likely to create a safety or environmental concern and the activity will not lower water levels below what was present before the beaver activity.

- Operations within existing landings are not permitted in **Zone A** and **Zone B** during the **terrestrial period,** unless with Ministry approval (see Appendix 1b)**.**

- Forestry-related traffic on branch and operational roads in **Zone A** and in **Zone B** during the **active season** will be accompanied by measures to reduce traffic speed (e.g., reduced speed limits, minimal grading) and measures to increase awareness (e.g., training, signage).

Best management practices

- Construct new roads on existing roadbeds (where the vegetation is predominantly <8 m tall) whenever practical.

- Reuse **old landings** whenever practical.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are permitted within the AOC subject to the following condition:
    - New forestry aggregate pits and wood storage yards are not permitted within **Zone A.**

Guidelines

- New forestry aggregate pits and wood storage yards are permitted within the AOC subject to the following condition:
    - New forestry aggregate pits and wood storage yards within **Zone B** will be constructed with Ministry approval (see Appendix 1b).

Best management practices

- During operations associated within existing forestry aggregate pits and wood storage yards in **Zone A** during the **active season** and in **Zone B** during the **terrestrial period**, operators should walk the aggregate pit or yard immediately (i.e., less than one hour) before operations during the nesting period.

Notes

Active season is April 1-October 31.
Terrestrial period is May 1-September 30.
Local knowledge may be used to adjust these dates.

Low risk road maintenance operations include grading localized areas of the travelled portion of the road such that the shoulders and edges of the road (first 30 cm of the roadbed) remain unaltered, topdressing in the traveled portion of the road (again ensuring that shoulders and edges of the road remain unaltered), removal of woody material, and dust suppression.

Mature forest meets the forest unit-specific age definition in the *Forest Management Guide for Great Lakes-St. Lawrence Landscapes* and has not received a selection harvest within the past 20 years or a shelterwood harvest within the past 40 years.

Old landing is a clearly recognizable landing with dominant vegetation generally comprised of raspberries (*Rubus* spp), other shrubs, and saplings <8 m tall.

4.3.7 Birds

There are a number of species of birds listed as species at risk that breed within the managed forest. Species-specific direction is not provided for every species. These species benefit from or are protected by general direction for conserving biodiversity (Section 3.2) and aquatic and wetland habitats (Section 4.1).

Section 4.2.2 provides direction for bird species at risk, including the short-eared owl and black tern, that may be affected by forest management operations and have identifiable nest sites. In the following section, direction is provided for a number of listed bird species that could be affected by forest management operations for which individual nest sites are unlikely to be known, but for which occupied breeding habitat can be delineated.

Most at risk bird species are protected under the federal *Species at Risk Act*, *2002*.

See Section 4.2.2 for application of the MBCA.

Direction

Suitable habitat occupied by breeding birds listed as species at risk is addressed by

operational prescriptions and conditions for AOCs. Direction provided below focuses on:

- Maintaining suitability of occupied breeding habitat
- Avoiding disturbance of nesting birds during the critical breeding period.

i) Bank swallow

The following direction is provided for bank swallow and its nest sites. Other components of bank swallow habitat are addressed by the coarse filter direction in this guide and in the Boreal and Great Lakes – St. Lawrence Landscape Guides (see discussion in Background and Rationale for Direction). The bank swallow nests in burrows excavated in riverbanks, lakeshore bluffs, road cuts and aggregate pits. Harvesting operations may create/enhance foraging habitat for this species.

Description of value

Natural or artificial bank/pit faces containing burrows, that are **known** or **suspected** to have been occupied by breeding bank swallows within the past 10 years for natural sites or 3 years for artificial sites and the area within a radius of 50 m comprise the AOC.

Bank/pit faces containing burrows, or structurally supporting burrows are considered linear features.

Operational prescription and conditions for the area of concern

Guidelines

- Harvest, renewal, and tending operations are not permitted within the following distances of occupied burrows during the **critical breeding period** based on potential impact of the operation (see Appendix 4.2), unless with Ministry approval (see Appendix 1b):
  - 50 m for high potential impact operations
  - 25 m for moderate impact operations
  - 10 m for low potential impact operations.

Conditions on primary roads and landings (planned or existing)

Standards

- New primary roads and associated landings are not permitted within the AOC associated with riverine nest sites.

- Operations associated with existing roads and landings are not permitted within 10 m (low impact operations), 25 m (moderate impact operations), or 50 m (high impact operations) (see Appendix 4.2) of occupied burrows during the **critical breeding period** unless with Ministry approval (see Appendix 1b). However, there is no timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading).

Conditions on branch and operational roads and landings (planned or existing)

Standards

- New branch roads and operational roads and associated landings are not permitted within the AOC associated with riverine nest sites.

Guidelines

- New branch roads and operational roads are permitted within the AOC associated with riverine nest sites if constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical and feasible and does not exceed 15 m, outside the **critical breeding period**.

- Operations associated with existing roads and landings are not permitted within 10 m (low impact operations), 25 m (moderate impact operations), or 50 m (high impact operations) (see Appendix 4.2) of occupied burrows during the **critical breeding period** unless with Ministry approval (see Appendix 1b). However, there is no timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- Follow forestry aggregate pit and wood storage yard direction, as per FMPM (Appendix III and IV), outside the **critical breeding period**.

Guidelines

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within 10 m (low impact operations), 25 m (moderate impact operations), or 50 m (high impact operations) (see Appendix 4.2) of occupied burrows during the **critical breeding period,** unless with Ministry approval (see Appendix 1b).

Notes

Nest sites **known** to be or have been occupied are those at which breeding activity has been confirmed. Nest sites **suspected** to be or have been occupied are those at which breeding activity has not been confirmed, but for which there is compelling evidence of current or previous use (e.g., presence of recognizable bank swallow burrows).

The **critical breeding period** is May 1-July 31. Local knowledge of breeding chronology may be used to adjust these dates.

ii) Cerulean warbler

The following direction is provided for Cerulean warbler and its breeding habitat. The cerulean warbler is a songbird that inhabits mature tolerant hardwood forest in the southern portions of the Great Lakes - St. Lawrence forest region. Principal threats are the loss and fragmentation of large patches of mature tolerant hardwood forest.

Description of value

Suitable habitat within a radius of 250 m of reliable observations of cerulean warbler breeding evidence reported within the past 30 years comprises the AOC.

The area within:

- 0-125 m is a reserve
- 126-250 m comprises a modified management zone (MMZ).

Suitable habitat to be delineated by the Ministry typically includes dense (i.e., ≥20 m^2/ha basal area and/or ≥70% canopy closure) mature or older tolerant hardwood forest with occasional large canopy gaps.

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the inner 125 m of the AOC.

- Harvest, renewal, and tending operations are permitted within the MMZ subject to timing restrictions (see below) and the following condition:

- Harvest operations are limited to selection harvest that follows residual stand structure targets for old growth hardwood forest (see *Ontario Tree Marking Guide*)

Guidelines

- Harvest, renewal and tending operations are not permitted within the AOC during the **critical breeding period** unless with Ministry approval (see Appendix 1b).

Conditions on primary roads and landings (planned or existing)

Standards

- New primary roads and associated landings are not permitted within the AOC.

- Operations associated with existing primary and associated landings are not permitted within the AOC during the **critical breeding period**.

Guidelines

- There is no timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading).

Conditions on branch and operational roads and landings (planned or existing)

Standards

- New branch roads and operational roads are not permitted within the inner 125 m of the AOC.

- New landings are not permitted within the AOC.

- Operations associated with new or existing branch roads, operational roads and associated landings are not permitted within the AOC during the **critical breeding period**.

Guidelines

- New branch roads and operational roads are permitted within the MMZ if constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical and feasible and does not exceed 15 m, outside the **critical breeding period**.

- There is no timing restriction on forestry related traffic or low potential impact road maintenance operations (e.g., grading).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **critical breeding period** unless with Ministry approval (see Appendix 1b).

Notes

The **critical breeding period** is May 1-July 31. Local knowledge of breeding chronology may be used to adjust these dates.

iii) Chimney swift

The following direction is provided for chimney swift and its natural nest or roost sites. Other components of chimney swift habitat are addressed by the coarse filter direction in this guide and in the Boreal and Great Lakes – St. Lawrence Landscape Guides (see discussion in Background and Rationale for Direction). Chimney swift nest and roost, singly or communally, in hollow structures (e.g., tree cavities).

Description of value

Trees with suitable nest/roost cavities **known** or **suspected** to be or have been occupied by nesting or roosting swifts and the area within a radius of 30 m comprise the AOC.

Nests/roosts are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to the following condition:
  - The nest/roost tree(s) will be retained

Guidelines

- Harvest, renewal, and tending operations are permitted within the AOC subject to the following conditions:
  - Harvest, renewal, and tending operations are not permitted within the AOC when there are occupied nests/roosts during the **critical breeding/roosting period**, except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process
  - Operations involving heavy equipment or that might otherwise adversely affect nest/roost trees or the amount of vertical or lateral cover are not permitted within 20 m of natural nest or roost sites.

Conditions on primary roads and landings (planned or existing)

Standards

- New primary roads and associated landings are not permitted within the AOC.

Guidelines

- Operations associated with existing primary roads or landings are not permitted during the **critical breeding/roosting period** when nest/roost trees are occupied, unless with Ministry approval (see Appendix 1b). However, there is no timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading) if the road predates the nest/roost site.

Conditions on branch and operational roads and landings (planned or existing)

Standards

- New landings are not permitted within the AOC.

Guidelines

- New branch and operational roads are permitted in the AOC if constructed on an existing roadbed (where the vegetation is predominantly <8 m tall) provided the cleared right-of-way width is as narrow as practical and feasible and does not exceed 15 m outside the **critical breeding period**.

- Operations associated with existing branch and operational roads and landings are not permitted during the **critical breeding/roosting period** when nest/roost trees are occupied, unless with Ministry approval (see Appendix 1b). However, there is no timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading) if the road predates the nest/roost site.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC, during the **critical breeding/roosting period** when nest/roost trees are occupied, unless with Ministry approval (see Appendix 1b).

Notes

Trees **known** to be or have been occupied are those at which breeding or roosting activity has been confirmed. Trees **suspected** to be or have been occupied are those at which breeding or roosting activity has not been confirmed, but for which there is compelling evidence of current or previous use (e.g., swifts observed in the vicinity of a tree suitable for nesting or roosting).

The **critical breeding/roosting period** is May 1-September 30. Local knowledge of breeding/roosting chronology may be used to adjust these dates.

iv) Golden-winged warbler and yellow rail

The following direction is provided for the golden-winged warbler and the yellow rail (classified as at risk) and their breeding habitat.

Description of value

Suitable habitat occupied by breeding golden-winged warblers or yellow rails within the past 20 years defined by either:

- suitable habitat occupied by breeding birds as delineated by field survey, or
- a 10 ha (golden-winged warbler)/15 ha (yellow rail) patch of suitable non-forested wetland habitat (or the entire wetland polygon if <10/15 ha) associated with reliable observations or other reliable sightings associated with breeding activity.

Direction applies to suitable breeding habitat delineated by the Ministry prior to, or during, operations. Delineated habitat comprises the AOC.

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Wildlife trees and residual forest will be retained within harvested portions of the AOC as per direction in Section 3.2.3.

Conditions on primary roads and landings (planned or existing)

Standards[1]

- New primary roads and associated landings are not permitted within the AOC.
- Water drawdowns or other activities that alter hydrological regime are not permitted.

Conditions on branch and operational roads and landings (planned or existing)

Standards[1]

- Water drawdowns or other activities that alter hydrological regime are not permitted.

Guidelines

- New branch and operational roads and associated landings are not permitted within the AOC, except in extraordinary circumstance as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards[1]

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Notes

[1]See also direction for mapped non-forested wetlands in Section 4.1.3.

v) Kirtland's warbler

The following direction is provided for the Kirtland's warbler and its breeding habitat.

Description of value

Suitable habitat within a radius of 500 m of reliable observations of Kirtland's warbler breeding evidence reported within the past 20 years comprises the AOC.

Suitable habitat to be delineated by the Ministry typically includes young stands of jack pine or red pine, 1.5-5 m tall, with ≥3,000 pine stems/ha, and an understory containing low sweet blueberry, bearberry, sweet fern, bracken fern, Canada mayflower, and various grasses.

Observations are considered point features.

See the *Action Plan for the Kirtland's Warbler (Setophaga kirtlandii) in Canada* (ECCC 2016) for more information on habitat suitability.

Operational prescription and conditions for the area of concern

Guidelines

- Harvest, renewal and tending operations are not permitted within the AOC unless compatible with enhancing or maintaining habitat as specifically identified and justified within the FMP AOC planning process and conducted outside the **critical breeding period**.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New landings are not permitted within the AOC.

Guidelines

- New roads are not permitted within the AOC except in extraordinary circumstances as specifically identified and justified through FMP AOC planning process and the following condition:
  - The patch of suitable habitat associated with the AOC is >80 ha in size, and the road location is specified.
- Road construction is not permitted within the AOC during the **critical breeding period** except in extraordinary circumstances, as specifically identified and

justified through FMP AOC planning process. There are no restrictions on operations associated with existing roads and landings within the AOC.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC; there are no restrictions on operations associated with existing forestry aggregate pits.

Notes

The **critical breeding period** is May 1-August 15. Local knowledge of breeding chronology may be used to adjust these dates.

vi) Least bittern

The following direction is provided for the least bittern and its breeding habitat.

Description of value

Suitable habitat within a radius of 400 m of reliable observations of least bittern breeding evidence reported within the past 20 years comprises the AOC.

Suitable habitat to be delineated by the Ministry typically includes marshes and shrub swamps with tall and robust emergent herbaceous and/or woody vegetation interspersed with open water (hemi-marsh conditions).

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within the AOC.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New landings are not permitted within the AOC.

- Operations associated with existing roads and landings are permitted within the AOC subject to the following condition:
  - Road maintenance is restricted to surface grading or other maintenance operations identified in the approved FMP.

- Water drawdowns or other operations that significantly alter hydrological regime are not permitted within the AOC.

Guidelines

- New all-weather roads are not permitted within the AOC. However, water crossings and associated approaches (branch and operational roads only) may be permitted in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process. In all cases, water crossings and associated approaches will be decommissioned or otherwise subject to access control measures following operations.

- New winter roads are permitted within the AOC with Ministry approval (see Appendix 1b).

vii) Louisiana waterthrush

The following direction is provided for the Louisiana waterthrush and its breeding habitat.

Description of value

Suitable habitat within 50 m on both sides of a stream for a distance of 400 m above and below of reliable observations of Louisiana waterthrushes within the past 10 years comprises the AOC.

Suitable habitat to be delineated by the Ministry typically includes forested ravines and wooded swamps or wetlands within mature, closed canopy forest.

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Single-tree selection harvest is permitted within the AOC outside the **critical breeding period.** No other types of harvest are permitted within the AOC.

- Renewal and tending operations are permitted within the AOC outside the **critical breeding period**.

- Wildlife trees and downed woody material will be retained within harvested portions of the AOC (see Sections 3.2.3.1 and 3.2.3.2).

Guidelines

- Harvest, renewal, and tending operations are not permitted within the AOC during the **critical breeding period**, except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on perational roads and landings (planned or existing)

Standards

- New all-weather roads or landings are not permitted within the AOC.

Guidelines

- New winter roads are not permitted except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

- Only operations associated with low-risk road maintenance (e.g., surface grading) to maintain safe travel conditions on existing roads are allowed during the **critical breeding period**.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New aggregate pits and wood storage yards are not permitted within the AOC.

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **critical breeding period,** except in extraordinary circumstances, as specifically identified and justified through the FMP AOC planning process.

Notes

The **critical breeding period** is May 1-July 31. Local knowledge of breeding chronology may be used to adjust these dates.

viii) Red-headed woodpecker

The following direction is provided for the red-headed woodpecker and its breeding habitat.

Description of value

Suitable habitat occupied by breeding red-headed woodpeckers within the past 10 years defined by either:

- suitable habitat occupied by breeding birds as delineated through field survey, or,
- a 3 ha patch of suitable habitat associated with reliable observations of red-headed woodpecker breeding evidence or other reliable sightings associated with breeding activity.

Direction applies to suitable breeding habitat delineated by the Ministry prior to, or during, operations. Delineated habitat comprises the AOC.

Observations are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest is permitted within the AOC that retains ≥70 dominant or codominant trees/ha subject to timing restrictions (see below); known nest trees will be retained in uncut patches ≥20 m in radius.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the AOC during the **critical breeding period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.
- Wildlife trees and downed woody material will be retained within harvested portions of the AOC as per general direction in Sections 3.2.3.1 and 3.2.3.2; living wildlife trees with cavities or the potential to develop cavities will be emphasized.

Best management practices

- Creation of group openings will be encouraged in single tree selection cuts.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Guidelines

- Road construction is not permitted within the AOC during the **critical breeding period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process. However, there is no timing restriction on forestry-related traffic or low potential impact road maintenance operations (e.g., grading).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the AOC.

Guidelines

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **critical breeding period** unless with Ministry approval (see Appendix 1b).

Notes

The **critical breeding period** is May 14-July 21. Local knowledge of breeding chronology may be used to adjust these dates.

4.3.8 Mammals

There are several species or ecotypes of mammals listed as at risk which occur (or potentially occur) within the managed forest. The woodland caribou responds to habitat composition and structure at large scales. Thus, direction for caribou is included in the Forest Management Guide for Boreal Landscapes.

Eight species of bats occur within the managed forest: big brown bat, eastern small-footed myotis (formerly small-footed bat), hoary bat, little brown myotis (formerly little brown bat), northern myotis (formerly northern long-eared bat), eastern red bat (formerly red bat), silver-haired bat, and the tri-colored bat (formerly eastern pipistrelle). All of Ontario's bats are insectivores. All species of bats are listed as specially protected mammals in the *Fish and Wildlife Conservation Act, 1997*. Seven of the bat species are listed as species at risk. The principal threat to eastern-small-footed myotis, little brown

myotis, northern myotis and the tri-colored bat is white-nose syndrome. The principal threat to the hoary bat, eastern red bat and silver-haired bat is impact with wind turbines and decline in prey availability.

General direction for bat habitat that maintains a diversity of forest types and ages (including old growth), a range of potential roost and nursery sites within stands (cavity trees), and the integrity of aquatic and shoreline habitats largely addresses the basic habitat requirements of bats is found in Sections 3.2 and 4.1. Direction is provided in this section for bat hibernation sites.

The eastern wolf (formerly known as Algonquin wolf) and grey wolf are habitat generalists that likely benefit from the diversity of conditions created by the general direction in the Landscape Guides, Section 3 of this guide, and the fine filter direction for key prey species (moose, deer) in Section 3.3. Direction is provided in this section for eastern wolf and grey wolf den sites and eastern wolf rendezvous sites.

The gray fox is also a habitat generalist that likely benefits from the diversity of conditions created by the general direction in the Landscape Guides and Section 3 of this guide. Direction is provided in this section for gray fox den sites.

Direction

Direction for bat hibernation sites focuses on:

- Minimizing alteration of habitat in the immediate vicinity of the hibernation site opening(s) and the surrounding microclimate
- Minimizing access to hibernation sites
- Minimizing potential sources of disturbance around hibernation sites during hibernation and during periods of entry and emergence

i) Bat hibernation sites

Five bat species hibernate in Ontario, including four listed species, eastern small-footed myotis, little brown myotis, northern myotis, and tri-colored bat, plus big brown bat, typically using caves or abandoned mines that provide above-freezing air temperature and high relative humidity. Suitable hibernation sites may be a limited resource; individual sites may be used by large numbers of bats drawn from an area of several thousand km^2 around the hibernation sites. Disturbance of hibernating bats is a major mortality factor.

Description of value

Hibernation sites **known** or **suspected** to have been used at least once within the past 20 years and the area 200 m wide surrounding hibernation sites comprise the AOC.

Hibernation sites to be delineated by the Ministry as the minimum convex polygon encompassing the full extent of entry/exit points and underground network of chambers associated with occupied caves or mines.

Hibernation sites are considered polygonal features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest, renewal, and tending operations are not permitted within 100 m of hibernation sites
    - Harvest, renewal, and tending operations associated with the clearcut silviculture system are not permitted within the AOC.

- Harvest, renewal, and tending operations are not permitted within the AOC during **fall swarming** or **spring emergence periods**.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within 100 m of hibernation sites.

- Operations associated with existing roads and landings are permitted within the AOC.

- Construction of roads and landings is not permitted within the AOC during the **hibernation, fall swarming,** or **spring emergence periods**.

Guidelines

- Avoid constructing new roads and landings within the outer 100 m of the AOC unless with Ministry approval (see Appendix 1b).

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within 100 m of hibernation sites.

- Construction of new forestry aggregate pits and wood storage yards is not permitted during the **hibernation, fall swarming,** or **spring emergence periods.**

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within the AOC during the **hibernation period.**

Guidelines

- Avoid constructing new forestry aggregate pits and wood storage yards within the outer 100 m of the AOC unless with Ministry approval (see Appendix 1b).

Notes

Hibernation sites **known** to have been used are those where presence of hibernating bats has been confirmed. Hibernation sites **suspected** to have been used are those where presence of bats during fall swarming or spring emergence has been confirmed. Given the potential difficulty of identifying all species using a hibernation site, this direction will be applied to all known or suspected hibernation sites unless the Ministry confirms sites are not occupied or likely to be occupied by bats.

The **fall swarming period** is defined as August 1-October 31.
The **spring emergence period** is defined as March 1-May 15.
The **hibernation period** is defined as October 1- April 30.
Local knowledge may be used to adjust these dates (considering all species of bats present).

Direction for eastern wolf and gray fox den sites and eastern wolf rendezvous sites focuses on:

- Minimizing disturbance of animals using den sites and traditional rendezvous sites (eastern wolf)
- Maintaining den structures
- Maintaining suitability of habitat immediately surrounding den sites and rendezvous sites (eastern wolf) for those sites likely to be traditionally used.

ii) Eastern wolf and grey wolf

Direction is provided for eastern wolf (formerly known as Algonquin wolf) and grey wolf and their den sites and for eastern wolf rendezvous sites. Planning teams will use the most recent information available to determine whether wolves in their forest management unit are likely the eastern or northern grey subspecies (e.g., see the *Backgrounder on Wolf Conservation in Ontario*, (OMNR 2005)).

Dens can include excavated, underground tunnels, crevasses, rock caves, upturned tree roots, hollow logs or stumps, or abandoned beaver lodges. Den sites are typically found in conifer dominated forests close to a permanent water source. The pack uses

one or more dens for the first one to two months of the wolf pups' life. There is fidelity to den sites and although not re-used each year, the re-use of den sites is common.

When eastern wolf pups are about two months of age, they are moved from maternal dens to a series of rendezvous sites where they remain while the pack hunts. Individual sites may be occupied for a period of days to weeks. By early fall, pups begin to hunt with the pack and use of rendezvous sites decreases.

Eastern wolf rendezvous sites may be found in a variety of habitats such as open bogs, burns, clearcuts, beaver meadows, and open forest. Rendezvous sites are often used by wolf packs during multiple years. Areas used as rendezvous sites one year may be used as den sites in a subsequent year. Wolves in remote areas, or where prone to harvest by humans, appear to have a low tolerance for human activity near rendezvous sites.

Eastern wolf and grey wolf den sites

Description of value

Suitable den sites known or **suspected** (with a high degree of certainty) to have been occupied by eastern wolves or grey wolves at least once within the past five years and the area with a radius of 200 m comprise the AOC.

Dens are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following condition:
    - Harvest is not permitted within 50 m of dens

Guidelines

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
    - Harvest that retains mature forest with ≥60% relatively uniform canopy closure (canopy openings not to exceed individual tree crowns) is permitted within 51-100 m of dens. Harvest that retains relatively uniform canopy closure ≥60% is generally restricted to commercial thinning, preparatory shelterwood harvest, or single tree selection harvest; no harvest is permitted if initial canopy closure <60%
    - Renewal and tending operations that will leave a residual stand structure below the minimum described above are not permitted; all other renewal and tending operations are permitted.

- Harvest, renewal, and tending operations are not permitted within the 200 m of occupied dens during the **denning period** except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within the inner 100 m of the AOC.

Guidelines

- New roads and landings will not be constructed within the outer 100 m of the AOC unless with Ministry approval (see Appendix 1b).

- When roads are constructed within the AOC, temporary roads and/or water crossings will be used to limit future access and disturbance unless with Ministry approval (see Appendix 1b).

- Road construction operations are not permitted within 200 m of occupied dens during the **denning period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Forestry-related traffic and road maintenance operations are not permitted within 100 m of occupied dens during the **denning period** unless the road predates the den or except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the inner 100 m of the AOC.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the outer 100 m of the AOC unless with Ministry approval (see Appendix 1b).

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within 200 m of occupied dens during the **denning period**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Notes

The **denning period** is April 1-June 30. Local knowledge of denning chronology may be used to adjust these dates.

Den sites **suspected** to be or have been occupied, are those at which animal presence has not been confirmed, but for which there is compelling evidence of current or previous use (e.g., presence of scat, gnawed bones or litter, hair).

Eastern wolf traditional rendezvous sites

Description of value

Traditional rendezvous sites are those that have been used ≥2 weeks/year for ≥2 years within the past 10 years. When detailed information on the periodicity of use is lacking, presence of matted vegetation, well-worn trails, and abundant wolf scat can be used as evidence of traditional use.

Rendezvous sites known to have received traditional use by the eastern wolf and the area within a radius of 200 m comprise the AOC.

Rendezvous sites are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following condition:
  - Harvest is not permitted within 50 m of rendezvous sites

Guidelines

- Harvest, renewal, and tending operations are permitted within the AOC subject to timing restrictions (see below) and the following conditions:
  - Harvest that retains **residual forest** is permitted within 51-100 m of rendezvous sites; no harvest is permitted if initial canopy closure <50%
  - Renewal and tending operations that will leave a residual stand structure below the minimum described above are not permitted; all other renewal and tending operations are permitted.

- Harvest, renewal, and tending operations are not permitted within the 200 m of occupied rendezvous sites during the **normal period of use** except in

extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are not permitted within the inner 100 m of the AOC.

Guidelines

- New roads and landings will not be constructed within the outer 100 m of the AOC unless with Ministry approval (see Appendix 1b).

- When roads are constructed within the AOC, temporary roads and/or water crossings will be used to limit future access and disturbance unless with Ministry approval (see Appendix 1b).

- Road construction operations are not permitted within 200 m of occupied rendezvous sites during the **normal period of use**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Forestry-related traffic and road maintenance operations are not permitted within 100 m of occupied rendezvous sites during the **normal period of use** unless the road predates the rendezvous site or except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are not permitted within the inner 100 m of the AOC.

Guidelines

- New forestry aggregate pits and wood storage yards are not permitted within the outer 100 m of the AOC unless with Ministry approval (see Appendix 1b).

- Operations associated with forestry aggregate pits and wood storage yards are not permitted within 200 m of occupied dens during the **normal period of use**, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Notes

See definition of **residual forest** in Section 3.2.2.1.

The **normal period of use** is May 15-September 15. Local knowledge of the chronology of use may be used to adjust these dates.

iii) Gray fox den sites

Site-specific direction is provided below to minimize disturbance around gray fox and its den sites.

Description of value

Den sites known or **suspected** (with a high degree of certainty) to have been occupied by gray foxes and the area within a radius of 100 m comprise the AOC.

Dens are considered point features.

Operational prescription and conditions for the area of concern

Standards

- Harvest, renewal, and tending operations are not permitted within 20 m of the den entrance.

Guidelines

- Harvest, renewal, and tending operations are not permitted within the AOC during the **denning period** if dens are occupied, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Standards

- New roads and landings are permitted within the AOC subject to the following condition:
    - New roads and landings are not permitted within 20 m of the den entrance.

Guidelines

- New roads and landings are permitted within the AOC subject to the following condition:
    - Construction of new roads and landings is not permitted within the AOC during the **denning period** if dens are occupied, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Forestry-related traffic and road maintenance operations are not permitted within 50 m of occupied dens during the **denning period** unless the road predates the den or except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- New forestry aggregate pits and wood storage yards are permitted within the AOC subject to the following condition:
    - New forestry aggregate pits and wood storage yards are not permitted within 20 m of the den entrance

Guidelines

- New forestry aggregate pits and wood storage yards are permitted within the AOC subject to the following condition:
    - Construction of new forestry aggregate pits and wood storage yards are not permitted within the AOC during the **denning period** if dens are occupied, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

- Operations associated with existing forestry aggregate pits and wood storage yards are not permitted within the AOC during the **denning period** if dens are occupied, except in extraordinary circumstances as specifically identified and justified through the FMP AOC planning process.

Notes

The **denning period** is April 15-September 15. Local knowledge of denning chronology may be used to adjust these dates.

Den sites **suspected** to be or have been occupied, are those at which animal presence has not been confirmed, but for which there is compelling evidence of current or previous use (e.g., presence of scat, remains of prey, hair).

iv) Wolverine den site(s) and rearing area

Wolverines require large areas (100s km^2) with little human infrastructure for their home range. The landscape-scale approach to the management of woodland caribou habitat and creation of large landscape patches in the Boreal Landscape Guide is expected to maintain large blocks of unharvested and roadless habitat suitable for wolverines when combined with the landscape-scale structure, composition, and pattern direction in the Boreal Landscape Guide. Direction is provided in this section to create small landscapes with minimal human disturbance associated with the protection of known denning and associated rearing area from the effects of disturbance.

Direction is provided for wolverine and its den site(s) and rearing area. Wolverine dens may be comprised of snow tunnels up to 60 m long and are typically associated with large boulders, large woody material, or fallen trees. They also use the permanent features into the spring. Human contact may cause females to abandon den sites; dens are typically located a considerable distance from roads and human infrastructure.

Direction for den sites and rearing area of wolverines focuses on:

- Minimizing disturbance of wolverines using den sites
- Maintaining suitability of habitat surrounding den sites and rearing areas.

Direction for development of a den site(s) and rearing area management plan for wolverines is nested within the landscape-scale direction in the Boreal Landscape Guide.

Description of value

Natal and/or maternal den areas known to have been occupied by wolverines within the past 8 years (unless documented as unoccupied for ≥4 consecutive years) and:

- The area centred on a single den site within a radius of 4 km comprise the AOC, or
- The area centred on a minimum convex polygon (minimum distance between multiple den sites) within a radius of 4 km comprise the AOC.

Dens are considered point features.

Operational prescription and conditions for the area of concern

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

Conditions on forestry aggregate pits and wood storage yards (planned or existing)

Standards

- In consultation with Ministry staff with expertise in species at risk, a den site(s) and rearing area management plan will be developed that outlines the extent and timing of harvest, renewal, and tending operations acceptable within the AOC, as well as conditions on roads, landings, forestry aggregate pits, and wood storage yards. NOTE: a den site(s) and rearing area management plans are required if the denning area overlaps planned operations.

Guidelines

- Reasonable efforts will be made to incorporate the AOC into a large block of unharvested and unroaded forest (e.g., incorporate the AOC into a dynamic caribou habitat schedule block that is not scheduled to be harvested in the near future).

- The den site(s) and rearing area management plan will:
    - Normally prohibit forest management operations during the **denning period.**
    - Any harvest, renewal, and tending operations, road and wood storage yard construction, and aggregate extraction permitted within the AOC will maintain the suitability of denning and rearing habitat. It is recognized that some operations may be permitted to meet ecological, social, or economic objectives.
    - Considerations in the development of the den site(s) and rearing area management plan should include: the strategic landscape map, planned operations, existing operations, existing disturbances, landscape features and balancing objectives (including socio-economic). If operations are considered, a modified management zone will be defined in the den site(s) and rearing area management plan.
    - Include Use Management Strategies for existing roads that will provide locally appropriate measures to minimize road-associated impacts on wolverines. This may include access controls while roads are in use and a decommissioning plan for roads following use.

Notes

The **denning period** is January 15-June 1. Local knowledge of denning chronology may be used to adjust these dates.

5.0 OPERATIONAL CONSIDERATIONS

The majority of the direction in the Stand and Site Guide can be directly related to at least one aspect (e.g., emulating natural disturbance) of the CFSA principle to conserve *large, healthy, diverse and productive Crown forests and their associated ecological processes and biological diversity*. This section aims to prevent, minimize, or mitigate any potential negative impacts on wildlife and the physical environment that could result from forest operations and that are not addressed in Sections 3 or 4.

The potential impacts of operations need to be considered during both the planning and implementation phases. Well-informed, advanced planning will help to prevent the selection of inappropriate operations and identify methods to prevent, minimize, and mitigate potential negative impacts that may occur during implementation.

A variety of strategies and techniques can be used during the implementation of forest operations to prevent, minimize, and mitigate negative impacts. However, the direction in this section of the guide is generally limited to what is required during planning or preparing for operations. In many cases, the direction in the guide will provide only the goal (e.g., minimize mineral soil exposure) or the conceptual approach (e.g., use erosion-resistant materials below the high-water mark).

There is a large amount of technical information available that can be used to implement the direction in this guide. Some commonly used technical documents that are particularly relevant to Ontario are cited, but in recognition of the fast pace of improvements in methods and materials (e.g., techniques and materials to mitigate concerns regarding erosion) direction on technical implementation of operations is generally not provided. Further, there are many technical details that cannot be well articulated in any document and only exist in the experience and ingenuity of the operators.

Section 5.1 provides direction for the planning, construction, maintenance and decommissioning of roads and water crossings. Section 5.2 provides direction for the conservation of soil resources and productive forest area. Section 5.3 provides a short discussion on the spread of invasive species.

The majority of the direction in Sections 5.1 will be implemented as conditions on roads, landings, forestry aggregate pits, and wood storage yards and the majority of the direction in Section 5.2 will be implemented as conditions on regular operations.

5.1 Roads and water crossings

The standards, guidelines, and best management practices assist planning teams with addressing environmental, social, and safety concerns associated with the planning, construction, maintenance, and decommissioning of roads and water crossings in FMPs. Much of the direction in this section has been used in Ontario for a number of years. The *Environmental Guidelines for Access Roads and Water Crossings* remains

available as a technical reference for this guide at https://www.ontario.ca/page/forest-management-guides.

5.1.1 Roads

Most requirements for road construction, maintenance, and decommissioning on Crown land in the managed forest are described in the FMPM. This section provides additional direction intended to mitigate potential adverse effects of all roads planned, constructed, maintained, and potentially decommissioned in accordance with the FMPM on wildlife, the physical environment, and public safety. Refer to Sections 3.3, 4.1, 4.2 and 4.3 and the Landscape Guides for additional restrictions based on the specific values (e.g., moose emphasis areas, water features, wetlands, nests, dens, species at risk) associated with LLPs, conditions for AOCs, or conditions on roads, landings, forestry aggregate pits, and wood storage yards for important ecological features. Refer to Section 5.1.2 for direction that addresses the potential effects of road crossings on water features.

Forest access roads no longer required for forestry purposes may be decommissioned. As per the FMPM, decommissioning is undertaken to render the road impassable to vehicular traffic, enhance public safety and reduce potential environmental damage. The objective of decommissioning a road or road network may be to limit vehicle access to a remote tourism lake (this may or may not include treatments to renew the roadbed as part of the physical work) or to return the right-of-way and roadbed to productive forest cover.

The decommissioning of roads and road networks generally includes the removal of associated water crossings at the same time. See Section 5.1.2. for further information on the removal of water crossings.

Direction

The direction in this section will be implemented using regular FMP products (e.g., road corridor or boundary planning) and conditions on roads, landings, forestry aggregate pits, and wood storage yards.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

i) Design and location

Guidelines

- To minimize the potential adverse effects of roads on terrestrial and aquatic ecosystems, road planning (location, layout and design) will:
    - Make use of existing roads where practical for long-term access

    - Ensure temporary roads are designed to the minimal standard necessary, reflecting their future management intent (e.g., anticipated traffic volume and service life, potential decommissioning)
    - Minimize the number of water crossings
    - Avoid unsuitable terrain including long, steep (>10%) grades, deep swamps, bedrock, and shallow soils
    - Avoid locating landings and turn-arounds in low, wet areas where they may disrupt hydrological function or cause rutting.

- When the location of the road and landings within the approved corridor or operational road boundary are being finalized, avoid hydrological connections that channel ephemeral surface flow and/or shallow groundwater flow to lakes, ponds, rivers, or streams.

Best management practices

- To minimize the risk of disrupting hydrological function within hydrological connections when avoidance is not practical or feasible, roads should cross:
    - At the narrowest point possible
    - At right angles to the direction of hydrological flow
    - As far from the connected aquatic features as possible
    - At locations with the highest soil bearing capacity possible (look for indicators of drier soil conditions).

- Where possible, locate roads and landings so skidding and forwarding does not have to cross natural drainage patterns.

- Avoid creating permanent, all-season loop roads where they may result in increased hunting and/or angling pressure and/or impede enforcement to pursue unauthorized hunting and angling activities.

ii) Construction and maintenance

Standards

- Materials moved during construction, such as grubbed soil and organic material, will not be piled where they block drainage courses.

- The Ministry will ensure that signs used to identify the use management strategies for roads (e.g., travel restrictions) are maintained.

- When grading roads, do not create false ditches (accumulated berms of gravel along road edges) that channel sediment-bearing water down the road directly into a water feature.

- Ensure road grading operations do not result in the blockage of off-take ditches.

- When grading a road adjacent to a bridge, do not pull road surface material onto bridge deck.

Guidelines

- Minimize the clearing width of the road right-of-way to that required for construction and safety (i.e., line of sight) purposes and specify maximum clearing widths (for roads outside AOCs that specify maximum right-of-way widths) in the FMP.

- When recognizable hydrological connections (linear features that channel ephemeral surface flow and/or shallow groundwater flows to lakes, ponds, rivers, or streams) must be crossed, road construction will not disrupt hydrological function. Maintain hydrological function through adequate cross drainage. Hydrological function will be considered to be disrupted if a road impedes water movement by restricting flow and creating pools of standing water that exist for >1 year that may or may not cause the flooding and subsequent mortality of adjacent trees. These locations may best be identified in the spring when ponding may be more frequent along a road.

- When ongoing monitoring reveals the need for road maintenance, remedial action will be undertaken as soon as possible based on the potential for environmental damage and/or risk to public safety.

Best management practices

- Grubbed material should be piled and stored so that it can be used to assist in road decommissioning.

- Construct offtake ditches on long sustained grades to reduce the flow velocity and volume of water being carried down roadside ditches.

- Ensure winter roads are constructed with water crossings able to accommodate flows from early and mid-winter thaws or from rain-on-snow precipitation events.

- Establish a minimum size for cross drainage culverts based on local conditions.

- Consider the following practices to mitigate the potential impacts of short duration, high intensity rainfall events:
    - Increase the number (spacing frequency) and size of cross drainage culverts to accommodate higher flows and more debris which will reduce the likelihood of washouts
    - Construct and maintain (through grading) road crowns to 3-5% to facilitate rapid removal of water off the road surface
    - Construct a shallow, armoured depression beside culverts (see Figure 5.1a) on low-volume roads to provide peak flow water passage over top of the road surface and divert flow back toward the natural channel with minimum damage.

- Consider following the signage requirements (regulatory, warning, temporary conditions, information and Ministry-specific signs) identified in the Ministry's *Roads and Crossings Sign Manual* (2018) for roads on Crown land that are administered under the CFSA. Users of the guide may refer to the manual for further direction on sign design, placement and maintenance.

- Have a maintenance schedule to keep cross drainage culverts clear of obstructions to help avoid potential problems such as roadside water ponding and washouts.

- Provide breaks in high snowbanks along the sides of a road to allow meltwater trapped on the road surface to flow away from the road.

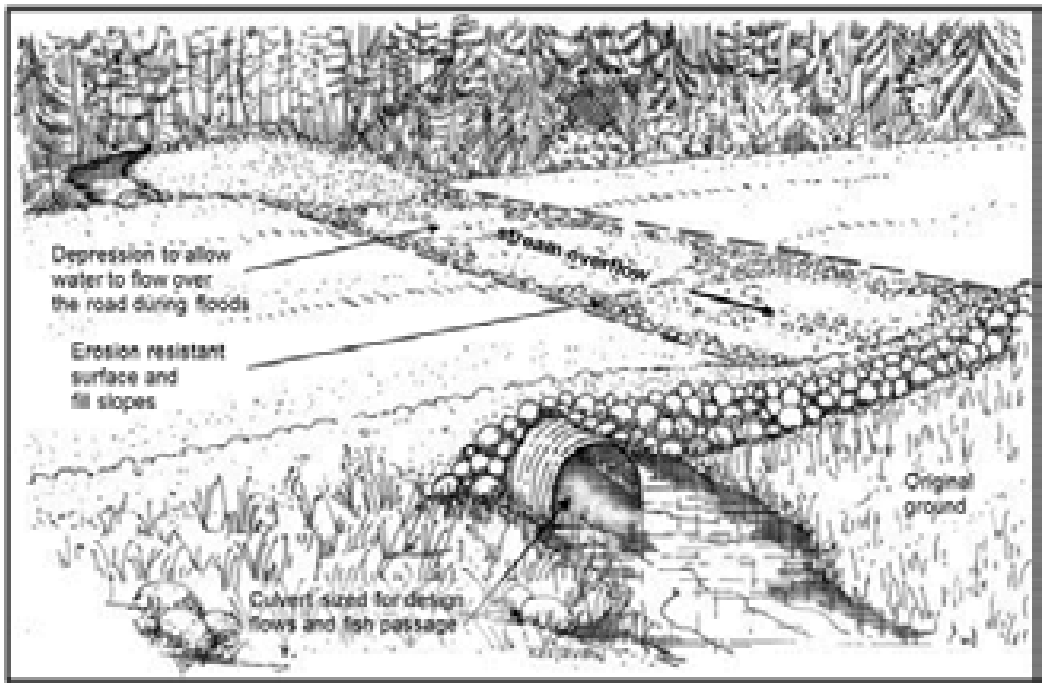

Figure 5.1a. A depression beside the culvert allows water to spill over the road in the event of a flood or culvert blockage (illustration by Kestevan Design).

iii) Decommissioning

Guidelines

- For each road or road network scheduled to be decommissioned, stabilize slopes susceptible to washouts (e.g., slope grading, surface roughening, applying logging debris, seeding) to prevent erosion and protect public safety.

- When a road or road network is to be decommissioned, all associated water crossings that have been assessed to pose a potential threat to public safety,

water quality or fish habitat, as per the criteria for water crossing structure removal in Section 5.1.2, will be removed in conjunction with the scheduling of any associated road treatments. Decommissioning of a road or road network may not require removal of all water crossings where agreed upon by the Ministry.

Best management practices

- Materials which had been moved and piled during construction, such as grubbed soil and organic materials and post-harvest slash should be pulled back onto the roadbed. This material will help to deter vehicles and improve microsite conditions for regeneration.

- Plan and construct roads to the minimum standard required to reduce efforts and costs associated with decommissioning (e.g., construct winter roads and crossings where operationally feasible, use temporary bridges).

- If the use management strategy includes access control, consider options such as:
    - Signage (under the *Public Lands Act)*
    - Physical barriers such as large rocks, slash, or berms
    - A gate
    - Seasonal closure
    - Any other option the planning team deems appropriate/effective for the area.

- Remove cross drainage culverts and slope the roadbed where culverts have been removed to prevent erosion and for public safety concerns, while allowing water to flow freely over it.

- If the objective of the road decommissioning includes returning the roadbed to a forested condition, establish access control(s) to prevent vehicular access to recently re-forested roadbeds to improve regeneration survival and growth.

- Consider establishing multiple access controls (e.g., multiple berms) on a road to improve the effectiveness of the treatment for reducing traffic. The number and type of access controls to be installed should reflect the sensitivity of the value being protected and the anticipated non-compliance efforts.

- Where it is operationally and environmentally feasible to do so, take advantage of natural barriers to traffic when decommissioning roads. Strategically located water crossing removals or roadbed removal where it crosses a wetland may reduce unwanted fording or circumvention of the decommissioning treatment.

5.1.2 Water crossings

Water crossings are locations where a road crosses a water feature. Water crossings can potentially have significant detrimental impacts on water quality, fish habitat and fish populations. Improperly designed, constructed, maintained, and/or removed water crossings can affect fish and fish habitat either directly or indirectly by blocking migration, causing sedimentation, removing shade and food sources through loss of vegetation, and/or adding deleterious substances to the water. Additionally, failed water crossings can potentially pose a serious risk to public safety and continued road use. Through appropriate selection of water crossing structure and location, and adherence to proper construction, maintenance, and removal practices and mitigation measures, potential disturbance or damage to the environment and aquatic resources will be minimized.

Direction

The direction in this section is applicable to all water crossings (i.e., temporary and permanent) unless more specific information is provided (e.g., direction for a temporary, winter-only crossing, non-road crossing). It also applies to previously constructed water crossings that require replacement, repair, or upgrading due to sub-standard safety, environmental, or operational issues.

The direction in this section will be implemented using regular FMP products (e.g., water crossing location planning) and conditions on roads, landings, forestry aggregate pits, and wood storage yards.

Conditions on primary and branch roads and landings (planned or existing)

Conditions on operational roads and landings (planned or existing)

i) General

Standards

- The submission, review and approval of water crossings built under authority of the CFSA will comply with the requirements of the FMPM, *Ministry of Natural Resources and Forestry/Fisheries and Oceans Canada Protocol for the Review and Approval of Forestry Water Crossings, Crown Land Bridge Management Guidelines*, and all other applicable legislation. Further information about the approval process for water crossings (e.g., Ministry engineering approvals) can be obtained from the local Ministry office and/or Conservation Authority.

- For the approval of construction or removal of single, closed-bottom round culverts >1,200 mm in diameter and/or multiple culverts, the Ministry will ensure that at a minimum, the general water crossing standards and water crossing standards for the construction and removal of single, small (≤1,200 mm) closed-bottom round culverts are applied.

ii) Design and location

Guidelines

- Selection of the type of water crossing structure, its location, and its capacity to pass water and allow for the movement of fish, will consider:
    i. possible negative effects on the form and function of the undisturbed natural channel and its floodplain;
    ii. the fish species present and the impact of the crossing structure on them, as required by the *Fisheries Act*; and
    iii. whether the water crossing is over navigable waters.

Best management practices

- If past or present beaver activity is identified at a crossing location, change the crossing location (preferably upstream of the area with beaver activity) or include mitigative techniques to address the probability beavers will return to the site.

- On large streams (i.e., streams >2 m wide), consider crossing with a bridge or arch (open-bottom) culvert. Bridges and arches have a higher initial cost but are less prone to washouts and beaver problems than closed-bottom round culverts.

iii) Construction and maintenance

Standards

- To facilitate fish passage, install culverts with at least 10% of the diameter of the culvert below the natural stream bed (excludes culverts installed for temporary winter access).

- Construct and use fords during the driest time of the year but not during the restricted time of high risk to fish (see Table 5.1a); ensure the ford does not restrict fish passage.

Guidelines

- Construction operations that enter a water feature (i.e., in-water work) or potentially cause sediment to enter a water feature, are not to occur during periods of fish spawning, incubation, or fry emergence, unless approved by the Ministry (see Appendix 1b). Timing restrictions vary across the province; generic timing restrictions, by species for each Ministry region, are provided in Table 5.1a.

Table 5.1a. Timing restrictions for in-water work to protect fish and fish habitat[1]

Spring spawners	Northwest region	Northeast region	Southern region
Walleye	Apr. 1 – June 20	Apr. 1 – June 20	Mar. 15 – May 31
Northern pike	Apr. 1 – June 15	Apr. 1 – June 15	Mar. 15 – May 31
Lake sturgeon	May 1 – June 30	May 1 – July 15	May 1 – June 30
Muskellunge	May 1 – July 15	May 15 – July 15	Mar. 15 – May 31
Largemouth bass	May 15 – July 15	May 15 – July 15	May 1 – July 15
Smallmouth bass	May 15 – July 15	May 15 – July 15	May 1 – July 15
Rainbow trout	Apr. 1 – June 15	Apr. 1 – June 15	Mar. 15 – June 15
Unknown species	Apr. 1 – June 15	Apr. 1 – June 15	Mar. 15 – July 15
Fall spawners	**Northwest region**	**Northeast region**	**Southern region**
Lake trout	Sept. 1 – May 31	Sept. 1 – May 31	Oct. 1 – May 31
Brook trout	Sept. 1 – June 15	Sept. 1 – June 15	Oct. 1 – May 31
Pacific salmon	Sept. 1 – June 15	Sept. 1 – June 15	Sept. 15 – May 31
Lake whitefish	Sept. 15 – May 31	Sept. 15 – May 15	Oct. 15 – May 31
Lake herring	Oct. 1 – May 15	Oct. 1 – May 31	Oct. 15 – May 31
Unknown species	Sept. 1 – June 15	Sept. 1 – June 15	Oct. 1 – May 31

[1]All dates inclusive. Local knowledge of periods of reproductive activity may be used to adjust these dates. In-water work may proceed with appropriate mitigation as approved by the Ministry or the appropriate authority.

- When existing water crossings are identified for replacement, maintenance, or unplugging (e.g., from beaver activity) in the monitoring program for road and water crossings approved in the FMP, prioritize required remedial work based on risk assessment (e.g., higher priority will be given to crossings that pose the greatest risk to public safety and fish passage and migration).

- When clearing water crossings that have been affected by beaver activity or other debris remove material gradually beginning with a small breach, working in

stages to control flows and prevent sediment from being released, downstream erosion, and fish stranding.

Best management practices

- Nuisance beaver activity should be managed to keep culverts clear and provide for the passage of water and fish. Suggested methods are provided in the Ministry's *The Beaver Handbook* (1995) or in Fisheries and Ocean's Canada (DFO)'s *Code of practice: Beaver dam breaching and removal* (2022).

iv) Removal

Standards

- When decommissioning of a road or road network is planned, all water crossings on that road or road system will be assessed for potential removal.

Guidelines

- Water crossing removal operations that may enter a water feature (i.e., in-water work) or that may potentially cause sediment to enter a water feature, are not to occur during periods of fish spawning, incubation, or fry emergence, unless approved by the Ministry (see Appendix 1b). Timing restrictions vary across the province; generic timing restrictions, by species for each Ministry region, are provided in Table 5.1a.

- Whether and how a water crossing structure is to be removed will be agreed upon by the Ministry and will be based on an analysis of the following criteria as a minimum:

  Biological

  i. history of beaver activity;
  ii. sensitivity of fish species;
  iii. whether the structure is currently an impediment to fish migration or may be an impediment to fish migration in the future;
  iv. the presence of critical fish habitat and the likelihood of the habitat being impacted should a washout occur; and
  v. whether removal activities would cause damage to fish or fish habitat.

  Water quality

  i. in the event of a washout or erosion problems, will additions to natural background levels of suspended sediments affect downstream fish habitat or other values.

  Engineering

  i. the type of the water crossing structure (e.g., culvert);
  ii. the length of time the structure was designed to be functional (e.g., whether the crossing has been designed for a 10-year or 100-year storm event);

iii. the expected life of the materials used in the construction of the crossing structure;
iv. whether the fill material is similar to the streambed/streambank material;
v. whether the road will allow for floodwaters to pass without washing out;
vi. the amount and type of fill used in construction of the water crossing.

Safety

i. if the water crossing structure failed or if a washout occurred, would a hazardous situation result.

Anticipated future use

i. whether the removal of water crossings is consistent with the vehicular traffic expected by the use management strategy for the road or road network.
ii. whether the crossing site will remain safe and erosion resistant after crossing structure removal if continued vehicle passage is anticipated (Figure 5.1b).

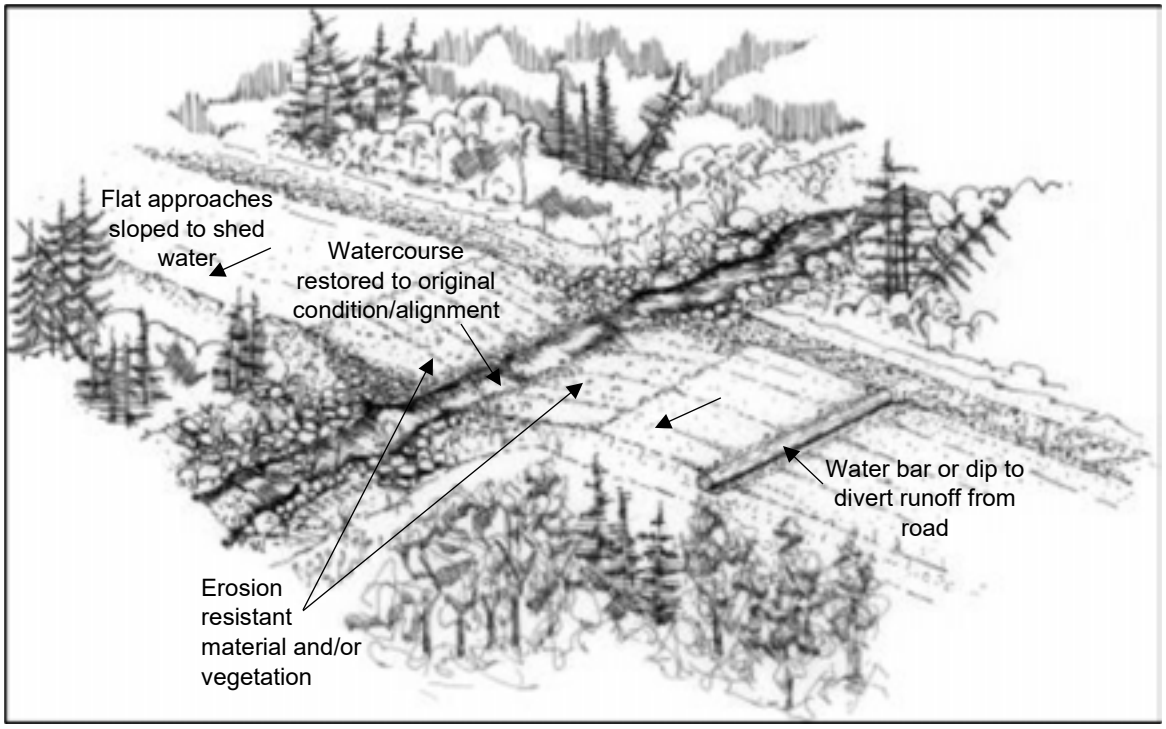

Figure 5.1b. Typical features and conditions of road approaches and watercourse after water crossing removal (illustration by Kestevan Design).

Best management practices

- Where a road or road network is being decommissioned and culverts are not being removed, incorporating a shallow depression in the approach will allow floodwater to flow over the road in the event of a culvert blockage or capacity

exceedance (Figure 5.1a). This may require placing erosion-resistant materials in the depression and on the downstream side of the road fill.

- When water crossing removal results in conditions unsuitable for vehicular passage, consider installing physical barriers (e.g., a large rock berm) for public safety.

5.2 Soil and productive forest area conservation

Maintaining healthy forest soils and productive forest area is critical to maintaining healthy forest ecosystems. The combination of all the direction (standards, guidelines, and best management practices) in this guide (e.g., aquatic values and hydrological connections between terrestrial and aquatic ecosystems in Section 4.1) and other forest management guides (e.g., Silviculture Guide) constitutes a comprehensive approach to soil and productive forest area conservation. If any single piece of direction in this section is applied in isolation, it would not be adequate to conserve soil resources and productive forest area. However, if applied in an integrated fashion, the probability of adverse impacts will be minimized.

Section 5.2 addresses the conservation of soil resources and productive forest area during forest management activities, with a focus on site disturbance resulting from forestry operations. Site disturbance does not necessarily imply site damage. The effects of site disturbance can be long-lasting or short-lived. Site disturbance can occur through both natural and human-caused forces, which may be important to long-term ecosystem function. The direction in this section is intended to lower the probability of site damage occurring but does not necessarily represent the threshold where site disturbance would begin to be considered site damage.

There are many ways to categorize the types of site disturbance that may be associated with forest management activities. The following sections present site disturbance direction under the categories of rutting and compaction (and associated hydrological disruption), erosion, nutrient loss, and loss of productive forest area (see Figure 5.2a). All of the above categories are linked and it is difficult to discuss one without thinking about the other. When considering direction for one type of site disturbance, managers are encouraged to consider opportunities for synergy with the direction in other disturbance categories and other sections of this guide. For example, soil rutting often results in compaction and both rutting and compaction can influence water infiltration and movement which can lead to erosion.

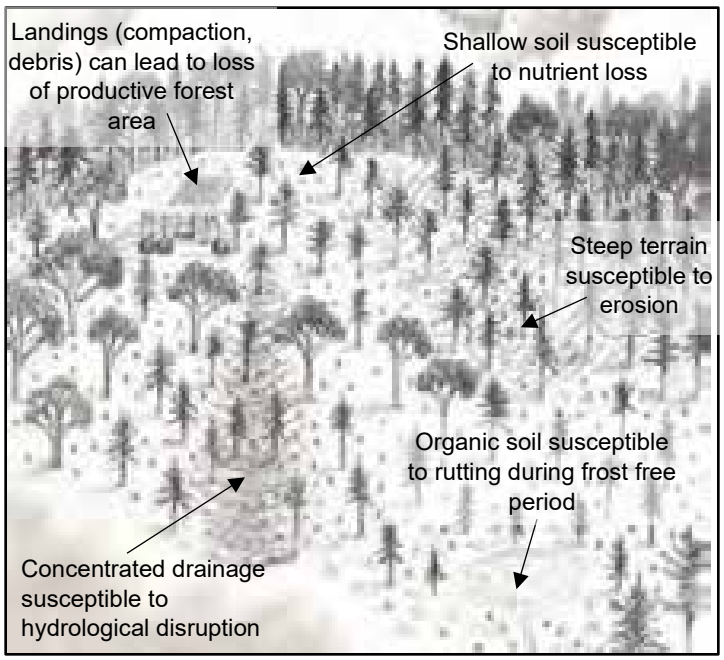

Figure 5.2a. Stylized overview depicting hypothetical areas susceptible to various forms of site disturbance resulting from forestry operations (illustration by Mandy Saille).

Well-informed advanced planning is the most critical step in conserving soil resources and productive forest area. This includes all aspects of planning such as block design, road location, landing location, skid trail layout, machinery selection, timing of entry, duration of entry, operator training, contingency planning, and renewal and tending planning. Sections 5.2.1-5.2.4 detail the standards, guidelines, and best management practices that are designed to prevent, minimize, or mitigate negative site disturbance or site damage occurrences and loss of productive forest area. The importance of prevention, through advanced planning, information on site susceptibility, communication, and operator training cannot be overstated.

Throughout this guide (e.g., Section 4.1), terms such as rut and significant mineral soil exposure are used. To understand the various pieces of direction that refer to these terms, it is important to first understand the definitions. The terms associated with site disturbance as used in this guide are defined below. These definitions by themselves are not to be construed as direction. Refer to the individual section where a definition is used to understand the application.

Rut: Continuous trench or furrow created by machine traffic that is ≥4 m long and ≥30 cm deep (Figure 5.2b). When operating on shallow soils the lesser of depth to bedrock/large boulders or 30 cm will be used. Ruts may be empty, filled with water, or filled with varying amounts of intermixed organic and mineral soil/debris. In cases of concentrated rutting, it may be difficult to distinguish individual ruts. Furrows, scalps, trenches, etc., created specifically for site preparation purposes are not considered ruts. This definition alone does not imply that ruts in excess of these dimensions are not allowed or that damage has occurred when these dimensions are exceeded.

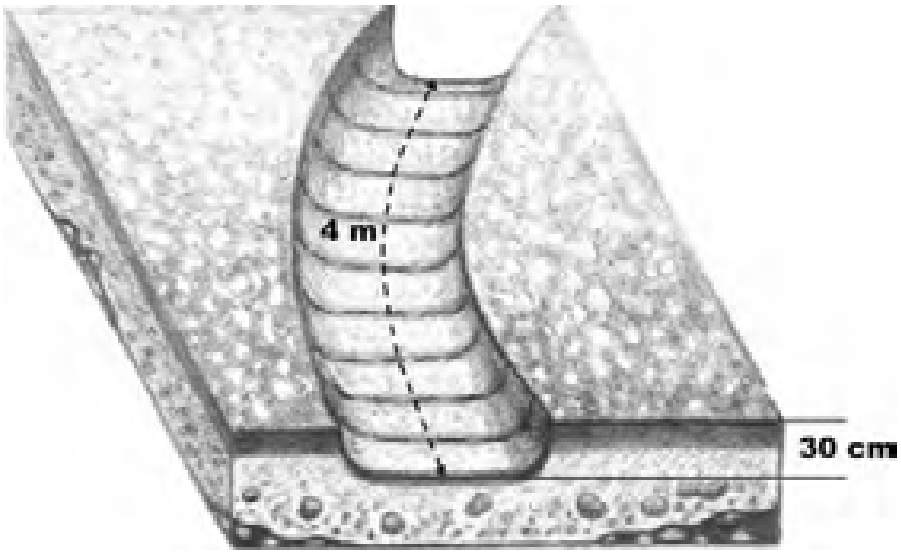

Figure 5.2b. Illustration of a rut (illustration by Mandy Saille).

Extraction trails: Anywhere a machine being used for extraction of wood (skidder, forwarder, etc) has traveled within the block (excluding travel on roads, landings, and roadside work areas).

Significant mineral soil exposure: Patches of mineral soil exposed by machine traffic that are individually larger than 4 m^2 in size or have an aggregate area that exceeds 5% coverage. The percent coverage of exposed mineral soil will be measured over a 15 m by 15 m area when operating adjacent to water or over the harvested area of the AOC for all other values (e.g., American ginseng).

Direction

The direction in Sections 5.2.1-5.2.4 apply equally to:

- Operations within regular harvest areas and areas of concern
- All harvest, renewal and tending operations.

Unless specifically referenced in the individual piece of direction, the direction in Sections 5.2.1-5.2.4 does not apply to roads, forestry aggregate pits, landings, roadside work areas, or wood storage yards. When assessing site disturbance of a current operation, any site disturbance associated with previous entries will be taken into consideration.

Direction will be implemented as conditions on regular operations.

5.2.1 Rutting and compaction

The objective of the direction in this section is to prevent, minimize, and/or mitigate rutting and compaction associated with forestry operations.

In general terms, a rut is a trench or furrow created by machine wheels or tracks caused by soil displacement and/or compaction. Compaction is the compression of soil caused by the machine load that exceeds the strength of the soil to resist it. Compaction can occur independent of rutting through machine vibration and slipping of tires. Rutting may occur independent of compaction (e.g., on saturated soil), but in general, a rut can be thought of as a visual proxy for compaction.

Conditions on regular operations

i) All silviculture systems

Standards

- No more than 40% of any 0.1 ha circle is permitted in ruts.

- Ministry and industry compliance staff will follow the approach to measuring rutting, the definition of a roadside work area, and percent coverage of extraction trails in Appendix 5.2a. This approach will be documented in the FMP.

Guidelines

- The area of rutting and compaction will be minimized.

Best management practices

- Refer to Appendix 5.2b for suggested strategies and techniques to minimize rutting and compaction during field implementation.

- Equipment operators should be trained in the identification of sites susceptible to rutting and compaction.

- Identify susceptible sites in advance of operations (e.g., via ground reconnaissance, drone-captured aerial imagery, remote sensing). An approach to dealing with these areas should be developed and communicated to operators and supervisors.
    - The site disturbance susceptibility table in Appendix 5.2c can be used as a starting point.
    - Hydrological modeling tools (e.g., flow accumulation models, LiDAR derived digital elevation models (Figure 5.2c)) can be used as an additional source of information for the possible location of susceptible sites. The outputs of these tools are not to be thought of as requiring verification, but equally they should not replace normal field reconnaissance.

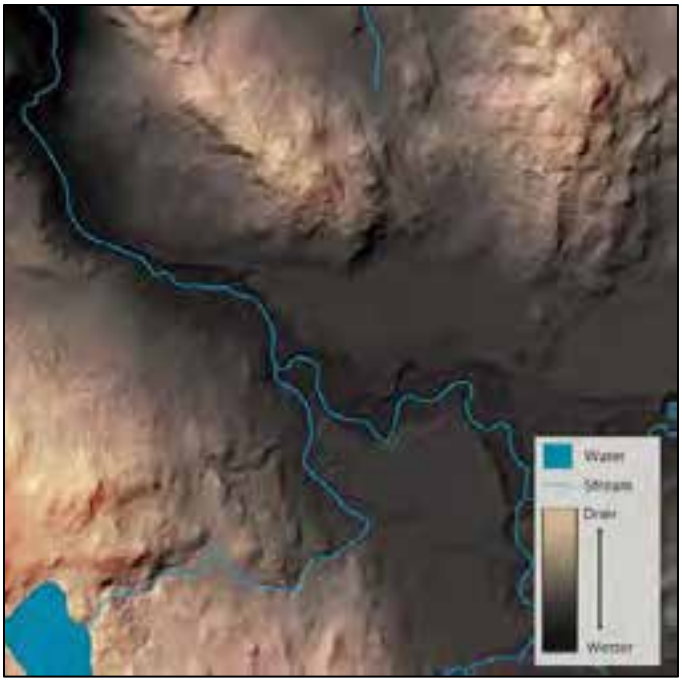

Figure 5.2c. Example of a LiDAR-derived digital terrain model that can be used to predict relative wetness. Knowing locations of predicted wet areas and concentrated drainage in advance better informs operational planning (season of harvest, equipment selection, road and skid trail layout, etc.).

- Develop local standard operating procedures to prevent, minimize, and/or mitigate disturbance for various site type and machine combinations that may potentially result in compaction and rutting.

- Selection of areas for harvest, both at individual and multi-year temporal scales, should consider susceptible sites and equipment limitations and seek a balance between stands in which operations can occur at any time of the year and those where operations are best carried out in the winter or the driest part of the summer.

- Where practical and feasible, maintain a choice of operating blocks within an economical floating distance to be able to move from susceptible areas during periods of abnormal environmental conditions (e.g., high rainfall, early thaw, late freeze) with minimal interruption in production.

ii) Clearcut silviculture system (excluding commercial thinning)

Standards

- No more than:
    - 5% of any 20 ha area (or the operating block if less than 20 ha) is permitted in ruts in shallow soils (<30 cm)

- 10% of any 20 ha area (or the operating block if less than 20 ha) is permitted in ruts in all other soils.

Best management practices

- In clearcut operations, where advanced regeneration is a significant contributor to future forest development (e.g., CLAAG, HARP, white pine advanced regeneration, tolerant hardwood understory), the area in extraction trails will be minimized. On sites susceptible to rutting, achievement of this guideline will have to be balanced against the increased rutting that may occur when extraction is concentrated on fewer trails.

iii) Selection and shelterwood (including irregular shelterwood) silviculture systems, commercial thinning

Standards

- No more than 900 m of rutted extraction trails for any continuous 20 ha area is permitted.

Guidelines

- If the threshold in the standard above is exceeded, ruts are to be rehabilitated within one year of completion of operations using appropriate equipment and during conditions (e.g., summer) that will not cause additional damage to the site. Follow the assessment method outlined in Appendix 5.2a.

- Area in extraction trails will be minimized and will not exceed the following values unless a higher value is required to meet objectives and specified in the FMP (e.g., silvicultural ground rule, conditions on regular operations).
  - 20% for selection
  - 30% for shelterwood and thinning

- Local criteria will be developed to identify when stabilization, repair, and/or work stoppage must occur to mitigate effects of ruts on long or short, steep slopes that may cause significant erosion that can degrade sites and prevent future use of extraction trails.

Best management practices

- When developing local criteria to address erosion potential, ruts longer than 20 m on slopes >20% should be stabilized (during operations) and/or rehabilitated (upon completion of operations). Stabilization and rehabilitation can include practices such as levelling, diverting runoff water to surrounding vegetation (e.g., water bars), controlling sediment (e.g., brush matting, straw bales) and/or other techniques appropriate to the circumstances.

5.2.2 Erosion

Erosion can be defined as the overland movement of soil particles by water, wind, or gravity. Erosion can be the result of either natural causes or human site alterations. Operations that are not implemented with erosion controls in mind can destabilize previously stable ground and result in localized erosion. Erosion can result in loss of productive land (e.g., blow sand – Figure 5.2d) and provide a source point for further erosion. The associated deposition of sediment can smother the roots of residual trees and may result in the harmful alteration, disruption, or destruction of fish habitat. Due to the relatively flat topography in most of Ontario, large-scale erosion is not normally a significant concern. Localized occurrences of erosion are most often visible following localized site disturbances. It is recognized that not all indicators of site instability are visible; however, if reasonable precautions are taken, the chance of localized occurrences of erosion can be minimized.

Figure 5.2d. Large areas of ‘blow sand’ can be difficult to stabilize and regenerate once exposed. Where it is not possible to maintain ground cover, prompt regeneration with suitable species can reduce the likelihood of erosion (photo by Scott McPherson).

Direction

The objective of the direction in this section is to prevent, minimize, and/or mitigate erosion associated with forest management operations. In addition to the guidelines and best management practices listed below, refer to direction for roads and water crossings (Section 5.1), rutting and compaction (Section 5.2.1), and aquatic and wetland ecosystems (Section 4.1).

The direction in this section will be implemented using conditions on regular operations.

Conditions on regular operations

Guidelines

- Stabilize (during operations) and/or rehabilitate (upon completion of operations) extraction trails constructed on steep slopes by levelling, diverting runoff water to surrounding vegetation (e.g., water bars – Figure 5.2e), and controlling sediment (e.g., brush matting, straw bales or other techniques appropriate to the circumstances).

Figure 5.2e. Rehabilitating main extraction trails by installing water bars on slopes and other means can reduce the risk of future erosion (photo by Bancroft Minden Forest Company Inc.).

Best management practices

- Refer to Appendix 5.2b for a partial list of strategies and techniques that may be used to minimize erosion during operations.

- Identify susceptible sites (see Appendix 5.2c for a starting point) and develop local standard operating procedures to minimize the risk of erosion on those sites.

- Minimize mineral soil exposure to that required for efficient operations and effective silviculture (i.e., consistent with silvicultural ground rule for the site).

- Field supervisors and equipment operators should be trained in:
    - Recognizing/locating sites susceptible to erosion
    - The significance of soil exposure and erosion.

5.2.3 Nutrient loss

Nutrient loss can be described as the release and off-site transport of nutrients following forest management operations. With present commercial rotations, on most sites, nutrient removals due to logging are not significant and total nutrient levels may actually increase over time. Natural nutrient cycling should replenish nutrient capital lost due to forest harvest with minimal impacts on ecosystem productivity if rotation lengths are sufficiently long. Sites where the trees hold a relatively high proportion of the nutrient capital are regarded as most susceptible (e.g., Fig 5.2f)

Figure 5.2f. Shallow soil site with potentially limited nutrient capital (photo by Dan Duckert).

Post-harvest nutrient loss due to leaching is also a consideration in determining site sensitivity. Leaching is greatest when no plant material is available to absorb and store nutrients on the site. Therefore, site susceptibility is related to how fast the site can be occupied by vegetation after harvest.

Direction

The objective of the direction in this section is to provide prevent, minimize and/or mitigate unintentional nutrient loss associated with forest management operations.

The direction in this section will be implemented using conditions on regular operations.

Conditions on regular operations

Standards

- Refer to the *Forest Management Guide to Silviculture in the Great Lakes-St. Lawrence and Boreal Forest of Ontario* for direction for specific site and treatment combinations that may be susceptible to nutrient loss.

Best management practices

- Refer to Appendix 5.2b for a partial list of strategies and techniques that may be used to minimize the risk of nutrient loss during operations on susceptible sites.

- Identify susceptible sites (see Appendix 5.2c for a starting point) and develop local standard operating procedures to minimize the risk of nutrient loss on those sites.

5.2.4 Loss of productive forest area

Loss of productive forest area can be described as the conversion of previously productive forest to a long-term or permanently non-forested condition as a result of forest management operations. Some loss of productive forest area through the conversion to other land types (e.g., permanent roads) is inevitable in even the most efficient forest operations.

During the forest management planning process, the loss of productive forest area is forecast and any effect incorporated into the development of the long-term strategic direction. The actual area of non-forest or non-productive forest (roads, landings, slash/debris piles, grass, brush, etc.) created through forest management operations is either spatially incorporated into the inventory, or otherwise reflected in the inventory attributes. Larger and more permanent features (e.g., primary roads) are normally represented as polygons in the inventory while the effects (if any) of smaller and less permanent features (e.g., slash/debris piles) are reflected in the stand description (e.g., stocking).

Direction

The objective of the direction in this section is to minimize and account for the loss of productive forest area associated with forest management operations.

The direction in this section will be implemented using conditions on regular operations.

Conditions on regular operations

Standards

- Coverage of operational roads and landings and unutilized slash and chipper debris will not impact the ability of a harvested area to meet the renewal standard (i.e., site occupancy, species composition) of the predominant silvicultural ground rule in a block in even-aged silviculture systems (i.e., clearcut and shelterwood). (Figure 5.2g).

Figure 5.2g. Unutilized woody material that accumulates at roadside can be piled and burned to maximize the area available for regeneration (photo by Herb Neubrand).

Best management practices

- As a rule-of-thumb, strive to keep the area of roads and landings to less than 4% on a per block basis (it is recognized that operational constraints may require more road in some circumstances and that less road may be possible, and therefore desirable, in others).

- Refer to Appendix 5.2b for a partial list of strategies and techniques that may be used to achieve the standard addressing loss of productive forest area during operations.

- Avoid piling unutilized fiber on productive non-forested wetlands (e.g., brush and alder).

5.3 Spread of invasive species

The health and biological diversity of Ontario's forests are at potential risk from the introduction and spread of a variety of invasive species. Invasive fungi, forest pathogens, and insects (e.g., butternut canker, white pine blister rust, emerald ash borer) can severely impact native tree species by damaging or killing populations of their native hosts, thus impacting forest ecosystem function and composition. Invasive plants are capable of spreading rapidly and outcompeting native plant species for water, nutrients and space if they become established. The potential disruptive impacts of invasive plants on sensitive wetland ecosystems include habitat loss for wetland-dependent wildlife species which include about 20% of Ontario's species at risk.
The Ontario Invasive Species Strategic Plan was developed to prevent the introduction of new invasive species and reduce the spread and harmful impact of existing species in the province. The subsequent *Invasive Species Act, 2015* established a legislative framework to regulate invasive species through prevention, detection, control, and

eradication. Specifically, the Act provides for the regulation of carriers (things capable of facilitating movement of invasive species from one place to another including machinery used in forest operations). Moving machinery and other mechanical equipment not properly cleaned can unintentionally introduce invasive species (e.g., common buckthorn, garlic mustard) to new areas by transporting their seed or other propagules that may be contained in mud on machinery.

When the spread of invasive species is known to threaten the viability of specific species, explicit direction has been provided in previous sections of this guide. For example, Appendix 4.1a associated with Section 4.1.3 recommends minimizing ground disturbance and all-season road construction (i.e., roadsides, ditches) in wetlands to deter the establishment of invasive wetland plant species in provincially significant wetlands. Section 4.3 encourages removal of trees that are infected with butternut canker to help reduce spread of the disease and requires thorough inspection and washing of equipment before working in habitat occupied by wetland plant and insects listed as species at risk list. Other Ministry guides, such as the *Forest Management Guide to Silviculture in the Great-Lakes St. Lawrence and Boreal Forests of Ontario* and the *Ontario Tree Marking Guide*, provide direction including recommending silviculture treatments that minimize the establishment, spread and persistence of invasive species and the removal of trees infected by introduced diseases such as white pine blister rust.

Direction

In addition to the cases noted above where specific pests may threaten certain values, forest operations should strive to minimize the risk of spreading any invasive species. The best management practices included in this section may be implemented as conditions on regular operations.

Conditions on regular operations

Best management practices

- Forest workers should be trained to identify invasive species in their local area and know what actions can be employed to minimize their spread. Various sources may be consulted for the latest information on invasive species such as:
    - Ontario Invasive Plant Council website (ontarioinvasiveplants.ca)
    - Canadian Forest Service's Forest Invasive Alien Species of Canada website (www.exoticpests.gc.ca)
    - Ontario Federation of Anglers and Hunters' Invading Species Awareness Program website (www.invadingspecies.com).

- Follow the *Clean Equipment Protocol for Industry* (Halloran et al 2013) when moving equipment from areas where an invasive plant species is known to occur to minimize the risk of transporting and introducing the species to new locations.

6.0 SALVAGE AND BIOFIBRE HARVEST

6.1 Salvage harvest

Salvage harvesting is undertaken in forests recently killed or damaged by natural disturbances (e.g., wildfires, insect outbreaks, windstorms) to recover timber volumes before decay reduces or eliminates its economic value. Given that the frequency of wildfire, wind disturbances, and insect outbreaks is expected to increase with climate change, the frequency and extent of salvage harvest operations in Crown forests in the province may increase in the future.

The potential impacts of salvage harvesting on ecosystem processes and diversity (particularly following wildfire) may be more considerable than those of harvesting or natural disturbance alone due to the cumulative effects of multiple disturbance events over a relatively short period of time. The objective of the direction in this section is to mitigate potential salvage harvest-related impacts that may compromise post-disturbance ecosystem diversity, function, productivity and recovery.

Although forest practices, within silvicultural limits, that emulate natural disturbances and landscape patterns are used to conserve biodiversity in Crown forests, they are unable to fully mimic the ecological processes and conditions created by natural disturbances. Thus, the direction below ensures that some naturally disturbed forest, in the form of patches and individual standing dead trees, be left unharvested on the landscape to fulfill its ecological role.

Direction

The direction in this section will apply to all salvage operations, regardless of the origin or type of natural disturbance. It does not apply to accelerated harvest operations that may be undertaken in an insect pest management program as a pre-emptive attempt to prevent an insect pest infestation from affecting particular stands.

The direction in this section will be implemented using FMP products (e.g., delineation of salvage boundary) and conditions on regular operations.

Conditions on regular operations

Guidelines

- Consistent with direction in Section 3.2.3.1, salvage harvest will normally retain an average of a relatively even mix of ≥25 dead and live (damaged and undamaged) stems/ha that are ≥10 cm dbh. This is the minimum average for the harvest block (or minimum average per 10 ha if the harvest block ≥10 ha) contingent upon the availability of sufficient numbers and types of standing stems in a condition suitable for retention.

- Salvage operations will consider strategic landscape objectives.

- When finalizing boundaries of a salvage operation that results from wildfire, the area of undisturbed forest included in the salvage operation will be minimized.

- When finalizing boundaries of a salvage operation that results from blowdown, insect infestation, or other factors (e.g., ice storms), the area of the salvage operation can include undisturbed forest. When salvage operations include undisturbed area, Section 3.2.2 will apply.

- The trees retained following salvage operations will have a range of distribution patterns (relatively even spaced to some clumping), recognizing operational limitations, and subject to the availability of standing trees.

- Adjust the timing of entry and/or other operational factors to minimize unnecessary site disturbance that could potentially result in ecological damage (e.g., avoid salvaging a swamp in the frost-free period).

Best management practices

- Whenever possible, the trees retained following harvest will be the same species and size classes as those that would have been retained following normal harvest (as per direction in Section 3.2.3.1).

- When leaving unsalvaged patches of disturbed forest, give preference to areas adjacent to, or in close proximity to, the undisturbed forest.

- Limit skid trail coverage when salvage operations are extended for ≥3 years, particularly in fire salvage areas.

- In fire salvage areas, preferably retain conifers such as jack pine and black spruce as wildlife trees.

6.2 Biofibre harvest

Forest biofibre refers to forest resources from Crown forests that are not normally being utilized for conventional forest products (e.g., sawlogs, pulpwood) and made available under an approved FMP (MNRF Forest Directive 03 02 01). Forest biofibre includes:

1. Unmerchantable timber such as undersized wood, cull trees or portions of trees
2. Individual trees and stands of trees that are unmerchantable and unmarketable
3. Trees that may be salvaged as a result of a natural disturbance.

Forest biofibre is differentiated from forest biomass in that the latter includes all organic material from trees (e.g, stumps, roots). Additionally, by limiting the scope of biofibre to material made available under an approved FMP, biofibre can be thought of as simply an additional forest resource, similar to sawlogs or pulpwood, which can be used to produce forest products (e.g., bioenergy, wood pellets, biochemicals). Biofibre is

typically removed for bioenergy feedstock through harvest intensification as a secondary product of undersized material from optimizing recovery of veneer, sawlogs, or pulpwood. Biofibre may also be the primary product of otherwise unmarketable stands of low-grade hardwoods.

Direction

The direction in this section aims to mitigate the potential negative impacts of biofibre harvesting on forest biodiversity, wildlife habitat, and long-term site productivity. In consideration of Ontario's emerging forest bioeconomy potential and the products derived, the direction in this section makes explicit the restrictions on what can be removed through forest harvesting, and unless otherwise specified, applies equally to all planned harvest areas.

The direction in this section will be implemented using conditions on regular operations.

Conditions on regular operations

Guidelines

- Stumps and all below ground portions of a tree are not available for utilization as a forest product. Movement or removal associated with normal operations (e.g., construction of roads, landings, and skid trails; renewal and tending; slash piling), including incidental movement or removal during harvest operations, is permitted but will be minimized to that required for efficient operations. Removal for forest health purposes is permitted.

- Organic matter that is not part of a harvested tree (including boles, branches, roots, bark, leaves, needles, debris, soil carbon) will remain on site. Movement of such material for access or silvicultural purposes is permitted.

7.0 EFFECTIVENESS MONITORING

Direction in this guide is primarily based on the best scientific information and expert advice available at the time of writing (see Background and Rationale for Direction). Some of the direction is based on a large body of scientific literature that thoroughly describes the effects of forest management operations, and in some cases, even evaluates the effectiveness of previous direction (e.g., red-shouldered hawk). However, some of the direction is based on a more limited body of scientific knowledge. For this direction, there is uncertainty associated with the outcome of its application. Uncertainty arises for numerous reasons. For example, there may have been few studies upon which to base direction, studies may have been conducted in a different ecological context (e.g., in western temperate forests), or results of studies may have been inconclusive or contradictory. Direction that is uncertain can be viewed as a hypothesis that requires testing within the context of the suite of forest management operations practised across Ontario's ecologically diverse landscape.

The Forest Operations and Silviculture Manual (FOSM) acknowledges uncertainty and stipulates that for all its associated policies, key uncertainties will be identified to inform, support, and undertake scientific investigations and monitor policy effectiveness. Additionally, the FOSM requires that all new or revised forest management guides will include a description of the approach to effectiveness monitoring.

Testing the effectiveness of direction forms one phase of the guide development cycle (Figure 7.0a). In the first phase, overarching objectives of the guide (i.e., CFSA principles) are defined. These principles, together with experience-based advice from practitioners and scientists, scientific and Indigenous knowledge, and available technologies and information, were considered during the development of the coarse and fine filter direction in this guide. When implemented through the forest management planning process, the direction described in Section 1.3 and contained in Sections 3 to 6 will influence strategic and operational planning including silviculture prescriptions, AOC prescriptions, and conditions on operations. Actual operations will be monitored to ensure compliance with approved FMPs and the results of operations will be monitored to ensure that direction is effective in producing anticipated outcomes. Effectiveness monitoring will then be used to evaluate (test) the effectiveness and effects of direction in the guide and revise as appropriate. A strong enough signal from the compliance monitoring (e.g., compliance inspections, independent forest audits), exceptions monitoring, or evaluation phase may result in a feedback loop that informs aspects of guide development (e.g., revise testable hypotheses) and/or implementation. This "learning while doing" cycle exemplifies the principles of adaptive management.

The following sections outline the Ministry's approach to monitoring the effectiveness of direction in this guide. A brief conceptual framework for conducting effectiveness monitoring research is first presented. Direction for which there is a relatively high degree of uncertainty, and thus is high priority for effectiveness monitoring, is then identified. Finally, the Ministry's approach to delivery of an effectiveness monitoring

program that will acquire new scientific and Indigenous knowledge to facilitate future review and revision of direction in the guide is described.

Figure 7.0a. The five-phase adaptive management cycle for the Stand and Site Guide.

7.1 Effectiveness monitoring principles

Direction in this guide is intended to conserve biological diversity at site, stand, multi-stand, and meso-landscape scales, using a nested coarse and fine filter approach (see Section 1.3).

Testing coarse filter direction

Coarse filter direction is designed to create habitat at various scales that supports a community of plants and animals that has a complement of species, has an abundance of each species, and functions in a manner similar to that of communities in habitats derived from natural processes. Examples of coarse filter direction include guidance on pattern within harvest areas, wildlife tree retention, and downed woody material.

Testing the effectiveness of coarse filter direction requires a comparison of plant and animal communities in stands or small landscapes that have been created through forest management operations that followed direction in the guide (or created conditions

similar to those prescribed by the guide) and those that have arisen from natural events. Studies may be mensurative or manipulative experiments. No study can hope to monitor all plants and animals so species or groups of species that serve as indicators of the composition, abundance, and functional integrity of the community need to be identified. There is a large body of literature describing how species can be selected as indicators. Species are typically selected to represent different taxonomic groups, functional groups, body sizes, habitat affinities, and special ecological roles (e.g., keystone species).

Comparing the list of species, or groups of species, and their abundance within habitats arising from forest management operations and natural disturbances will provide one assessment of the effectiveness of the direction in this guide. However, abundance by itself is not always a good indicator of habitat suitability. Some habitats may support a high density of a specific species, but certain characteristics of the habitat may predispose residents to high rates of mortality or low rates of fecundity. These habitats may be population sinks rather than sources. Consequently, testing the effectiveness of direction also requires some comparison of population demographics or trend in addition to simple measures of species richness and abundance.

Testing fine filter direction

Fine filter direction is intended to either provide habitat conditions that maintain a specific species at a desired level or to mitigate the potentially disruptive effects of some forest management operations on wildlife or the physical environment. Examples of the former include direction that specifies the amount of mild and severe winter cover to retain in winter deer emphasis areas and the amount of dense mature hardwood forest to retain in the vicinity of red-shouldered hawk nests. Examples of the latter include direction that restricts harvest, renewal, and tending operations near bald eagle nests during the breeding season and direction that limits the amount of extraction trail coverage.

Testing the effectiveness of individual pieces of fine filter direction requires explicit identification of the objective of the direction. For example, restrictions on operations within 400 m of bald eagle nests during the breeding season are intended to ensure use and productivity patterns that are comparable between nests in harvest areas and those in remote undisturbed locations.

Testing the effectiveness of fine filter direction lends itself to either manipulative or mensurative experimental approaches. In both cases, it is essential to have a sample size that is large enough to have a reasonable expectation of being able to detect meaningful differences if they exist.

How close is close enough?

Ideally, coarse filter direction in this guide would create habitat with exactly the same mix of species and with each species found in exactly the same abundance as in habitat arising from natural processes. In reality, outcomes from application of the guide will rarely be exactly the same as conditions observed in natural situations. Management

activities guided by coarse filter direction cannot completely duplicate all aspects of natural processes (especially the tremendously wide range of natural variability). The CFSA recognizes this fact by explicitly requiring the emulation not duplication of natural disturbances within the limits of silvicultural requirements. Even when management activities and natural processes produce habitats with similar composition and structure, differences in the response of plants and animals may be observed. Thus, when evaluating the coarse filter direction in the guide it is imperative to define in advance 'how close is close enough', and which spatial and temporal scales are appropriate for assessment.

In contrast to coarse filter direction, evaluating the effectiveness of fine filter direction is somewhat more straightforward because it is associated with simpler objectives. However, as a consequence of sampling error, observed outcomes may not exactly match expected outcomes, even when direction is effective. Thus, as part of the evaluation process, it is important to identify in advance what will be considered a meaningful (rather than simply a statistically significant) deviation from expectation.

The response of plants and animals to the habitat created by both the coarse and fine filter direction in this guide may be influenced by numerous factors unrelated to habitat, such as level of harvest by hunters, density of local predator populations, and severity of local winter weather conditions. Thus, when evaluating the effectiveness of direction in this guide, it is imperative that these non-habitat factors be considered and incorporated or controlled, to the extent possible, during study design and data analysis.

Rempel et al (2011) provides a detailed discussion of the Ministry's forest management guide effectiveness monitoring strategic direction and principles associated with study design, study area selection, monitoring program economic sustainability, and context of decision analysis and adaptive management.

7.2 What to evaluate – Identifying key uncertainties

Significant resources would be required to rigorously test the effects of forest management operations and/or the effectiveness of all guide direction for which there is some uncertainty. To efficiently direct effectiveness monitoring efforts, eight priority hypotheses have been identified. During development of this revised version of the guide, the 10 key uncertainties in the previous version were reviewed by subject matter experts, advisory teams, and the Provincial Forest Technical Committee. Those that were considered adequately addressed or no longer relevant were removed and those that were considered not adequately addressed have been retained. The following eight priority hypotheses were identified considering the amount of reliable supporting knowledge and the potential impact of applying ineffective (or inefficient) direction.

Wildlife communities and wildlife habitat and supply

$H_0$1: Within the context provided by direction in the Landscape Guides, if the coarse filter direction in Section 3.2.2 and fine filter direction in Section 4 produce a pattern of harvested and residual forest at stand and multi-stand scales similar to that found in

habitats disturbed by natural events, then similar wildlife communities will be maintained.

$H_0$2: If the direction for AOCs (around water features and other site-specific values), small residual patches, wildlife trees, and downed woody material in Section 3.2.3 maintains or produces sufficient downed woody material through time similar to that arising from natural events, then DWM-dependent wildlife, plant, and fungal communities and ecological processes (e.g., nutrient cycling) will be maintained.

$H_0$3: If forest management operations permitted within shoreline AOCs (Sections 4.1.1 and 4.1.2) create a diversity of ages of shoreline forest similar to that found in habitats arising from natural events, then similar riparian wildlife communities (including beavers) will be maintained.

$H_0$4: The fine filter direction for moose in Section 3.3.4 will create habitat that sustains a higher density of moose (or a higher harvest of moose) than that produced by the general coarse filter direction in the Landscape and Stand and Site Guides.

Terrestrial and aquatic ecosystems processes

$H_0$5: Within the context provided by direction in the Landscape Guides, if the coarse filter direction in Section 3.2.2 and fine filter direction in Section 4 retain residual forest that is spatially arranged in catchments similar to that observed in naturally disturbed catchments, then hydrological effects resulting from forest management operations will not exceed observed and acceptable levels for specific parameters (e.g., methylmercury).

$H_0$6: Direction in Sections 4.1, 4.1.1, and 4.1.2 will mitigate undesirable effects (e.g., harmful alteration, disruption, or destruction of fish habitat) of forest management activities permitted within shoreline AOCs on water quality and aquatic biota.

$H_0$7: Direction in Sections 4.1, 5.1, and 5.2 will mitigate undesirable effects of forest management operations on hydrological linkages between upland forest and aquatic habitats.

$H_0$8: Restrictions on rutting and skid trail coverage in Section 5.2.1 will contribute to acceptable growth of residual trees (partial harvests) and regeneration success (all harvests).

Direction contained within this guide for many species at risk is associated with a high degree of uncertainty. Direction with the highest degree of uncertainty tends to be associated with species with few known sites. While further research on these species is desirable, specific questions have not been identified as a high priority for consideration within the Ministry's effectiveness monitoring program because too few sites are typically known to permit a scientifically rigorous evaluation. However, it would be desirable, when opportunities for potential collaboration and partnerships arise, to undertake smaller-scale research projects (with sufficient sample sizes) on the

effectiveness of individual pieces of fine-filter direction in this guide to minimize adverse effects of forest management activities on species at risk and their habitats.

Similarly, an effectiveness monitoring strategy for this guide may also include undertaking smaller-scale research projects on the effects of other fine-filter direction to minimize adverse effects on some aspects of the managed forest that are beyond their intended scope including:

- Forest access roads (distribution, density, and access to resources)
- Available harvest area
- Habitat for plant and animal species valued by Indigenous communities and stakeholders for which specific direction is not provided.

7.3 Delivering effectiveness monitoring: Acquiring new knowledge

The Ministry has an extensive science, research, and monitoring organization with a long history of conducting terrestrial and aquatic ecosystem research, including monitoring the effects of forest operations and the effectiveness of forest management guides in mitigating effects. In 2014-15, the Ministry's Science and Research Branch (SRB) undertook a strategic exercise to review its current science portfolio and to identify its science needs. As a result of this exercise, two strategic science initiatives, the Integrated Science Action Plan (ISAP) and the Integrated Monitoring Framework (IMF), were developed. The ISAP addresses activities across the full science continuum from data and values collection to inventory, monitoring, and assessment, to applied research and development, and the associated information management. The priority hypotheses identified in Section 7.2 fall under the Ministry's science priorities as described in the ISAP objectives to:

- Collect information about the state of wildlife species to inform and evaluate wildlife policies including:
    - Monitoring landscape scale populations of cervid species (Objective 4a)
    - Inventorying the distribution and diversity of wildlife species as an indicator of the state of crown forest biodiversity and terrestrial habitats and ecosystems (Objective 4d).
- Acquire knowledge about forested landscapes, ecosystems, and associated species including conducting research to understand:
    - Effects of natural disturbance emulation, natural and anthropogenic post-disturbance ecology and succession on terrestrial and aquatic ecosystems, landscape processes, and cumulative impacts (Objective 8a)
    - Potential impacts of forest operations on site protection and productivity (e.g., soil disturbance standards) (Objective 8c)
    - Ecological and management implications of removing forest bio-fibre on wildlife habitat and long-term forest productivity (Objective 8d).
- Acquire knowledge about wildlife species and their habitat by conducting research on game and furbearing species to address critical knowledge gaps (Objective 9a).

The Ministry's monitoring activities will contribute to informing and evaluating guide direction by assessing the effects of ecological and environmental changes on forest resources, impacts of management actions on ecosystems, and whether specified management activities had the desired effect. Specifically, the Ministry's terrestrial monitoring (e.g., broad-scale land cover and disturbance mapping), growth and yield permanent forest plot network, and wildlife and moose monitoring (aerial moose population inventory) programs will help to measure changes in species, habitats, biodiversity, and the factors affecting them, as well as identifying additional monitoring and research needs to better address and inform effectiveness monitoring questions.

The Ministry routinely follows a process of assessing its science and monitoring needs to inform short-term science priorities. Periodic discussions also occur to assess the longer-term foundational science portfolio. As part of the regular and longer-term science dialogue within the Ministry, science priorities, including the eight priority hypotheses noted above will be brought forward for resourcing discussions. The Ministry will then investigate opportunities for addressing and resourcing the highest priority science needs that are believed to provide the greatest benefit related to reducing risks associated with natural resource management decision making. This will enable the Ministry to balance its responsiveness to emerging and longer-term science needs.

The Ministry uses a range of approaches to acquire new reliable scientific knowledge important to informing resource management decision making. When there are insufficient resources or capacity internally within the science organization to address the priority questions, the Ministry will seek out collaborations with and encourage partners to initiate new research studies relevant to the priority questions. The Ministry will continue to review and evaluate relevant scientific literature for application in Ontario and compliance and exceptions monitoring information.

The Ministry will also maintain and endeavour to develop new connections with researchers and Indigenous communities and organizations to identify new knowledge (science and Indigenous) that may help evaluate direction in the guide. When possible, the Ministry will seek to integrate both science and Indigenous knowledge in guide direction. As part of the regular review and revision of guides to complete the adaptive guide development cycle, new knowledge acquired through this combination of approaches will be used to revise direction as appropriate.

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APPENDICES

Note: The numbering system used in these appendices (and the Background and Rationale for Direction document) does not follow a conventional numbering system. The number for each appendix corresponds to the section and subsection (e.g., 4.2) where it is first referred to in the guide. Where more than one appendix was referred to in the same section, an alphabetic suffix has been added (e.g., 5.2b).

Appendix 1a – Contributors

The following individuals were the principal authors of this document:
Jodi Hall, MNR, Forest Management Policy Section, Thunder Bay
Dana Kinsman, MNR, Forest Management Policy Section, Sault Ste. Marie
Jamie Mucha, MNR, Forest Management Policy Section, Thunder Bay
Kim Mahon, MNR, Forest Management Policy Section, Timmins
Brian Naylor, MNR, Forest Policy Section, North Bay

The Ministry gratefully acknowledges the contributions of the following members of the Technical Advisory Team and Indigenous Adivsory Team in reviewing draft products and providing constructive advice:

Technical Advisory Team
Ildiko Apavaloae, MNR Southern Region
Don Bazeley, GreenFirst
Dawn Burke, MNR Southern Region
Natasha Carr, MNR Southern Region
Barry Davidson, Westwind Forest Stewardship Inc.
Nick Gooderham, Ottawa Valley Forest Inc.
Michael Henry, MNR Southern Region
Peter Hettinga, MNR Northwest Region
Beau Johnson, Domtar
Mike Liukko, MNR Northeast Region
Lauren McDonald, MNR Northeast Region
Scott McPherson, Nippissing Forest Resource Management Inc./Vermillion Forest Management Ltd.
Kurt Pochailo, Miisun Integrated Resource Management Co.
Neil Peterson, MNR Northwest Region
Tom Ratz, Domtar
Derrick Romain, MNR Northeast Region
Scot Rubin, Lake Nipigon Forest Management Inc.
Jennifer Tallman, Eacom
Svetlana Zeran, Bancroft-Minden Forest Co. Inc.

Indigenous Advisory Team
Jake Chalmers, Métis Nation of Ontario
John Connor, Rainy River First Nation
Kaitlin Hill, Curve Lake First Nation
Todd Lewis, Wiikwemkoong Unceded Territory
Jacques Picotte, Métis Nation of Ontario

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Appendix 1b - Procedure for implementing activities requiring Ministry notification or approval in an operational prescription or condition(s) in an area of concern or conditions on operations in the FMP

Ministry notification

The procedure for implementing activities requiring Ministry notification in an operational prescription or condition(s) for an AOC or CRO in the FMP will be documented in the FMP and is as follows:

1. If implementing an activity requiring Ministry notification in an operational prescription or condition(s) for an AOC or CRO in the FMP because it cannot be reasonably avoided, the forest licensee will identify the activity and prepare a notice. The notification documentation can be provided in a template format and will include:
    a. The details of the individual identified value, including associated geographical area of the AOC, or important ecological feature including location portrayed on a map, block number, and a description of the activity requiring Ministry notification in an operational prescription or condition(s) for an AOC or CRO in the FMP.

    b. Rationale for implementing the activity requiring Ministry notification, including any impacts of not implementing the activity.

    c. A summary of how potential impacts of the activity requiring Ministry notification on the value or feature will be minimized or mitigated.

    d. An approximate start date the preferred course of action will commence.

2. The forest licensee will submit the notification documentation to the Ministry staff member(s) designated as the recipient in the FMP (e.g., Ministry Management Biologist, Management Forester, Integrated Resource Management Technical Specialist assigned to forest management unit) in the form of an email with a carbon copy sent to the Ministry District Supervisor. Every practical effort should be made by the forest licensee to provide notification in a timely manner so that the Ministry is able to conduct a field visit (if necessary) and to provide any input or concerns to the forest licensee. Once notification has been submitted, the forest licensee can commence work (i.e., no response from the Ministry is required prior to implementing activity). The forest licensee and Ministry are encouraged to conduct joint field visits when contemplating situations where

activities requiring Ministry notification in an operational prescription or condition(s) in an AOC or CRO in the FMP will be implemented.

3. Ministry staff will file notification documentation to be accessed and used for compliance purposes once operations are complete.

Ministry approval

The procedure for implementing activities requiring Ministry approval in an operational prescription or condition(s) for an AOC or CRO in the FMP will be documented in the FMP and is as follows:

1. If implementation of an activity requiring Ministry approval in an operational prescription or condition(s) in an AOC or CRO in the FMP cannot be reasonably avoided, the forest licensee will identify the activity and prepare an approval request. The request will include:
    a. The details of the individual identified value, including associated geographical area of the AOC, or important ecological feature including location portrayed on a map, block number, and a description of the activity requiring Ministry approval in an operational prescription or condition(s) for an AOC or CRO in the FMP.

    b. Rationale for implementing the activity requiring Ministry approval, including any impacts of not implementing the activity.

    c. A summary of how potential impacts of the activity requiring Ministry approval on the value or feature will be minimized or mitigated.

2. The forest licensee will submit the request to the Ministry staff member(s) designated as the recipient(s) of approval requests in the FMP (e.g., Ministry Management Biologist, Management Forester, Integrated Resource Management Technical Specialist assigned to forest management unit) in the form of an email, with a carbon copy sent to the Ministry District Supervisor, to seek input and approval.

3. The Ministry recipient of approval request ensures other appropriate Ministry staff (if necessary) are informed of request so that they may review request and provide input. A field visit or request for additional information may be required.

4. The Ministry District Supervisor will approve or deny request and provide forest licensee with an email response (include appropriate individuals as identified in FMP) within an agreed upon timeframe (10 working days (i.e., two weeks) is recommended) identified in the FMP.

5. Ministry staff will file approval documentation to be accessed and used for compliance purposes once operations are complete.

Appendix 1c – Scientific names of species mentioned in the Stand and Site Guide

(based primarily on the Natural Heritage Information Centre website https://www.ontario.ca/page/get-natural-heritage-information)

Common name	Scientific name
Woody Plants	
Alder	*Alnus incana & Alnus viridis*
Balsam fir	*Abies balsamea*
Beech	*Fagus grandifolia*
Black ash	*Fraxinus nigra*
Black spruce	*Picea mariana*
Bur oak	*Quercus macrocarpa*
Butternut	*Juglans cinerea*
Cedar	*Thuja occidentalis*
Dogwood	*Cornus* spp.
Green ash	*Fraxinus pennsylvanica var. subintegerrima*
Hemlock	*Tsuga canadensis*
Jack pine	*Pinus banksiana*
Labrador tea	*Rhododendron groenlandicum*
Leatherleaf	*Chamaedaphne calyculata*
Mountain ash	*Sorbus* spp.
Oak	*Quercus* spp.
Poplar	*Populus* spp.
Red ash	*Fraxinus pennsylvanica*
Red maple	*Acer rubrum*
Red oak	*Quercus rubra*
Red pine	*Pinus resinosa*
Red spruce	*Picea rubens*
Silver maple	*Acer saccharinum*
Trembling aspen	*Populus tremuloides*
White birch	*Betula papyrifera*
White elm	*Ulmus americana*
White pine	*Pinus strobus*
White spruce	*Picea glauca*
Willow	*Salix* spp.
Non-woody plants	
American ginseng	*Panax quinquefolius*
Branched bartonia	*Bartonia paniculata*
Eastern prairie fringed-orchid	*Platanthera leucophaea*

Garlic mustard	*Alliaria petiolata*
Small white lady's-slipper orchid	*Cypripedium candidum*

Lichens

Pale-bellied frost lichen	*Physconia subpallida*
White-rimmed shingle lichen	*Fuscopannaria leucosticte*

Invertebrates

American bumble bee	*Bombus pensylvanicus*
Bogbean buckmoth	*Hemileuca* spp.
Monarch	*Danaus Plexippus*
Rainbow mussel	*Villosa iris*
Suckley's cuckoo bumble bee	*Bombus suckleyi*
Yellow-banded bumble bee	*Bombus terricola*
West Virginia white	*Pieris virginiensis*

Fish

American eel	*Anguilla rostrata*
Aurora trout	*Salvelinus fontinalis timagamiensis*
Brook trout	*Salvelinus fontinalis*
Channel darter	*Percina copelandi*
Kiyi	*Coregonus kiyi*
Grass pickerel	*Esox americanus vermiculatus*
Lake herring	*Coregonus artedi*
Lake trout	*Salvelinus namaycush*
Lake sturgeon	*Acipenser fulvescens*
Lake whitefish	*Coregonus clupeaformis*
Largemouth bass	*Micropterus salmoides*
Muskellunge	*Esox masquinongy*
Northern brook lamprey	*Ichthyomyzon fossor*
Northern pike	*Esox lucius*
Pacific salmon	*Oncorhynchus*
Rainbow trout	*Oncorhynchus mykiss*
River redhorse	*Moxostoma carinatum*
Shortjaw cisco	*Coregonus zenithicus*
Silver lamprey	*Ichthyomyzon unicuspis*
Smallmouth bass	*Micropterus dolomieu*
Walleye	*Sander vitreus*

Amphibians and reptiles

Blanding's turtle	*Emydoidea blandingii*
Eastern foxsnake	*Elaphe gloydi*
Eastern hog-nosed snake	*Heterodon platirhinos*
Gray ratsnake	*Elaphe obsolete*
Eastern massasauga	*Sistrurus catenatus*
Eastern ribbonsnake	*Thamnophis sauritus*

Five-lined skink	*Plestiodon fasciatus*
Milksnake	*Lampropeltis triangulum*
Northern map turtle	*Graptemys geographica*
Snapping turtle	*Chelydra serpentina*
Spotted turtle	*Clemmys guttata*
Eastern musk turtle	*Sternotherus odoratus*
Wood turtle	*Glyptemys insculpta*

Birds

American black duck	*Anas rubripes*
American crow	*Corvus brachyrhynchos*
American kestrel	*Falco sparverius*
American goshawk	*Accipiter gentilis*
Bald eagle	*Haliaeetus leucocephalus*
Bank swallow	*Riparia riparia*
Barn swallow	*Hirundo rustica*
Barred owl	*Strix varia*
Black tern	*Chlidonias niger*
Bonaparte's gull	*Larus Philadelphia*
Boreal owl	*Aegolius funereus*
Broad-winged hawk	*Buteo platypterus*
Brown-headed cowbird	*Molothrus ater*
Canada goose	*Branta canadensis*
Cerulean warbler	*Dendroica cerulea*
Chimney swift	*Chaetura pelagica*
Common grackle	*Quiscalus quiscula*
Common nighthawk	*Chordeiles minor*
Common raven	*Corvus corax*
Common yellowthroat	*Geothlypis trichas*
Cooper's hawk	*Accipiter cooperii*
Eastern kingbird	*Tyrannus tyrannus*
Eastern screech-owl	*Megascops asio*
Eastern whip-poor-will	*Antrostomus vociferus*
European starling	*Sturnus vulgaris*
Golden-winged warbler	*Vermivora chrysoptera*
Great blue heron	*Ardea Herodias*
Great gray owl	*Strix nebulosa*
Great horned owl	*Bubo virginianus*
House sparrow	*Passer domesticus*
Kirtland's warbler	*Dendroica kirtlandii*
Least bittern	*Ixobrychus exilis*
Long-eared owl	*Asio otus*
Louisiana waterthrush	*Seiurus motacilla*
Merlin	*Falco columbarius*
Northern harrier	*Circus cyaneus*
Northern hawk owl	*Surnia ulula*

Northern saw-whet owl	*Aegolius acadicus*
Osprey	*Pandion haliaetus*
Peregrine falcon	*Falco peregrinus*
Pileated woodpecker	*Dryocopus pileatus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Sandhill crane	*Grus canadensis*
Sharp-shinned hawk	*Accipiter striatus*
Short-eared owl	*Asio flammeus*
Trumpeter swan	*Cygnus buccinator*
Turkey vulture	*Cathartes aura*
Wood duck	*Aix sponsa*
Yellow rail	*Coturnicops noveboracensis*

Mammals

Beaver	*Castor canadensis*
Big brown bat	*Eptesicus fuscus*
Black bear	*Ursus americanus*
Bobcat	*Lynx rufus*
Cougar	*Puma concolor*
Coyote	*Canis latrans*
Tri-colored bat	*Perimyotis subflavus*
Eastern red bat	*Lasiurus borealis*
Eastern small-footed myotis	*Myotis leibii*
Eastern wolf	*Canis sp. cf. Lycaon*
Elk	*Cervus canadensis*
Fisher	*Martes pennanti*
Gray fox	*Urocyon cinereoargenteus*
Grey wolf	*Canis lupus*
Hoary bat	*Lasiurus cinereus*
Least weasel	*Mustela nivalis*
Little brown myotis	*Myotis lucifugus*
Long-tailed weasel	*Mustela frenata*
Lynx	*Lynx canadensis*
Marten	*Martes Americana*
Mink	*Mustela vison*
Moose	*Alces americanus*
Muskrat	*Ondatra zibethicus*
Northern myotis	*Myotis septentrionalis*
Raccoon	*Procyon lotor*
Red fox	*Vulpes vulpes*
Red squirrel	*Tamiasciurus hudsonicus*
River otter	*Lontra canadensis*
Short-tailed weasel	*Mustela erminea*

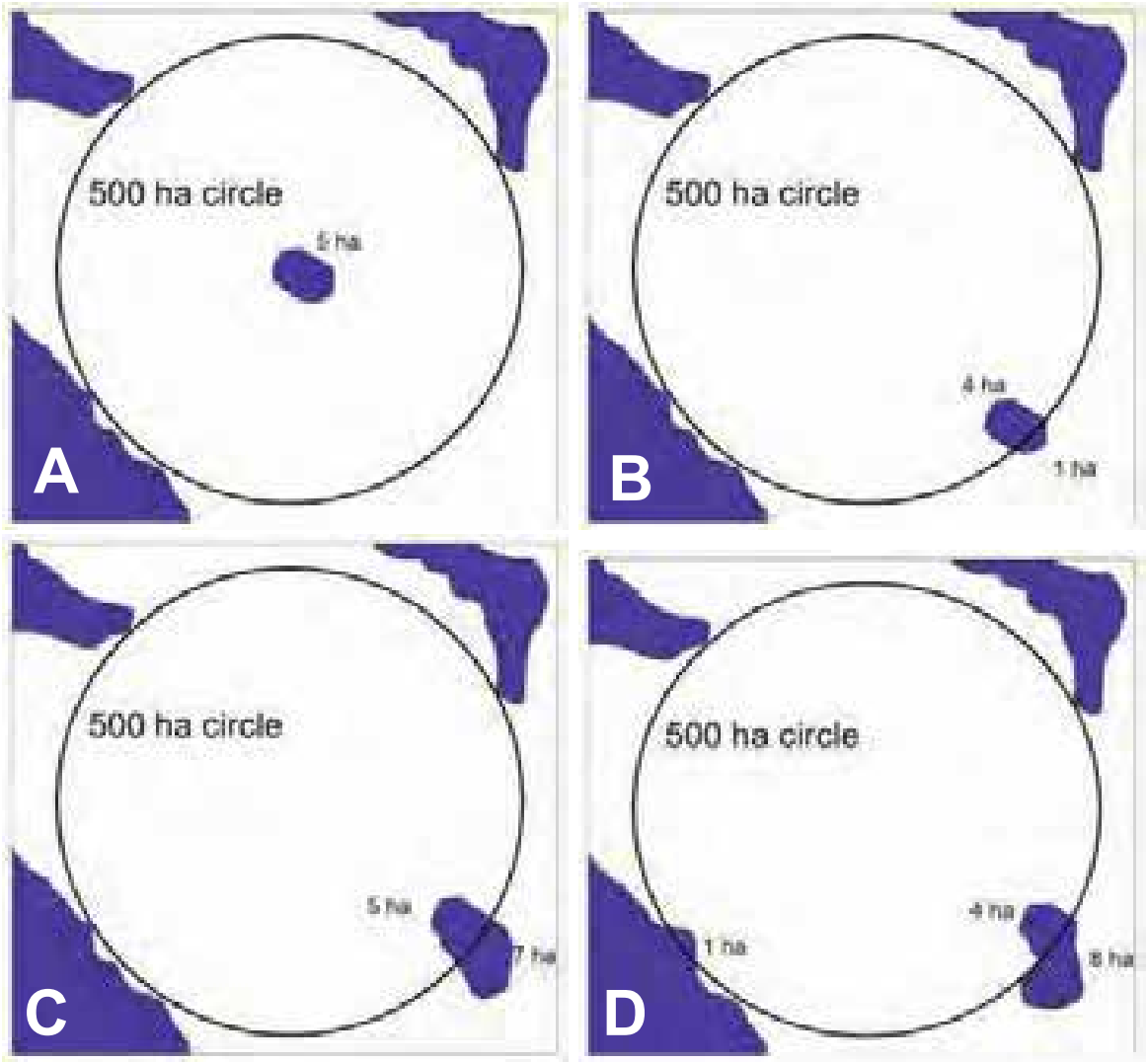
Silver-haired bat	*Lasionycteris noctivagans*
Southern flying squirrel	*Glaucomys Volans*
Striped skunk	*Mephitis mephitis*
White-tailed deer	*Odocoileus virginianus*
Wolverine	*Gulo gulo*
Woodland caribou	*Rangifer tarandus caribou*

Diseases

Beech bark disease	*Nectria coccinea* var. *faginata*
Butternut canker	*Sirococcus clavigignenti-juglandacearum*
White pine blister rust	*Cronartium ribicola*

Appendix 3.2a – Example of the implementation of the 5 ha patch size requirement in Section 3.2.2.2

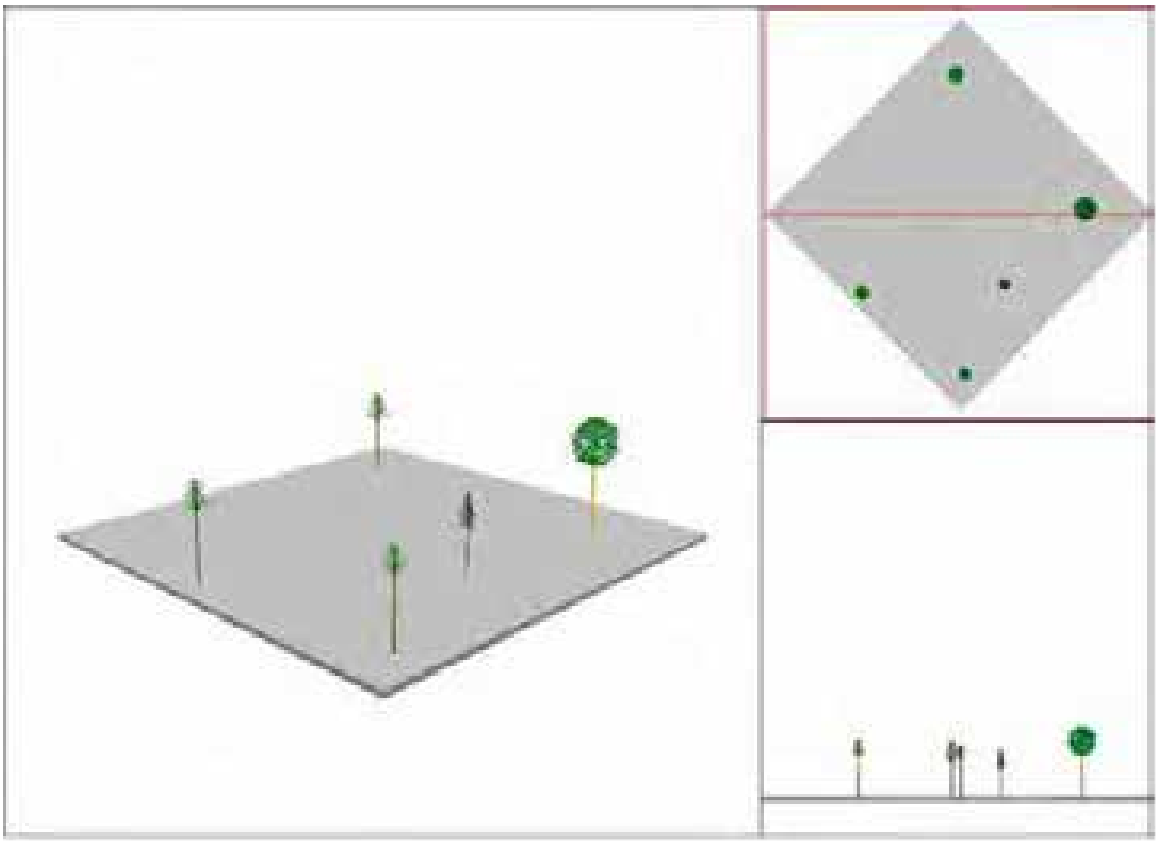
The 5 ha requirement can be satisfied by a single 5+ ha patch completely contained within the 500 ha assessment area (A), a single 5+ ha patch partially within the circle with at least 5 ha within the assessment area (C), or several 5+ ha patches partially within the 500 ha assessment area whose combined area within the assessment area is at least 5 ha (D). A single 5 ha patch that is not entirely within the assessment area (B) or several 5+ ha patches partially within the 500 ha assessment area with a combined area less than 5 ha (not shown) would not be acceptable.



Appendix 3.2b - Graphical examples of post-harvest stand structure created by application of the wildlife tree direction in Section 3.2.3.1

Example A: Clearcut harvest

The following figure depicts a hypothetical 1 ha block of forest that meets the minimum wildlife tree direction for clearcut harvests (i.e., ≥5 large living and/or dying trees/ha). In this case, the operator has left 1 large living trembling aspen (oval crown) and 4 large living conifers (pyramidal crowns) with existing cavities or the potential to develop cavities. While this condition is acceptable on individual hectares within a cutblock, wildlife tree retention within any 10 ha portion of a cutblock must meet the following additional direction including an average of ≥25 wildlife trees/ha and an average of ≥10 large stems or large stubs/ha.

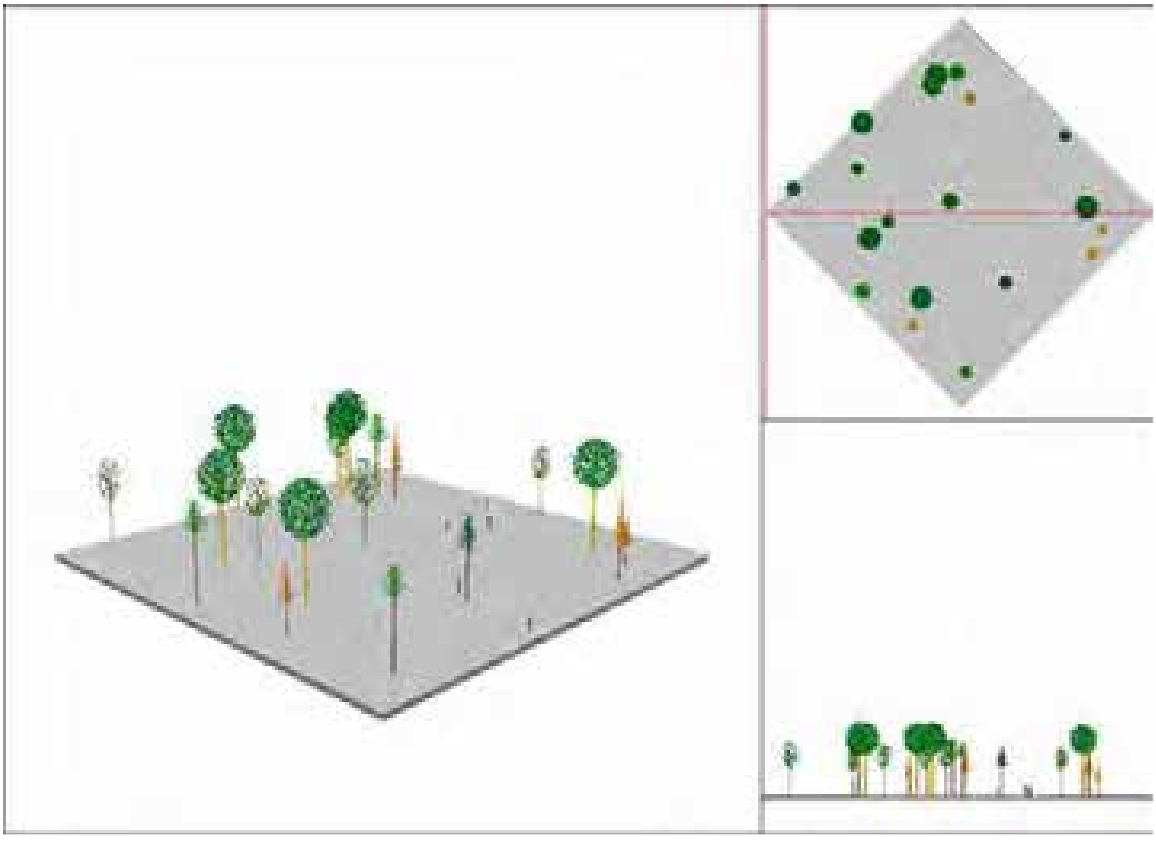


Example B: Clearcut harvest

The following figure depicts a hypothetical 1 ha block of forest that meets all wildlife tree standards and guidelines for clearcut harvests. The operator has left:

- 25 wildlife trees/ha (direction is an average of ≥25/ha), comprised of:
    - 10 large living trees – mix of trembling aspen (large, oval crowns) and conifers (green, pyramidal crowns) with existing cavities or the potential to develop cavities (direction is an average of ≥10 large stems/ha with a minimum of 5 large living and/or dying trees/ha), and
    - 15 other stems – mix of small trembling aspen (small, oval crowns), small safe dead conifers (brown, pyramidal crowns), and small stubs (black sticks) (direction is additional wildlife trees may be safe standing dead trees, small stubs, or any other living trees; stubbing is encouraged as a best management practice).

- Wildlife trees are well-dispersed; at least 10 individual stems/ha.

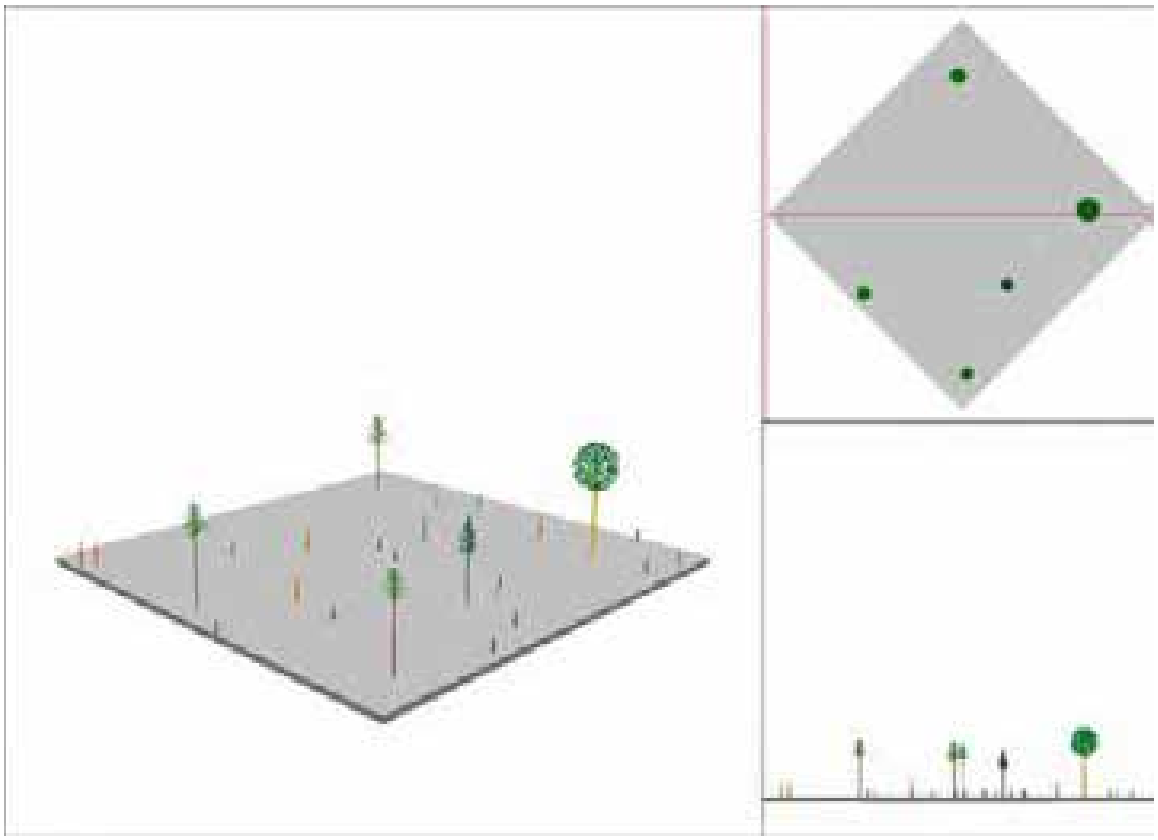


Example C: Clearcut harvest

The following figure depicts a hypothetical 1 ha block of forest that meets all wildlife tree standards and guidelines for clearcut harvests. The operator has left:

- 25 wildlife trees/ha (direction is an average of ≥25/ha), comprised of:
    - 5 large living trees – 1 trembling aspen (oval crown) and 4 conifers (pyramidal crowns) with existing cavities or the potential to develop cavities – and 5 large stubs (orange sticks) (direction is an average of ≥10 large stems/ha with a minimum of 5 large living and/or dying trees/ha)
    - 15 small stubs (black sticks) (direction is additional wildlife trees may be safe standing dead trees, small stubs, or any other living trees; stubbing is encouraged as a best management practice).

- Wildlife trees are well-dispersed; at least 10 individual stems/ha.



Example D: Selection harvest

The following figure depicts a hypothetical 1 ha block of forest that meets all wildlife tree standards and guidelines for tolerant hardwood selection harvests. Tree markers retained:

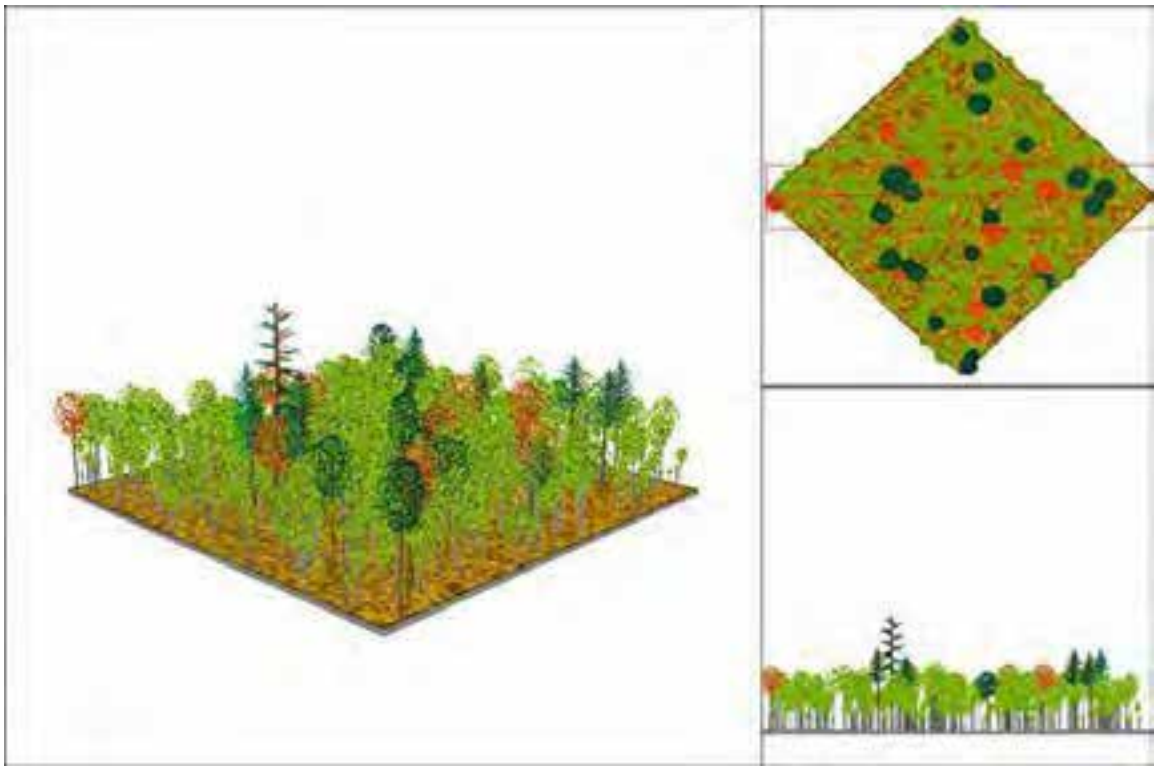
- 10 living cavity trees – tolerant hardwoods (dark green oval crowns) with existing cavities or the potential to develop cavities (direction is an average of ≥10 living cavity trees or large stubs/ha with a minimum of 5 living and/or dying cavity trees on each hectare)

- 10 scattered conifers (pyramidal crowns) (direction is an average of ≥10/ha), including 1 pine supercanopy tree (tallest of the conifers shown) (mandatory direction is an average of ≥1/ha)

- 10 mast trees – healthy dominant and co-dominant beech trees (orange oval crowns) (direction is an average of ≥10/ha)

- Wildlife trees are well-dispersed.

The other pale green trees were left for silvicultural purposes.



Example E: White pine shelterwood regeneration harvest

The following figure depicts a hypothetical 1 ha block of forest that meets all wildlife tree standards and guidelines for white pine shelterwood regeneration harvests. Tree markers retained:

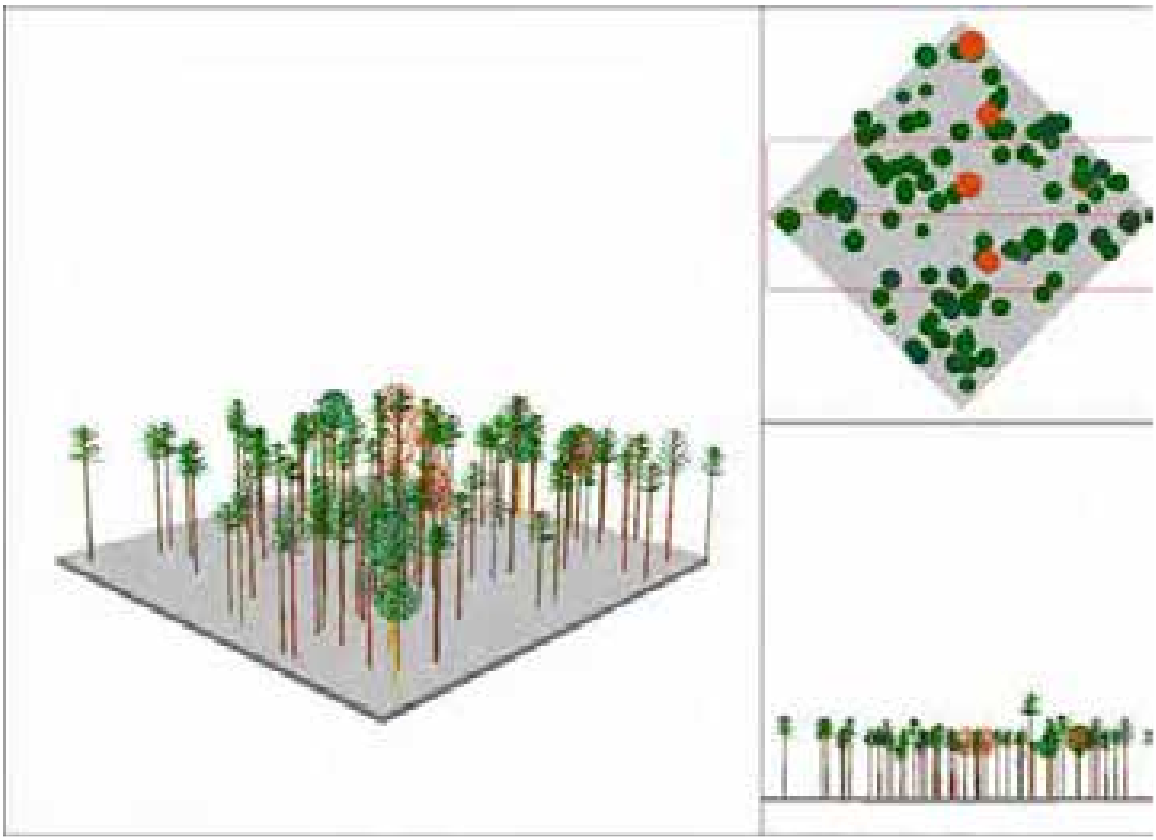
- 10 living cavity trees – mix of trembling aspen (dark green oval crowns) and pines (pyramidal crowns) with existing cavities or the potential to develop cavities (direction is an average of ≥10 living cavity trees or large stubs/ha with a minimum of 5 living cavity trees on each hectare)

- 5 mast trees – healthy dominant and co-dominant oaks (orange oval crowns) (direction is an average of ≥10/ha when available - in this case, all oaks present were retained)

- 1 pine supercanopy tree (tallest of the conifers shown) (direction is an average of ≥1/ha)

- 84 pine crop trees - crop trees address direction of ≥10 scattered conifers/ha

- Wildlife trees are well-dispersed; at least half as individual stems.

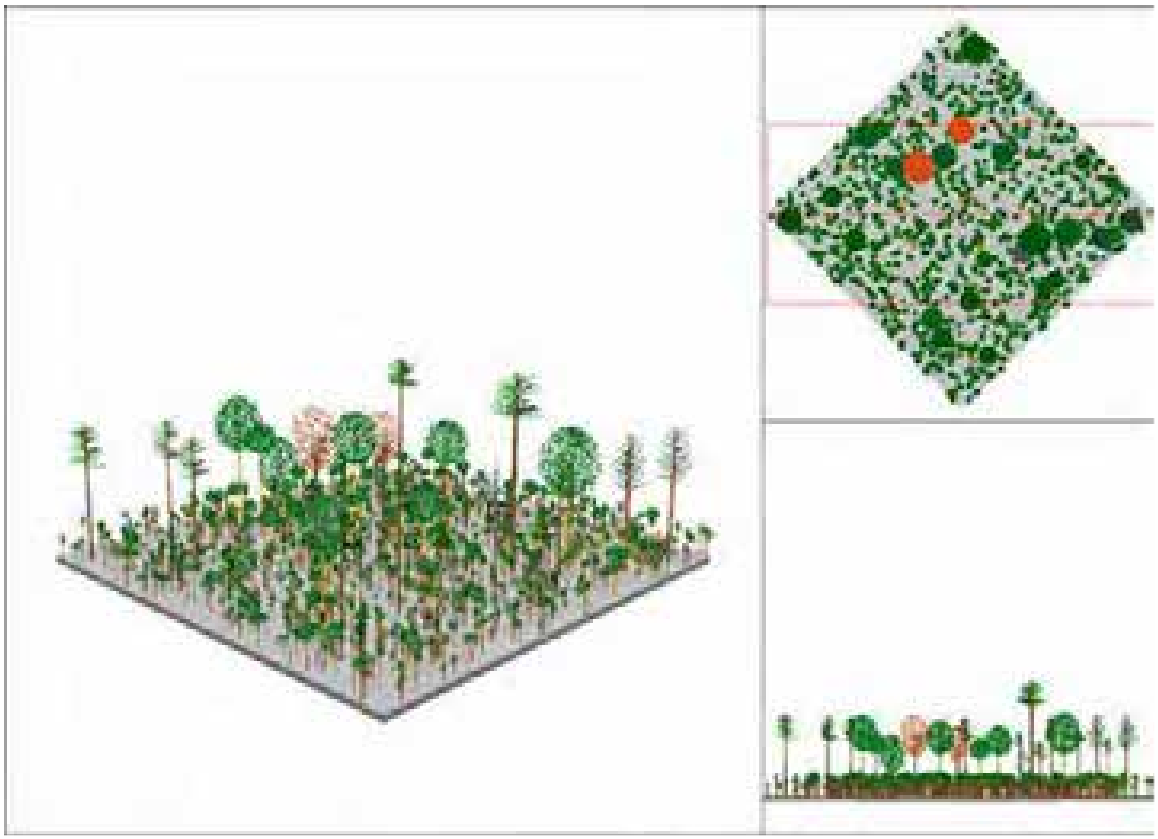


Example F: White pine shelterwood final removal harvest

The following figure depicts a hypothetical 1 ha block of forest that meets all wildlife tree standards and guidelines for white pine shelterwood final removal harvests. Tree markers retained:

- 25 wildlife trees/ha (direction is an average of ≥25 stems/ha), comprised of:
    - 10 living cavity trees – mix of trembling aspen (green oval crowns) and pines (pyramidal crowns) with existing cavities or the potential to develop cavities (direction is an average of ≥10 living cavity trees or large stubs/ha with a minimum of 5 living cavity trees on each hectare)
    - 10 veteran trees – mix of healthy, dominant and co-dominant pines (pyramidal crowns) and oaks (orange oval crowns) (direction is an average of ≥10 veteran trees/ha with a minimum of 5 on each hectare)
    - 1 pine supercanopy tree (tallest of the conifers shown) (direction is average of ≥1 supercanopy tree/ha)
    - 4 other pines - not necessarily healthy, dominant or co-dominant trees (direction is additional wildlife trees may be safe standing dead trees, small stubs, or any other living trees).
- Wildlife trees are well-dispersed; at least 10 individual stems/ha.

The short green stems represent regeneration (too small for wildlife trees).

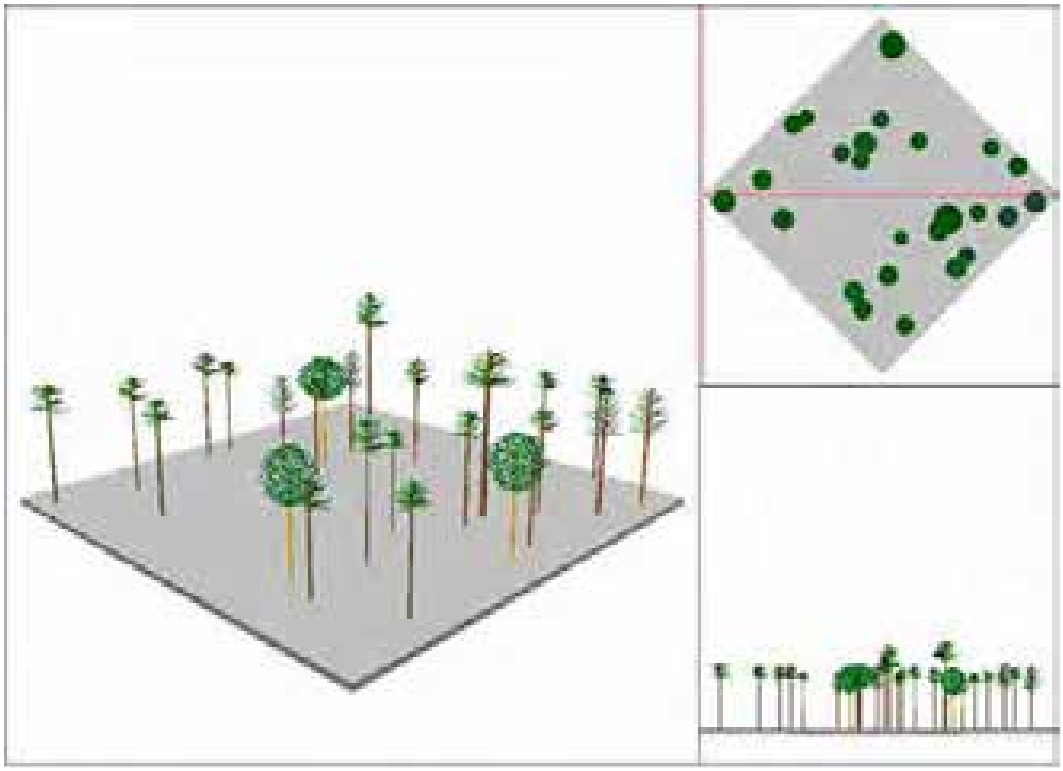


Example G: White and red pine seed tree harvest

The following figure depicts a hypothetical 1 ha block of forest that meets all wildlife tree standards and guidelines for white and red pine seed tree harvests. Tree markers retained:

- 25 wildlife trees (direction is an average of ≥ 25/ha), comprised of:
    - 10 living cavity trees – mix of trembling aspen (oval crowns) and pines (pyramidal crowns) with existing cavities or the potential to develop cavities (direction is an average of ≥10 living cavity trees or large stubs/ha with a minimum of 5 living cavity trees on each ha)
    - 15 healthy dominant and co-dominant pine seed trees – seed trees count as veteran trees (direction is an average of ≥10 veteran trees/ha with a minimum of 5 on each hectare)
    - 2 of the pine cavity trees are also supercanopy trees (tallest of the conifers shown) (direction is average of ≥1 supercanopy tree/ha).

- Wildlife trees are well-dispersed; at least 10 individual stems/ha.



Appendix 4.1a - Considerations for developing individual AOC operational prescriptions and conditions for provincially significant wetlands that mitigate potential effects on wetland features and functions and adjacent lands

Wetland function	Planned forest management activities	Potential impacts on function	Considerations for developing direction for provincially significant wetlands (PSWs) north of ecoregion 5E and adjacent lands
Hydrological o Water quantity/flow o Water quality	Harvest, renewal, tending	• Rutting/compaction • Erosion/sedimentation • Forest cover removal can result in thermal warming of water • Disruption of hydrological linkages between aquatic and terrestrial ecosystems • Short term post-harvest inundation (watering-up)	• To moderate water temperature, trap sediments, and filter nutrients, for more hydrologically sensitive portions of PSWs (marshes, fens), follow operational prescriptions for HPS lakes/ponds (30-90 m AOC) in section 4.1.1. • For less hydrologically sensitive portions of PSWs (swamps, bogs), follow operational prescriptions for LPS ponds (15-45 m AOC) in section 4.1.1. • For operations in adjacent lands that are linked to the PSW, follow conditions on regular operations for hydrological connections between terrestrial and aquatic ecosystems in section 4.1.4. • If planned harvest will exceed 25% of a catchment, consider scheduling harvest over multiple years to mitigate potential impacts of forest cover removal on water yield.

	Roads, landings, forestry aggregate pits, wood storage yards	• Erosion/sedimentation
		• Disruption of ground and subsurface hydrological function/flow
			• No construction of roads, landings, forestry aggregate pits, or wood storage yards permitted within more hydrologically sensitive marsh/fen portions of PSW.
			• Apply conditions on roads, landings, forestry aggregate pits, and wood storage yards for standing water in section 4.1.1 in adjacent lands.
			• For less hydrologically sensitive portions of PSWs (swamps, bogs):
			  • Avoid constructing all-season roads and landings. Construct winter roads where practical and feasible.
			  • When winter roads are not practical or feasible, follow conditions on roads, landings, forestry aggregate pits, and wood storage yards for all wetlands not addressed by operational prescriptions and conditions for AOCs in section 4.1.3. Permitting a road to cross these portions of a PSW may be acceptable (e.g., crossing at a narrow point to avoid the construction of additional roads/water crossings elsewhere) if impact is deemed to be minimal and other

			feasible alternatives would result in undesirable ecological or socio-economic impact. • No construction of new forestry aggregate pits and wood storage yards permitted. • Permitting use (and associated maintenance) of existing roads, landings, forestry aggregate pits, and wood storage yards in a PSW may be acceptable if impact on significant wetland features/functions is deemed to be minimal and other feasible alternatives would result in undesirable ecological or socio-economic impact.
Biological Terrestrial/aquatic habitat	Harvest, renewal, tending	• Change in forest composition and structure in adjacent lands can lead to local habitat loss or alteration for terrestrial wetland species • Sedimentation in PSWs capable of providing fish habitat • Increased potential for introduction of invasive/exotic species	• Apply prescriptions/conditions as an overlapping AOC if they exist (e.g., heronry). • Develop AOC prescriptions/conditions if they do not exist as per FMPM. When developing an AOC, consider potential wetland wildlife and plant species habitat requirements that extend beyond the wetland boundary (e.g. suitable nesting sites, mature forest cover, early successional habitat). For example, the Natural Heritage Reference Manual (2010) suggests an adjacent lands AOC width of 120 m for wetland species that are dependent on adjacent lands for upland habitat.
	Roads, landings, forestry aggregate pits, wood storage yards	• Increased human activity	• Establish proximity limitations for new roads, landings, forestry aggregate pits, and wood storage yards where wetland dependent species (e.g., non-species at risk amphibians, reptiles) that use adjacent lands to complete a portion of their life cycle are a significant biological feature. • Permitting use (and associated maintenance) of existing roads, landings, forestry aggregate pits, and wood storage yards in a PSW may be acceptable if impact on significant wetland features/functions is deemed to be minimal and other feasible alternatives would result in undesirable ecological or socio-economic impact.
Attribute • Species at risk, rare species • Critical/vulnerable habitat (concentrations of species, migration areas)	Harvest, renewal, tending Roads, landings, forestry aggregate pits, wood storage yards	• Change in forest composition and structure in adjacent lands can lead to local habitat loss or alteration for terrestrial wetland species • Sedimentation can reduce habitat suitability for aquatic species	Species at risk: • Apply species at risk prescriptions/conditions as an overlapping AOC if they exist. • Develop species at risk AOC prescriptions/conditions if they do not exist as per FMPM. Rare species, critical/vulnerable habitat: • If the PSW provides habitat for a rare plant community, an AOC width of 15 m would provide for the maintenance of the natural physical and chemical characteristics of aquatic resources.

		• Increased potential for invasive/exotic species • Increased human activity	• Harvest, renewal and tending operations at an appropriate scale may be used to renew critical/vulnerable habitat within the AOC. • Construct winter road or decommission or control access of roads once operations are complete if increased human access will potentially impact species or habitat. • If a PSW is an important waterfowl staging area, schedule forest management activities to avoid staging periods. • If introduction of invasive wetland plants is a concern for a PSW, develop conditions that prohibit new all-season road access (i.e., significant mineral soil disturbance) adjacent to the wetland boundary.

Appendix 4.1b – Determining self-sustaining trout lakes and ponds with a high risk of threat to sustainability from increased angling use and alien aquatic species establishment associated with new or improved access

i) Risk assessment considerations for self-sustaining brook trout lakes and ponds

All lakes and ponds with **self-sustaining** brook trout populations should be considered high risk if **new** or **improved** forest access roads are expected to increase **angler use** of the lake or pond (see Notes in Section 4.1.5 for definitions of bolded terms).

See additional considerations below that apply to all self-sustaining trout lakes.

ii) Risk assessment considerations for self-sustaining lake trout lakes less than 500 ha in size

When assessing whether **alien aquatic species** establishment might negatively impact the status of existing lake trout populations, lake size is an important consideration. Vander Zanden et al (1999) found that lake trout populations are more vulnerable to invasions of alien aquatic species, such as smallmouth bass, in lakes that lack pelagic prey-fish (i.e., cisco). In these lakes, alien aquatic species often outcompete lake trout for littoral prey-fish, which is typically their primary food source. In lakes where pelagic prey-fish exist, including cisco, lake trout may shift their diet to rely more on pelagic prey-fish which are generally not consumed by bass. Larger lakes typically support more complex fish communities, including cisco. Analysis of unpublished Aquatic Habitat Inventory (AHI) data for 9,437 Ontario lakes supplied by Nigel Lester (March 2020) indicates that the probability of presence of cisco increases to greater than 50% when lake surface area exceeds 500 ha. Thus, lake trout populations in larger lakes may be less impacted by alien aquatic species establishment.

All lakes less than a threshold size of 500 ha with self-sustaining lake trout populations should consequently be considered high risk (i.e., apply direction in Section 4.1.5) if new or improved forest access roads are expected to increase angler use of the lake. However, if a comprehensive lake inventory exists that confirms the presence of cisco or other pelagic prey-fish for a lake less than 500 ha in size, the risk assessment described in iii) should be applied as angling exploitation may still be a concern.

See additional considerations below that apply to all self-sustaining trout lakes when deciding to apply direction in Section 4.1.5.

iii) Risk assessment considerations for self-sustaining lake trout lakes 500 ha and greater in size

To determine whether lakes 500 ha and greater in size with self-sustaining lake trout are high risk, the assessment not only includes consideration of the potential increase in

angler use from new or improved access, but also a consideration of the potential impact of this increased use on the sustainability of the population (considerations (1) and (2) in Figure 1). This additional consideration acknowledges that increased angler use may not always result in the over-harvest of lake trout populations in self-sustaining lake trout lakes.

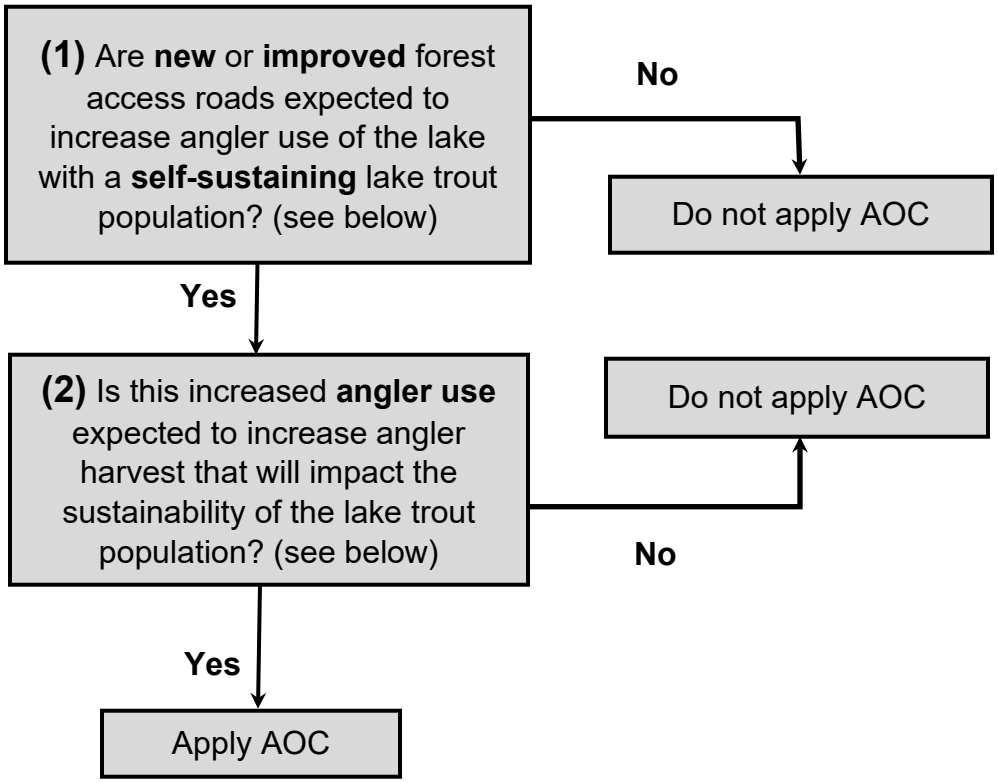


Figure 1. Decision key for assessing risk of new or improved forest access roads on the sustainability of self-sustaining populations of lake trout in lakes 500 ha and greater in size.

Consideration (1) in Figure 1
This consideration in the decision key acknowledges that new or improved access near a self-sustaining lake trout lake may not always result in increased angler use. For example, a new forest access road constructed near a self-sustaining lake trout lake will not result in increased use if the lake has a pre-existing boat launch.

Consideration (2) in Figure 1
For lakes 500 ha and greater in size with self-sustaining lake trout populations, the consequences of increased angler use on population sustainability must be considered (consideration (2) in Figure 1). This consideration is limited in scope to potential impacts from expected angler harvest from new or improved access alone. Often, site-specific information about the status of existing populations of lake trout will be unavailable. In these cases, it is recommended that the evaluation be conducted using aggregated

data and information such as those available for Fisheries Management Zones or Ministry administrative regions.

Information from Lester et al (2021) can be used to assess whether increased angler use might result in unsustainable lake trout harvest in lakes 500 ha and greater in size. They provide a detailed lake trout model to estimate maximum sustainable level of angling effort intensity (E_{MSY}, in h/ha). Using survey data from the Aquatic Habitat Inventory, the model was used to calculate E_{MSY} for surveyed lakes in Ontario. Mean E_{MSY} for lakes 500 ha and greater in size by fisheries management zone and lake size class (500-1,500 ha, 1,501-5,000 ha, >5,000 ha) are presented in Table 1.

With data from Ontario's Broadscale Monitoring program (BsM) (September 2020), estimates of average lake trout targeted angling effort intensity (h/ha) on lake trout lakes for each Ministry administrative region are presented in Table 2. These estimates are subject to change as additional BsM data become available. Practitioners are encouraged to search for revised data before using these estimates.

Table 1. Average estimated angling effort intensity at maximum sustainable yield (E_{MSY} in h/ha/yr) for lakes greater than 500 ha by FMZ and lake size class. E_{MSY} values in brackets represent 68% confidence interval (CI). E_{MSY} values in bold indicate that the upper bounds of 68% CI for current average lake trout targeted angling effort intensity (from Table 2) exceeds lower bounds of 68% CI for mean E_{MSY}. If angling effort intensity exceeds E_{MSY}, lakes that fall into that FMZ/size class should be designated as high risk.

Ministry Region	**FMZ**	**E_{MSY} (h/ha/yr)**		
		500-1,500 ha	**1,501-5,000 ha**	**>5,000 ha**
Northwestern	2	2.8 (2.6-2.9)	**1.8 (1.7-1.9)**	**1.7 (1.6-1.8)**
	4	2.9 (2.7-3.0)	2.3 (2.2-2.4)	1.8 (1.7-1.9)
	5	3.6 (3.5-3.7)	2.9 (2.8-3.0)	2.4 (2.2-2.5)
	6	3.4 (3.3-3.6)	2.6 (2.4-2.7)	**1.7 (1.5-1.9)**
Northeastern	7	**2.9 (2.7-3.1)**	**2.4 (2.2-2.6)**	**2.0 (1.8 - 2.2)**
	3	**1.7 (1.7-1.7)**	no data	no data
	8	**2.7 (2.5-3.0)**	**2.0 (1.9-2.2)**	**1.7 (1.7-1.7)**
	10	**3.5 (3.4-3.6)**	**2.5 (2.3-2.7)**	**1.8 (1.6-2.1)**
	11, 12	**3.5 (3.3-3.7)**	**2.6 (2.3-2.9)**	**2.0 (1.8-2.1)**
Southern	15	**3.3 (3.2-3.4)**	**2.8 (2.7-2.9)**	**2.5 (2.4-2.6)**
	18	**2.9 (2.7-3.1)**	**2.1 (1.9-2.3)**	no data

Table 2. Average lake trout targeted angling effort intensity (h/ha/yr) from BsM data for lakes greater than 500 ha by Ministry administrative region and lake size class. Angling effort intensity values in brackets represent 68% confidence interval (CI).

Ministry Region	Angling effort intensity (h/ha/yr)		
	500-1,500 ha	1,501-5,000 ha	>5,000 ha
Northwestern	1.4 (1.1-1.8)	1.6 (1.2-1.9)	1.4 (1.1-1.6)
Northeastern	3.5 (2.2-5.5)	1.9 (1.6-2.3)	2.4 (1.8-3.0)
Southern	6.4 (5.5-7.3)	6.1 (4.7-7.5)	6.3 (5.0-7.6)

If the estimated angling effort intensity on a lake or pond with self-sustaining lake trout exceeds the estimated angling effort intensity at maximum sustainable yield, the waterbody should be designated as high risk.

See additional considerations below that apply to all self-sustaining trout lakes.

Kaufman et al (2009) provides an alternate approach to estimate open water season and winter fishing effort on lake trout lakes where angling effort is divided by lake size (ha) to obtain angling effort intensity. These authors estimated models of angling effort on Northeast Region lakes with lake trout from factors including lake size, access type, and travel time to different size communities of people. These model estimates, therefore, can provide estimates of angling effort intensity that account for some contextual factors beyond region and lake size.

iv) Risk assessment considerations that apply to all self-sustaining trout lakes

- Generally, for lakes or ponds without pre-existing access, if a new road is proposed or an existing road that is to be improved is located within 1,000 m of a lake or pond with a self-sustaining trout population, there is a higher potential that it will result in increased angler use of the lake or pond (Hunt and Lester 2009).

- Any existing use management strategies identified in the FMP (e.g., efforts in place to control access) for roads or road networks within the vicinity of lake or pond also need to be considered when determining if any planned access may result in increased angler use of the lake or pond.

- A high-risk designation for potential unsustainable harvest and/or alien aquatic species introduction should also be informed by expert judgement and local knowledge that brings regional and local contextual factors into the evaluation including but not limited to:
    - Fishing regulations (e.g., regulations that close winter fishing on brook trout and/or lake trout, regulations that ban live bait);
    - Expected demand for angling use at the lake (e.g., available fishing alternatives, fishing quality, number of anglers who reside nearby, regional patterns of fishing activity, and available technology to the angler such as tools that increase fishing effort or the harvest efficiency of effort).; and
    - Local site conditions (e.g., fish species, lake size, topography, soils).

- The risk assessment (high or not high risk) for self-sustaining trout populations also requires an estimation of confidence. When confidence in the assessment is low, the AOC should be applied to be consistent with the precautionary principle. The confidence assessment should focus on available information used to decide whether; 1) new or improved forest access roads will increase angler use of lakes and ponds, and for lake trout in lakes 500 ha and greater, 2) increased angler use will result in potentially unsustainable angling effort intensity. Gaps in knowledge and understanding that prevent greater confidence in the assessment should be identified and addressed through additional science-based activities.

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Appendix 4.2 – Assessing the potential impact of forest management operations on nesting birds

Forest management operations (excluding nest monitoring) that may potentially disturb nesting birds are classified as high, moderate, or low impact operations in Section 4.2.2 based on the following six criteria:

Criterion	Description and score
A	Duration of individual events (e.g., a truck driving past a nest is a discrete event): 1. Seconds 2. Minutes 3. Hours
B	Number of individual events per day: 1. Few (<5) discrete events 2. Many (≥5) discrete events 3. Events are continuous (e.g., harvest operation)
C	Time period over which events occur during the breeding season: 1. Minutes 2. Hours 3. Days
D	Detectability of events at nest: 1. Low likelihood of being heard or seen 2. Likely to be heard 3. Likely to be seen
E	Number of pedestrians involved in activity: 0. None 1. Few (<5) 2. Many (≥5)
F	Number of small (e.g., chainsaws) or large (e.g., skidders) pieces of equipment involved that produce noise: 1. None 2. One large or a few (<5) small pieces of equipment

The overall score = [(A+B+C)*(D+E+F)]/36

A score ≥0.67 suggests a HIGH potential impact
A score ≥0.33 suggests a MODERATE potential impact
A score <0.33 suggests a LOW potential impact

For example, a mechanical harvesting operation involving 1 or more feller bunchers, 1 or more grapple skidders, and many people that could be heard for numerous weeks from an osprey nest would score a 2 for criterion A, a 2 for criterion B, a 2 for criterion C, a 1 for criterion D, a 2 for criterion E, and a 2 for criterion F for a total score of 0.83 (high potential impact).

A small crew of tree planters working around an osprey nest in a cutover for 1 day would score a 2 for criterion A, a 2 for criterion B, a 1 for criterion C, a 2 for criterion D, a 1 for criterion E, and a 1 for criterion F for a total score of 0.56 (moderate potential impact).

One truck hauling within sight of an osprey nest (>5 loads per day) for a week would score a 0 for criterion A, a 1 for criterion B, a 2 for criterion C, a 2 for criterion D, a 0 for criterion E, and a 1 for criterion F for a total score of 0.25 (low potential impact).

The above approach can be used to rate the potential impact of any proposed activity. The following table provides some examples of how common activities typically rank using the above approach.

Potential Impact	**Examples**
High	Harvest operation Large tree plant (≥5 people) if visible Mechanical site preparation Road construction
Moderate	Ground (airblast) herbicide application Large tree plant if not visible Small tree plant if visible Small crew using brushsaws
Low	Aerial application of herbicides Boundary/tree marking Hauling Routine road maintenance (e.g., grading)

Note: For complex operations, the cumulative potential impact of all concurrent activities should be assessed. For example, when a harvest operation involves concurrent felling, skidding/forwarding, roadside delimbing, slashing, and loading, all activities should be included in the evaluation of potential impact.

Appendix 5.2a – Measuring rutting and extraction trail coverage and defining roadside work areas

The following methodologies are recommended for measuring rutting and extraction trail coverage and defining roadside work areas. Planning teams may choose to adjust or expand upon locally.

Measuring rut depth and length

- Measure rut depth from the top of the soil surface, including organic layers (LFH) if present. Figure 1 provides examples from which local determinations can be expanded.

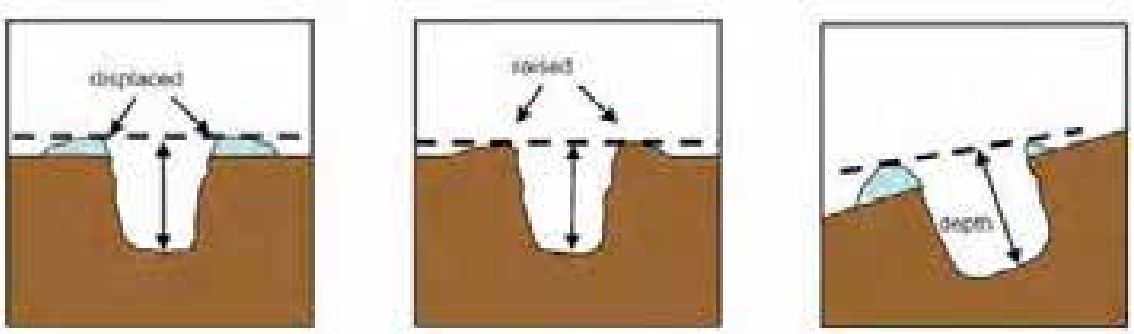

Figure 1. Approach to measuring rut depth.

- When the depth varies across the width of the rut (i.e., perpendicular to the direction of travel), the deepest point is to be measured as the depth.

- When a rut has been filled, or partially filled with soil, litter, water, or debris, the depth will be measured as if the rut had not been filled. This includes areas in organic soil where churning and mixing of surface and sub-surface organic layers has occurred. In some circumstances it will be difficult to determine the unfilled depth.

- When determining if a potential rut is at least 4 m long, the length is measured as the contiguous portion that is deeper than 30 cm (or depth to bedrock / large boulders) and is not to be an average depth measurement where some of the length is less than 30 cm deep.

Measuring rutted extraction trail coverage of any 20 ha area in selection and shelterwood (including irregular shelterwood) silviculture systems and commercial thinning

- Identify a continuous 20 ha area (~450 m x 450 m or as block boundaries permit) where it is suspected the block-level rutting threshold of 900 m of extraction trails has been exceeded based on observations (e.g., during a ground inspection or from drone-captured aerial imagery). Exclude roads, roadside work areas, landings, and the first 30 m of any extraction trail that originates from a landing from the assessment area.

- Measure the length of extraction trails that are rutted in the 20 ha area by measuring how many meters of extraction trail are either single (i.e., only one wheel track) or double rutted (i.e., both wheel tracks). Where parallel trails exist and where total width exceeds 7 m, measure parallel trails separately as independent trails.

Measuring rut coverage (clearcuts, excluding commercial thinning) or extraction trail coverage (selection, shelterwood, and commercial thinning) of any 20 ha area using the line transect method

- Stratify block to delineate areas where the direction applies;
  - Exclude roads, landings, and roadside work areas
  - Define the area of clearcut, shelterwood, and selection harvest
  - Define the area of shallow soils in clearcut areas.

- To layout transects, select the center of a 250 m radius circular plot (20 ha) covering the most disturbed area in the block (Figure 2). For a quick, preliminary assessment to determine if rut or trail coverage may be approaching the allowable threshold, establish three random, 100-pace transects, offset by 120^{o}, within the 20 ha plot.

- Walk each of the three 100-pace transects. Count every time a pace (1 pace = 2 steps) intersects a rut or trail. The percent cover of ruts or trails would be the total number of paces on the three transects that intersect a rut or trail divided by the total 300 paces surveyed. For example, if 30 of a total 300 paces fell over top of a rut or trail, coverage would be 10%.

- If the percent coverage of ruts or trails for the three transect lines is approaching or exceeds the threshold using the preliminary pace assessment, a more accurate (and intensive) assessment will need to be conducted. Switch from pace-based transects to transects measured in meters. Establish three 100 m transects and measure the total length (m) of ruts or trails that intersect the three transects. The percent coverage of ruts or trails would be the total number of meters of ruts or trails measured along the three transects divided by the total 300 m of transects surveyed. Additional 100 m transects may need to be established within the 20 ha plot for a more accurate assessment if rut or trail coverage is very close to the threshold (e.g., +/- 5%).

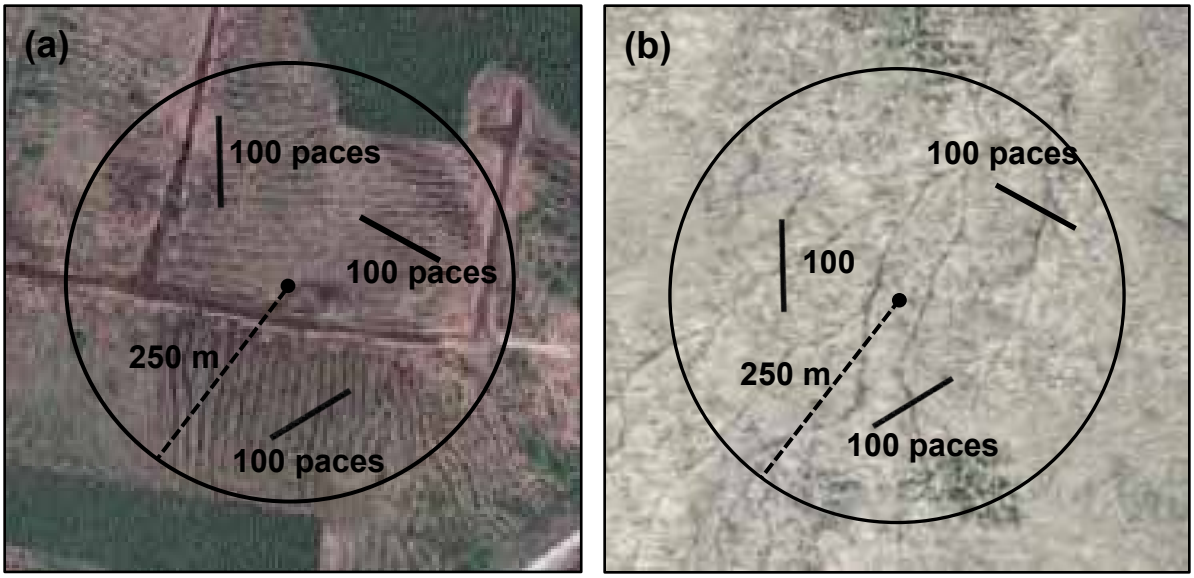

Figure 2. Plot layout to do a preliminary assessment of percent coverage of ruts (a) and extraction trails (b) for a 20 ha area using 100-pace (1 pace = 2 steps) transects.

Defining roadside work areas

Roadside work areas include areas at the edge of the road where concentrated activity other than skidding (e.g., piling, delimbing, slashing, chipping, slash piling) is necessary to receive and process wood from the rest of the harvest area. The roadside work area can extend up to 1.5 tree-lengths (e.g., 30 m) from the edge of the road and may only occur along the length of some portions of the road, depending on the pattern of operations. Operations that process in the block and deliver wood to roadside may have a narrower roadside work area than full-tree and tree length operations.

Appendix 5.2b – Suggested strategies and techniques to minimize site disturbance during harvest, renewal, and tending operations

i) Rutting and compaction

- Encourage advanced planning of access within the block (i.e., skid trails and landings) by the operator and/or supervisor.
- Identify and locate primary trails and convergence zones where the ground has the greatest load-bearing capacity.
- Limit and flag the number of main skid trails and ensure all operators are aware of their location.
- In fully mechanized operations, limit travel of forwarder and skidder to harvester trails.
- Consider strengthening main trails and convergence zones with slash matting where damage is likely to occur. In some cases, gravelling of main skid trails should be considered.
- Keep skid trails as straight or as gently curving as possible.
- In clearcut systems, normally distribute skid trails widely, while avoiding wet or other susceptible areas. In partial cut systems, normally concentrate skid trails to minimize the extent of damage to residual stems.
- Forwarding/skidding should not deviate from designated extraction trails.
- When only a few machine passes can create a significant risk of compaction or rutting, concentrate machine traffic on main trails and mitigate any damage that occurs (i.e., do not disperse traffic).
- Recognize that some damage to main trails should be anticipated as a cost of minimizing damage to residual trees and rest of site and have a plan to mitigate and/or rehabilitate damage on main trails.
- In partial cut systems, winch as much wood as possible to the skidder to minimize the extent of skid trails.
- Use high floatation equipment if summer logging includes large areas of organic soil and monitor closely to ensure damage is minimal.
- If it is not possible to avoid susceptible wet areas such as swales, seeps, and wetlands:
    - Reach into them with a felling head or winch wood out of them using conventional cut and skid systems
    - Use feller-bunchers to cut and move bunches to solid ground
    - Use “hoe-chucking” (e.g., excavator) to move wood to solid ground
    - Use brush and tops to increase load-bearing capacity of the soil, recognizing some disturbance may occur
    - If machine traffic must enter a wet area, avoid crossing the entire width, but rather approach from both sides and reach into middle.
- On sites susceptible to compaction and rutting, place slash in front of machines when using cut-to-length systems that limb and top on site.

- Recognize that use of slash matting or other mitigative techniques may disguise some types of soil disturbance and consider moving blocks if excessive use of mitigation is required.
- Minimize disturbance/removal of soil organic layers and topsoil during harvesting and site preparation operations.
- Operations should be undertaken or discontinued based on actual compaction and rutting which is occurring. As examples:
    - In late winter/early spring, if frost conditions permit, it may be possible to operate overnight until mid-morning and cease operations when the ground warms up in the afternoon
    - A shut down for a few days may be required after a period of high precipitation.
- Whenever possible, non-productive areas (such as rock outcrops) or other relatively high load-bearing soils should be selected for landing sites.
- Daily on-site planning is important. Operators need to be competent, properly trained, and aware of the objectives and plans for specific sites.
- Frequently monitor operations (both during and after) to mitigate any damage that may occur and better forecast where future problems may occur.
- In winter conditions where the soil is not adequately frozen, compacting snow with a feller-buncher prior to wood extraction or blading off some snow from trails and landings, will allow frost to penetrate deeper. Allow sufficient wait time in sub-zero temperatures (at least overnight) for the soil to freeze.
- Skid or forward wood as soon as possible to avoid the “watering up” that can occur within days after felling.
- Where possible, locate roads and landings so that skidding can occur in a downhill direction. Adjust strategy as necessary when working on erosion-prone soils.
- Where possible, turn machinery on roads or on other high strength soil rather than in cutblock.
- Where machine design permits (e.g., some forwarders), travel empty in reverse to avoid soil damage caused by turning.
- On high hazard sites (see Appendix 5.2b), or when conditions are such that rutting can occur, reduce skidder loads to distribute weight evenly on all wheels (rule of thumb – 2/3 of a full load).

ii) Erosion

- Where safety permits, skid across slopes and avoid skidding with slope.
- Avoid road and landing layout that requires skidding or forwarding up or down steep slopes.
- Where skidding or forwarding with the slope is necessary:
    - Consider dispersing traffic so repeat traffic does not cause rutting and/or compaction
    - use chains or other implements to increase traction to avoid tearing root mat and organic layers
    - avoid turning on slope to minimize tearing of root mat and organic layers.

- Consider extremely steep slope areas as inoperable and avoid machine travel. The specific steepness threshold should be determined locally, based on site conditions and available machinery.
- Consider the use of winter-only operations on very high-hazard sites (e.g., very fine sand with thin organic layers).
- Avoid harvesting areas where tree removal (and associated root decay) is likely to increase erosion damage (e.g., discontinuous shallow organic layer over bedrock).
- Where possible, use low or no mineral soil exposure renewal and site preparation options such as natural regeneration, direct planting, manual site preparation, or mechanical mounding in steep and/or erosion-prone areas.
- Where safety permits, ensure site preparation runs across the slope and avoid aligning with slope.
- Site prepare to provide the minimum amount of mineral soil exposure to achieve silviculture objectives. On high-hazard sites, favour mounding over continuous trenching or broadcast site preparation (e.g., blading, ploughing).
- Within the limits of operational efficiency, use the smallest prime-mover possible to achieve site preparation goals.
- Schedule timely renewal and select fast-growing species in steep or erosion prone areas.
- Identify ruts or furrows on slopes that are channeling runoff and causing erosion. Limit further erosion by filling these ruts with slash, debris, or non-erodible soil.
- Divert mid-slope ruts that are, or are likely to, channel water with cross drains, obstacles, or berms (i.e., water bars). This is particularly applicable to extraction trails in partial harvest systems.
- On high-hazard sites, frequently monitor operations (both during and after) to mitigate any damage that may occur and better forecast where future problems may occur.
- Where possible, disperse unutilized slash over areas that are prone to erosion (e.g., fine sands that are easily eroded by wind and on slopes).

iii) Nutrient Loss

- Give preference to logging methods that leave debris and unutilized fibre in the block (e.g., cut-to-length, tree length) over logging methods that process and pile debris and unutilized fibre at roadside (e.g., full-tree).
- Use winter harvest operations to conserve nutrients on site (leaf fall and root stores).
- Where possible, re-distribute unutilized slash and chipper debris back over block in a manner that will not interfere with silviculture or diversity objectives.
- Retain a diversity of tree and shrub species on site, including hardwood species and alders, to improve capture and cycling of nutrients.
- Leave some trees (potentially non-crop trees) un-harvested to serve as nutrient sinks to capture mobile ions made available immediately following harvest and site preparation.

- On very shallow soil sites, or sites with undulating topography, use high flotation (low impact) equipment to maintain surface organic layer integrity and prevent rutting or compaction in deeper soil inclusions. This is especially important during wet weather conditions when the organic layer or soil is saturated.
- Post-harvest prescriptions and renewal efforts should be carried out as quickly as possible on shallow soil sites to encourage full site occupancy. This should also help to prevent problems with erosion and loss of nutrients.
- Lower nutrient demanding species, such as jack pine, should be matched to nutrient-poor sites. Selection of fast-growing species is advisable to ensure timely renewal and reduce erosion risk.

iv) Loss of productive forest area

- All roads should be marked on the ground in advance of construction, preferably the corridor as well as the center line.
- Develop a block plan for operational roads and communicate plan to operators. Alternatively, encourage operators to develop a block plan in advance of harvesting and construction.
- Locate branch and operational roads to ensure operators are skidding the maximum cost-effective distance.
- Avoid excessive use of turn-arounds and loop roads.
- Use winter-only access options where delivery schedules and silviculture requirements permit.
- Pre-determine number and location of landings and communicate with the operator. Identify contingency landings to adapt to localized situations, such as encountering susceptible areas or unmapped streams that may change skidding plan.
- Use shovel equipment (excavator, backhoe, etc.) rather than bladed equipment (dozers, etc.) to build roads to minimize width of disturbed areas.
- Whenever possible, non-productive areas (such as rock outcrops) should be selected for landing sites.
- Where feasible, use equipment combinations that maximize distance between roads (e.g., forwarders).
- Where feasible, select machinery combinations that maximize within-block processing to minimize slash and debris piles.
- Practice environmentally friendly, zero discharge maintenance and re-fueling to ensure no soil contamination occurs.
- Pile roadside wood as high as safety permits to minimize area of landings.
- Keep bush inventories low by “hot logging” to minimize number of landings. This approach should be balanced with the potential for rutting and compaction as a greater area of the block converges on fewer landings.
- Where a use management strategy suggests a road will not be used in the long-term (e.g., operational roads), consider returning the roadbed to productive forest area. Roadbeds, log landings, loading areas, and turn-around areas can be treated and planted with trees or other plants appropriate for the site and consistent with other management objectives of the area.

- Educate supervisors and operators on short- and long-term effects of excessive conversion to non-forest to enable informed planning and decision-making.
- Where safety permits and other values will not be compromised, burn piles of slash, debris, and unutilized fibre.
- If long windrows of slash are created, breaks should be provided to allow animals, other forest users and operations unobstructed access routes across the right-of-way. A 10 m break every 100 m of windrow is a good target.
- Reduce thickness and footprint of debris on productive land through carry back, piling/spreading, or burning to make it more amenable to further silviculture treatment.
- Maximize use of unutilized processing debris for:
  - Road construction. (e.g., brush matting swamp crossings, fill wet holes, stabilize steep road banks, stabilize ditches)
  - Rehabilitation of gravel pits, borrow pits, or other human-caused unproductive sites.
- Use the following decision key (modified from Buda et al (2015)) to assist in making informed decisions about chipper debris management.

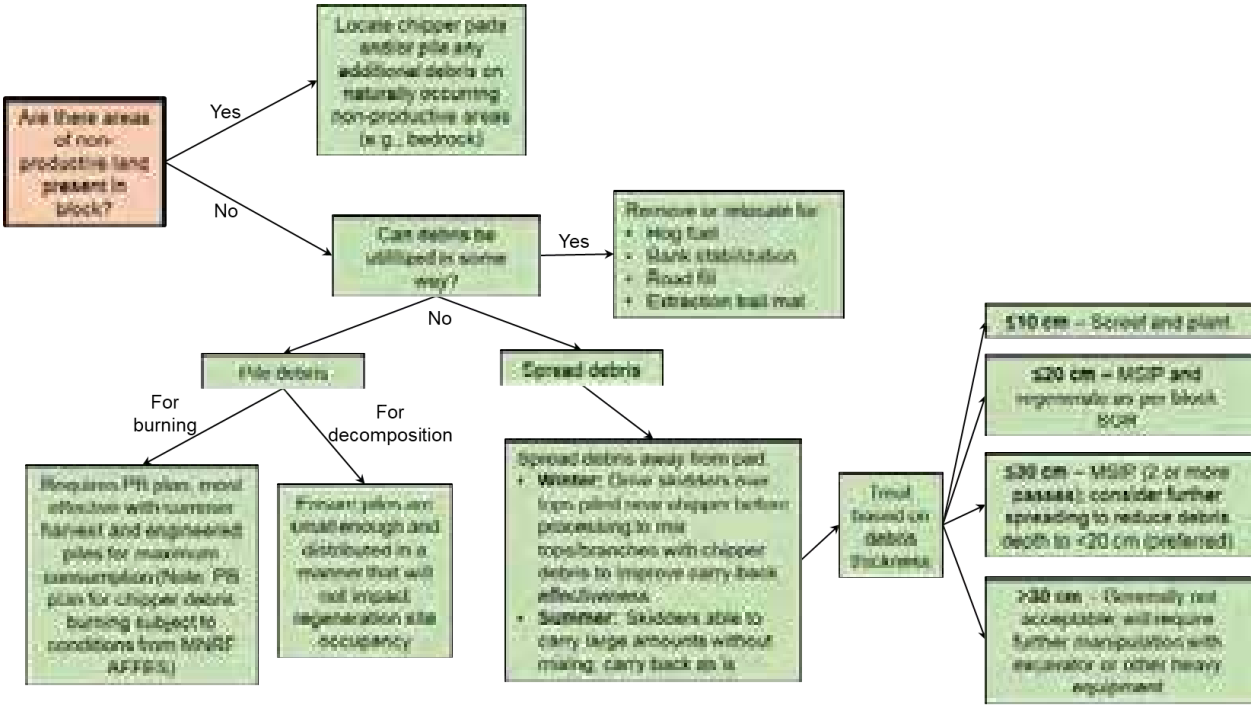

Figure 3. A chipper debris management decision key based on the recommendations of the northwestern Ontario Chipper Debris Working Group (modified from Buda et al (2015)).

Literature cited

Buda, N., J. Lane, D. Morris, G. Nishio, P. Poschmann and D. Reid. 2015. The Northwestern Ontario Chipper Debris Working Group: A summary of activities and findings, 2011-2014. OMNRF, Science and Research Branch, Peterborough, ON. Science and Research Information Report IR-04.

Appendix 5.2c – Site disturbance susceptibility tables

The following color codes apply to the site disturbance susceptibility charts. The soil descriptions generally follow the Ontario Institute of Pedology descriptions.

Rutting susceptibility

	Texture	Mineral			Organic		
	Depth	All <30cm	Sand 31+	Other 31+	Fibric all	Mesic all	Humic all
Soil Moisture Condition	Wet						
	Moist						
	Dry						
	Frozen						

Low
Low-mod
Mod
Mod-high
High
NA

Erosion susceptibility

	Texture	All shallow mineral		Mineral other than silty		Silty		Organic - fibric		Organic – mesic/humic	
	Depth	0-5	6-30	31-60	61+	31-60	61+	21-40	41+	21-40	41+
Slope (%)	31+										
	11-30										
	0-10										

Nutrient loss susceptibility

	Texture	All shallow mineral			Sandy		Other mineral	Organic
	Organic Depth	0-5	6-20	0-5	0-5	6-20	All	All
	Mineral Depth	0-5	0-5	6-30	31-60	31-60	All	All
Logging method	Clearcut - full tree							
	Clearcut – tree length and cut to length							
	Partial harvest							

GLOSSARY

Active nests/colonies: Occupied nests/colonies (occupied colonies are those containing ≥1 occupied nest) where breeding activity has been confirmed or those at which breeding activity has not been confirmed, but for which there is compelling evidence of recent use.

AOC: Area of concern

AGS: Acceptable growing stock

BCR: Bird Conservation Region – Ecologically distinct regions in North America with similar plant and wildlife communities as well as similar soils, drainage, and climatic characteristics. There are 4 bird conservation regions within Ontario.

Bedding areas: Generally in reference to specific areas where cervids lie down or sleep. Bedding areas often have a seasonal and/or temporal aspect to their location and pattern of use (e.g., day and night).

Best management practice: A component of a guide that suggests a practice or strategy to help implement the overall purpose of the associated standard(s) and/or guideline(s).

Biofibre: Forest resources from Crown forests that are not normally being utilized for conventional forest products and that are made available under an approved forest management plan.

Browse: Twigs and foliage of tree and shrub stems that are consumed by one or more species of cervid. Species used and preferred as browse differ among cervid species. Usually, only the current annual growth is suitable and selected as browse, because it is more nutritious and palatable. However, older stems and twigs may be consumed, particularly when populations exceed habitat carrying capacity.

BSH: Brush and alder (a polygon type in the forest resources inventory of a forest management plan as defined in the *Forest Information Manual* and associated *Forest Resource Inventory Technical Specifications*)

Cavity tree: A dead, dying, or live tree with a cavity or cavities, or with the potential to develop cavities, that is ≥10 cm dbh and ≥3 m tall. In the past, these trees were sometimes referred to as ‘snags’ or ‘snag trees’. The term snag is no longer applied to wildlife trees to avoid confusion or contradiction in terminology (e.g., *Regulations for Industrial Establishments O. Reg. 851 (s.103), made under the Occupational Health and Safety Act, 1979*).

Cervid: Mammalian species that are a member of the deer family. There are four cervid species in Ontario (moose, white-tailed deer, elk, and woodland caribou).

CFSA: *Crown Forest Sustainability Act, 1994*

CLAAG: Careful logging around advanced growth – An operational practice that can be applied with any harvest method under the clearcut silviculture system where the objective is to remove the overstory, protect understory advance growth, and regenerate an even-aged stand. The resulting stand develops under full light conditions, generally with a reduced rotation length.

Conditions on operations: Conditions applied in areas of harvest, renewal and tending operations (conditions on regular operations), conducted in accordance with the silvicultural ground rules, and conditions applied on roads, landings, forestry aggregate pits, and wood storage yards to maintain or protect important ecological features (e.g., grouse nests, wildlife trees) that are not addressed by operational prescriptions and conditions for areas of concern or to implement specific operational direction (e.g., rutting, large landscape patches).

Critical breeding season: The critical breeding season includes courtship, nest building, egg laying, incubation, and rearing of young to fledging and is defined based on the best data available for Ontario (primarily by using the Nesting Calendar Query Tool available on the Birds Canada website (https://www.birdscanada.org/)).

Crown/canopy closure: The ground area covered by the crowns of trees or woody vegetation as delineated by the vertical projection of crown perimeters and commonly expressed as a percentage of total ground area.

Culvert: Corrugated steel pipe is the common material used for small diameter (usually less than 1,800 mm) culverts to convey water under an access road. The term refers to the factory-assembled round shapes connected together with couplers. Larger culverts (generally those >1,800 mm diameter), are normally multi-plate or structural plate culverts and are assembled in the field.

Deer winter concentration area: Normally identified as winter deer emphasis area (DEA). A forested area deer traditionally migrate to and where they spend the winter months. The ‘core’ of a deer winter concentration area is where use by deer is highest during winters that are severe, also referred to as stratum I. Boundaries of a deer winter concentration area tend to change over time.

DFO: Department of Fisheries and Oceans

Disruption of hydrological function: Alteration of the physical characteristics of a site such that the natural flow of water, on or below the surface, is significantly impeded (e.g., by damming), accelerated (e.g., by channelization), or diverted (e.g., by ditching). The natural “watering up” process associated with the removal of forest cover is not considered a hydrological disruption.

Diversity tree: Trees retained as wildlife trees that occur infrequently or are uncommon for the forest type.

Exception: An operational prescription or condition for an area of concern or a condition on operations for an important ecological feature or specific operational direction which differs from a standard or guideline in this guide. Requirements for including an exception in an FMP are specified in the *Forest Management Planning Manual*

Existing roadbed: Any clearly recognizable roadbed with dominant vegetation generally comprised of shrubs and/or saplings that is predominantly <8 m tall (i.e., not contributing to the overall canopy closure).

Extraction trail: Anywhere a machine being used for extraction (e.g., skidder, forwarder) has traveled within the block (excluding travel on roads and landings).

Extraordinary circumstances: In a very limited number of situations during the implementation of an FMP, deviation from direction in this guide may be permitted when:

1. Strict application of the direction would result in unacceptable and imminent socio-economic or environmental consequences
2. The modified activities are unlikely to have an adverse effect on the objectives of the direction
3. The situation could not reasonably be foreseen and planned for, is unavoidable, and is beyond the forest licensee's control.

For example:

1) An occupied hawk nest is located after some harvesting has been conducted within its AOC. Skidding wood already felled would normally not be permitted during the critical breeding period. However, if there is a high risk that the merchantability of the wood will be compromised by delaying skidding until after the critical breeding period (e.g., white pine logs will stain) and the risk of disrupting the breeding activity is considered to be low (e.g., skidding activity will not be visible from the nest, will be conducted when the chicks are no longer being brooded, will not be conducted on cold or wet days), the situation may be considered an extraordinary circumstance.

2) During operational road layout, it is determined that due to site conditions both within (e.g., steep or otherwise unsuitable terrain) and adjacent (e.g., presence of lakes and/or other land ownership) to the approved operational road boundary, the only reasonable alternative for the road location is within an adjacent AOC associated with a lake. This situation may be considered an extraordinary circumstance if not locating the road within the AOC results in an additional length of required road that results in an unacceptable increase in construction costs and footprint on the land base. Depending on site conditions, road construction within the AOC would be subject to mitigative measures such as locating the road as far from the lake as possible, minimizing grubbing and

ditching during construction, and/or ensuring adequate erosion control and cross drainage.

In both these examples, the prescription for the specific value may be amended to permit the normally prohibited activity as subject to appropriate conditions. An amendment (administrative or minor) will be prepared to amend this individual prescription to the FMP. This amended prescription will not be considered an exception to this guide.

Fish habitat: Resources and conditions essential for the production of fish, including water quality and quantity, spawning grounds, nursery, rearing, food supply, and migration areas on which fish depend, directly or indirectly, for their life processes.

Featured species: These are species that have been identified as species for which habitat will be managed. The habitats of provincially-featured species, which include moose, deer, marten, pileated woodpecker and species that are listed as species at risk, must be managed; habitats of species identified as locally-featured are managed at the discretion of the District Manager in recognition of the value of that species locally. Locally-featured species may be individual species or combinations of species and can be animals or plants.

FMP: Forest Management Plan

FMPM: *Forest Management Planning Manual*

GIS: Geographic information system

Guideline: Mandatory direction (i.e., must be followed) that may require professional judgement and/or local or Indigenous knowledge, within the constraints set out in the guideline, to be applied appropriately at the local level.

Habitat carrying capacity: Carrying capacity (K) is a concept basic to wildlife management, generally defined as the maximum number of individuals (e.g., moose) an area can support on a sustained basis (i.e., without detrimental effects on the habitat).

Habituated birds: In the context of this guide, habituated birds are those that exhibit a high tolerance for human activity in the vicinity of their nest sites (e.g., they nest in close proximity to well-traveled roads or human habitation). Direction in Section 4.2.2 may be overly conservative for habituated birds. Thus, planning teams may choose to develop unique prescriptions for habituated birds that will not be considered exceptions to the direction in this guide. Habituated birds will be identified by the Ministry based on consideration of the history of occupancy and productivity of the nest site and the history of both forestry and non-forestry related human activities in the vicinity of the nest site.

HARP: Harvest with advanced regeneration protection – The removal of the dominant canopy layer in uneven-aged lowland black spruce ecosystems. HARP protects and retains stems below a set diameter limit leaving a significant component of the overstory. The resulting stand is uneven-aged and uneven-sized.

Height of land: The local, highest portion of ground above a water feature at which point surface water run-off would drain away from the water feature and not flow directly into the water feature.

High potential impact operations: (as used in Section 4.2.2) Forest management operations that have a high potential to disturb nesting birds and adversely affect occupancy or productivity. Potential impact of operations is based on duration of individual events, number of individual events per day, time period over which events occur during the breeding season, detectability of events at the nest, number of pedestrians involved in activity, and number of small (e.g., chainsaw) or large (e.g., skidder) pieces of equipment involved that produce noise (see Appendix 4.2 for details). Harvest operations, large tree planting operations (≥5 people) if visible, and road construction are typically considered high potential impact operations.

Hydrological connection: Linear feature that connect terrestrial and aquatic ecosystems that channel ephemeral surface and/or shallow groundwater flows to lakes, ponds, rivers, or streams that can be reasonably recognized at the time of operations. They are linear features without well-defined channels that generally flow (visibly) only during and after large precipitation events.

Inactive nests/colonies: Unoccupied nests/colonies for the duration according to the species-specific definition, see sections 4.2.2.1 – 4.2.2.8

Intermittent streams: Streams with a well-defined channel that generally flow only during wet seasons (30-90% of the year). During the driest part of the summer, flow may be reduced to a trickle or may only occur within the streambed.

Lakes: Areas of open water ≥8 ha in size and, at some point, >2 m deep. Small lakes are <100 ha in size. Medium lakes are 100-999 ha in size. Large lakes are ≥1,000 ha in size.

LiDAR: Light detection and ranging

LLP: Large landscape patch

Low potential impact operations: (as used in Section 4.2.2) Forest management operations that have a low potential to disturb nesting birds and adversely affect occupancy or productivity. Potential impact of operations is based on duration of individual events, number of individual events per day, time period over which events occur during the breeding season, detectability of events at nest, number of pedestrians involved in activity, and number of small (e.g., chainsaw) or large (e.g., skidder) pieces

of equipment involved that produce noise (see Appendix 4.2 for details). Tree marking, routine road maintenance such as grading, and hauling are typically considered low potential impact operations.

MAFA: See moose aquatic feeding areas

Mast tree: Mast trees are trees that produce edible fruits. Mast is usually described as hard mast (e.g., acorns) or soft mast (e.g., cherries).

Mature forest: As used in this guide, forest that has reached the mature development stage. Holloway et al. (2004) define the mature development stage as the period in which overstory trees attain full development and sexual maturity, mortality of overstory trees begins to create canopy gaps and encourages understory development, and height growth of overstory trees slows dramatically. The onset age of the mature development stage is typically 60-80 years.

Moderate potential impact operations: (as used in Section 4.2.2) Forest management operations that have a moderate potential to disturb nesting birds and adversely affect occupancy or productivity. Potential impact of operations is based on duration of individual events, number of individual events per day, time period over which events occur during the breeding season, detectability of events at nest, number of pedestrians involved in activity, and number of small (e.g., chainsaw) or large (e.g., skidder) pieces of equipment involved that produce noise (see Appendix 4.2 for details). Large tree planting operations (≥5 people) if not visible, small tree planting operations if visible, and small crews using brushsaws are typically considered moderate potential impact operations.

Moose aquatic feeding areas (MAFAs): Relatively small, shallow water areas with an abundance of aquatic vegetation comprised of mostly submergent species moose (and deer) favour as food.

Nests – good repair: A nest is considered to be in good repair when there is sufficient nest material present to permit its use with minimal reconstruction. The nest on the left is in poor repair. The nest on the right is in good repair. (Photo by K. Szuba)

Occupied nests: Nests where breeding activity was confirmed (containing eggs or young or being attended by adults in anticipation of laying eggs) or where breeding activity was not confirmed, but for which there is compelling evidence of recent use. Nests in suitable habitat that are in good repair or contain new material may be suspected to have been recently occupied.
Examples (see below and see criteria in Box 4.3 (page 90) in OMNR 2004):

- Pair of falcons observed at cliff site during the critical breeding period;
- **Nests in good repair**, in suitable habitat, with down feathers, decoration, new material or whitewash;
- Are in close proximity (within 400 m) to nests occupied by species in question.

Old forest: Holloway et al. (2004) define the old development stage as the period when frequent mortality of overstory trees results in a mosaic of canopy gaps and encourages development of a multi-layered canopy and an abundance of dead trees and downed woody material. The onset age of the old development stage is typically 90-130 years.

OMS: Open wetland (a polygon type in the forest resources inventory of a forest management plan as defined in the Forest Information Manual and associated Forest Resource Inventory Technical Specifications)

Permanent stream: A stream with a well-defined channel that generally flows throughout the majority (≥90%) of the year. The streambed is typically located below the water table and groundwater (or a permanent water feature) is the primary source of flow.

Ponds: Bodies of shallow (generally <2 m deep), open water (≤25% of surface area covered by emergent vegetation) between ≥0.5 ha and <8 ha in size.

PSW: Provincially significant wetlands are wetlands ranked as provincially significant through the science-based Ontario Wetland Evaluation System (OWES) because of the presence of outstanding biological, social, or hydrological values or other special features.

Residual forest: A forested patch that generally functions more as habitat for wildlife that inhabit older forest than as habitat for wildlife that inhabit younger forest. Quantitative criteria are provided in Section 3.2.2.1. As defined in this guide, it is not to be confused with the term “residual” (e.g., residual stocking, residual basal area, residual tree spacing) to describe post-harvest retention objectives in partial harvest systems.

Roadside work area: The area of land adjacent to a road and within the boundaries of the harvest area where concentrated activity other than skidding (e.g., piling, delimbing, slashing, chipping, slash piling) is necessary to receive and process wood from the rest of the harvest area.

Rut: Continuous trench or furrow created by machine traffic that is ≥4 m long and ≥30 cm deep. When operating on shallow soils the lesser of depth to bedrock/large boulders or 30 cm will be used. Ruts may be empty, filled with water, or filled with varying amounts of intermixed organic and mineral soil/debris. In cases of concentrated heavy rutting it may be difficult to distinguish individual ruts. Furrows, scalps, trenches, etc., created specifically for site preparation purposes are not considered ruts.

SGR: Silvicultural ground rule. Specifications, standards, and other instructions, that direct silvicultural activities on a management unit during the period of the forest management plan.

Significant mineral soil exposure: Patches of mineral soil exposed by machine traffic that are individually larger than $4m^2$ in size or have an aggregate area that exceeds 5% coverage. The percent coverage of exposed mineral soil will be measured over a 15 m by 15 m area when operating adjacent to water, or the harvested area of the AOC for all other values (e.g., ginseng).

Silviculture system: A process that applies silviculture practices, including tending (thinning, pruning, etc.), harvesting, and renewal, to a stand to produce a crop of timber and other forest products. Systems are classified according to the method of harvesting of mature forest stands with a view to regeneration establishment (i.e., clearcut, shelterwood, selection).

Species at Risk: Any species listed on the Protected Species in Ontario List, O. Reg. 60/26 under the *Species Conservation Act, 2025,* and fish species and migratory birds protected under the federal *Species at Risk Act, 2002.*

Stage of management: One of a series of cuts when using the shelterwood silviculture system to aid in stand improvement and regeneration. Generally, these are referred to as preparatory, regeneration, and removal cuts, although the number of stages can vary dependent on stand characteristics and silviculture objectives. Cutting may be distributed uniformly across a stand or concentrated in narrow strips or small patches.

Standard: Mandatory direction that must be followed as written; there is no flexibility for interpretation on the part of guide users.

Stubs: A stub is a live tree that has been cut (and killed) well above the normal stump height (i.e., 3-5 m high). In managed forests, the 'stubbing' of live trees is increasingly being used when the objective is to emulate some of the physical properties of a tree that died quickly during a catastrophic natural event (e.g., wildfire).

Succession: Changes in species composition in an ecosystem over time, often in a predictable order.

Supercanopy trees: Large trees that emerge above the main canopy of a stand.

Tending: Forest operations which are carried out to improve the growth or quality of a forest. Tending may involve cleaning (i.e., the removal of undesirable or competing vegetation using herbicides or manual treatments), thinning, stand improvement, or pruning.

TMS: Treed wetland (a polygon type in the forest resources inventory of a forest management plan as defined in the Forest Information Manual and associated Forest Resource Inventory Technical Specifications)

Travel routes: Trails used by animals (e.g., cervids) to move among, or between, habitats. Travel routes are often traditional, may be used over long periods of time, and may have a seasonal aspect to use.

Use management strategy: A statement outlining the purpose and description, and defining the roles and responsibilities related to use, maintenance, use control, abandonment, and monitoring of roads on Crown land.

Veteran trees: Trees with characteristics (e.g., thick bark) that allow them to survive a stand-initiating disturbance, such as a fire, and eventually grow to become supercanopy trees in the future mature stand.

Windrow: A longitudinal pile of material, usually difficult for humans, large mammals, and machinery to traverse. Road building may result in windrows comprised of rocks, boulders, and other aggregate that tend to run parallel to a section of road. Windrows are also commonly created by the piling of tops and branches of trees that have been brought to roadside and de-limbed or by the alignment of slash during site preparation operations.

Woodland pools: Small isolated open water wetlands that have hydrologic regimes characterized by alternating periods of flooding and drying.