

Best Management Practices for Tree Removals in Parks and Protected Areas

PLANNING



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Preface

British Columbia is recognized globally for its exceptional wildlife, diversity of ecosystems and its rich natural resources. The Ministry of Water, Land and Air Protection (WLAP) works to maintain these valuable natural assets, which are at the heart of many recreational and economic activities enjoyed by British Columbians in all regions of the province.

WLAP has responsibility for the protection and stewardship of BC's environment. To achieve this goal, the Ministry develops policy and legislation, regulations, codes of practice, environmental contracts and covenants (legal agreements). In addition, the Ministry sets science- and results-based objectives and standards for activities that affect biodiversity. It monitors and reports on selected species and habitats, and acquires information on habitat and species health.

Clear goals, objectives, meaningful performance measures and science-based tools guide Ministry actions in improving environmental management. Regulatory frameworks allow headquarters and regional staff to set and report on standards for environmental quality, and for discharges and emissions to air, land and water. Regulatory compliance is addressed through policy development, enforcement and publicly reporting the results of compliance monitoring.

An Increasing Role for Stewardship

While the Ministry takes a leading role in the protection of BC's natural resources, species, and habitats, environmental protection and stewardship is the responsibility of all British Columbians. Stewardship of natural resources is key to maintaining and restoring the province's natural diversity, and achieving the Ministry's important environmental mandate. A stewardship approach involves all British Columbians taking responsibility for the well being of the environment by acting to restore or protect a healthy environment.

The Ministry is actively pursuing opportunities for sharing the responsibility of environmental protection. As a Ministry, WLAP looks to establish vital partnerships and move forward together to protect the environment and the health of all British Columbians. WLAP is listening to and developing partnerships with governments, First Nations, communities, academic institutions, industries, volunteer organizations, and citizens. The involvement of these partners in the shared environmental protection and stewardship of BC's resources is essential because of their local knowledge, resources and expertise. The environment will benefit as a result of an increased level of responsible environmental stewardship ethics, immediate and long-term improvements to environmental health and an increased awareness of ecosystem needs among the partners.

A Changing Process

Over the next several years, the Ministry will be making strategic shifts (changes in business practices) towards:

- Shared stewardship between the Ministry and other stakeholders;
- Clear roles for gathering environmental information and achieving environmental objectives;
- Integrated WLAP program delivery based on the best available science and an ecosystem-based approach; and
- Clear, reasonable environmental outcomes, with discretion as to how to achieve these outcomes.

This document is an interim document and will change in the future. Changes to the delivery model of this information are also expected, through the movement towards Internet-based access.

What will this document do for me?

This document exists to help you act as a steward of the environment. The information you will find in this document will help to ensure that your proposed development activities are planned and carried out in compliance with the various legislation, regulations, and policies that apply to your activity. By understanding the standards your activities must meet, you can choose an appropriate set of best practices to help you carry out your activities to achieve the required standards.

This is one of three guidebooks that provide best management practices for the planning and implementing of tree removal projects within BC Parks. The purpose of this guidebook is to provide government staff and contractors with a comprehensive planning structure that ensures that ecological impacts caused by the project are minimized.

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1 Introduction

BC Parks is responsible for the protection and management of natural and cultural features found within the Protected Areas system in British Columbia. As much as possible, these areas are managed as complete, functioning ecosystems where natural processes are allowed to predominate. There are however, certain circumstances which justify human intervention. These include public safety measures, the development of essential infrastructures and facilities, as well as initiatives to restore natural disturbance regimes. When these projects require the removal of trees, the primary objectives are twofold: to minimize the ecological damage caused by the operation, and to ensure that the site is rehabilitated as quickly as possible.

In order to ensure that all tree removal projects within BC Parks are consistent with the conservation policies of the Ministry of Water, Land and Air Protection (MoWLAP) as well as all provincial and federal legislation, three tree removal guidebooks have been developed. These guidebooks provide base standards, objectives and “Best Management Practices” (BMP) for tree removal in parks. They provide an overview of the planning process for the development of tree removal prescriptions, the engineering and construction of roads, as well as guidelines for the harvesting and transportation of trees.

The base standards used to develop these guidebooks were taken from relevant provincial and federal legislation and regulations; primarily the *Forest Practices Code* (FPC). However, objectives and practices regarding tree removal in parks differ from those established for commercial forestry. Therefore, the existing commercial standards were expanded upon to emphasize the goal of minimizing ecological degradation. Best Management Practices were then outlined to provide park managers with specific and clear directives and procedures.

The topics covered by these three guidebooks are extremely complex. In addition to this, BMPs vary according to project objectives and the diversity of terrain and ecosystems found throughout British Columbia. Consequently, a complete set of BMPs cannot be covered adequately by the scope of these guidebooks. Instead, our objective is to provide an overview of the BMPs for tree removal projects in BC Parks, with an emphasis on the adaptation of traditional commercial forestry practices.

2 Purpose/Scope

This guidebook covers the planning aspects involved in tree removal projects. Its purpose is to provide government staff and contractors with a comprehensive planning structure, ensuring that all tree removal projects are executed in compliance with both BC Parks policies and all provincial and

Background

federal legislation. The guidebook is primarily based on planning guidelines already established for the forest industry under the *Forest Practice Code*, although greater emphasis is added here on the identification and protection of critical ecological features. Due to the particular scope of this document, it serves as a summary or an overview of the recommended contents essential to most planning documents. Professional judgment should be used to determine the details of specific planning documents on a project-by-project basis.

The planning guidelines encompass general recommendations from higher-level planning and site assessments, to defining the project area and developing detailed tree removal prescriptions. The primary users of this document are Protected Areas managers who initiate and supervise the projects, as well as contractors who implement the tree removal prescriptions.

3 Background

BC Parks was created both to protect and represent wilderness and the natural diversity of British Columbian landscapes, and to provide and sustain appropriate outdoor recreation opportunities. In some cases, the removal of trees is necessary to meet these objectives. Tree removal projects are considered only in exceptional circumstances where natural processes cannot be accommodated. The removal of trees in parks differs greatly from commercial logging in that the purpose is not to generate an economic return, but to promote ecological health and to ensure public safety.

Comprehensive guidelines and Best Management Practices have already been established for commercial forestry practices, however certain objectives differ from those of BC Parks. This guidebook was developed to define a planning process that will ensure that BC Parks' policies and objectives are followed consistently for all tree removal projects.

Projects involving the removal of trees are complicated and Best Management Practices vary greatly according to biophysical conditions, as well as the scope and objectives of each project. The existing commercial forest industry guidelines provide the minimum standards that must be met within BC Parks' projects. In most park situations however, tree removal will exceed commercial Best Management Practices because of the fundamental objective of protecting the natural integrity of a park's ecosystem.

These guidebooks provide an overview of the issues to consider when developing tree removal prescriptions, and also serve as a template for documenting this process. They emphasize those areas that differ from commercial forestry and supply references for more comprehensive guidelines.

4 How to Use This Document

To facilitate integrated planning, the processes outlined in this guidebook generally follow those developed for the *Forest Practices Code* while placing greater emphasis on identifying critical ecological features and minimizing ecological impacts. The guidebook is divided into two sections which detail the requirements for the development of two planning documents. The first section is a project site assessment that ensures the feasibility of the project and its compliance with all higher-level plans, policies and legislation. The second section is a comprehensive tree removal prescription that specifies where and how a project should take place in order to minimize ecological impacts. Some of the contents outlined in these two documents may not be relevant to all projects, therefore professional judgment should be used to determine the extent of detail required.

5 Key Issues of Concern

The primary concern is that all aspects of the planning process be completed and held to a higher standard than that of commercial forestry, and that the final tree removal prescription clearly delineates how operational activities are executed so as to minimize all ecological impacts. This document will ensure that a comprehensive site assessment is completed and that the findings of this assessment are used to properly develop a detailed tree removal prescription.

6 Objectives

The primary objectives of this guidebook are to ensure that:

- A consistent planning process is followed for all tree removal projects
- All tree removal projects are consistent with all higher-level-plans and policies
- All tree removal projects comply with federal and provincial legislation
- All tree removal projects are planned and carried out in such a way as to avoid environmental impacts (where possible) and to minimize those impacts which cannot be avoided.
- Rehabilitation and enhancement measures are carried out to maintain critical ecological functions in the event of habitat losses due to tree removal projects

Best Management Practices

- The public and First Nations are properly consulted throughout the planning process
- The tree removal plan is prepared by a qualified professional and approved by a governing body

7 Standards

Standards are quantifiable and measurable thresholds typically defined by laws or regulations, and as such are mandatory. The *Park Act* is the main legislation governing Protected Areas in British Columbia. It provides for the designation and administration of provincial parks, recreation areas and nature conservancy areas. The *Park Act* specifies that all trees cut on or removed from any park must be disposed of in accordance with the *Forest Act*. There are no stipulations regarding the *Forest Practices Code of BC Act*, however BC Parks recognizes in this Act the minimum standards to be followed. The intent of the Best Management Practices in this document is to build upon and exceed these standards.

It is important to note that the *Forest Practices Code* is in a state of transition toward new legislation called the *Forest and Range Practices Act*. This new act and its regulations took effect January 31, 2004. Any activities already approved under the existing Forest Practices Code may continue until December 31, 2005. After that, all planning and on-the-ground work must comply with the *Forest and Range Practices Act* and regulations.

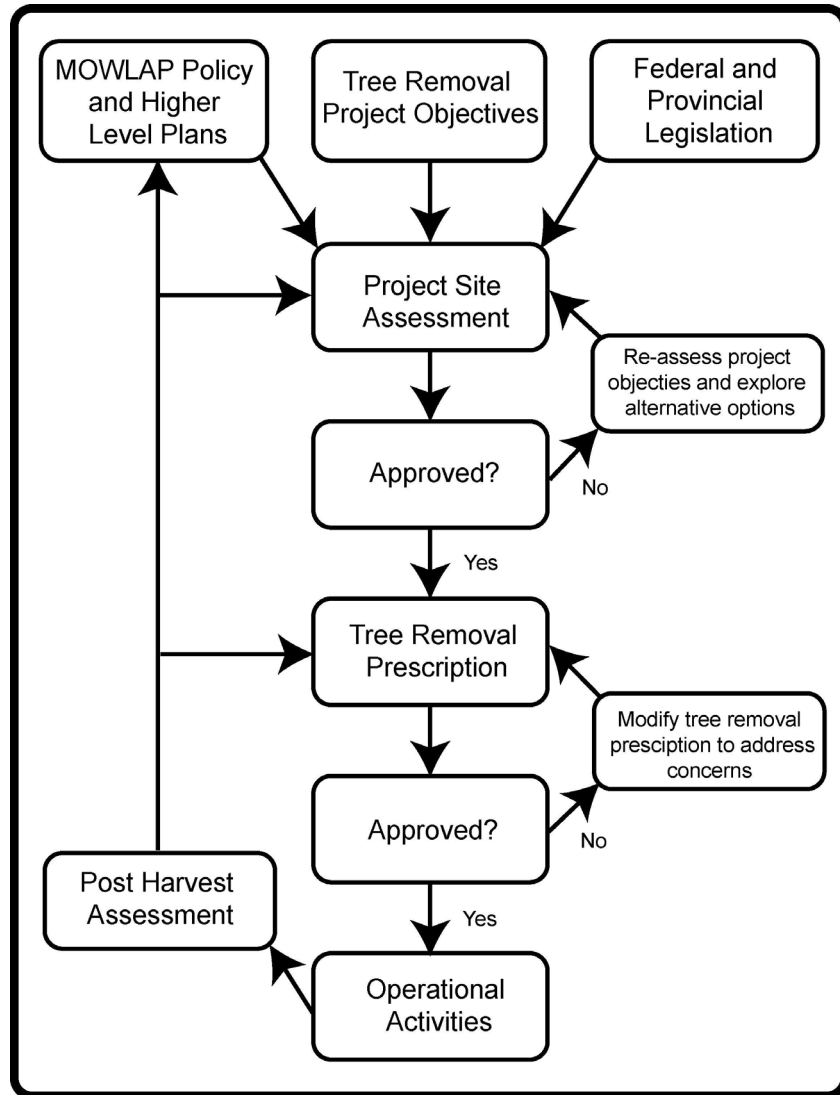
There are also a number of other federal and provincial acts which must be abided by. The planning process recommended for tree removal projects in parks must be consistent with all of these acts and regulations. The most relevant of each have been summarized, with web-based links and references provided in Appendix A.

8 Best Management Practices

The planning guidelines are divided into two sections, both requiring a written document prepared by a professional and approved by the Ministry of Water, Land and Air Protection.

1. The first section outlines the requirements for a site assessment document ensuring the project's feasibility and its compliance with all higher-level plans, policies and legislation.
2. The second section outlines the requirements for a comprehensive tree removal prescription. It specifies where and how the project should be implemented in order to minimize ecological impacts.

The completion of these documents ensures that tree removal projects comply with all higher-level plans and legislation, and that they are consistent with the policies and priorities of BC Parks. An overview of the planning process is illustrated in the following figure.



8.1 BMP for Site Assessment

The first step in the planning process is to complete a detailed assessment of the proposed treatment area and the lands adjacent to it. This will determine the feasibility of the project and will identify the specific treatment boundaries. This document ensures that all of the critical environmental and social factors have been considered and that the project complies with higher-level planning, legislation and BC Parks policy. The level of detail required by this assessment will vary, depending on the size and complexity of the proposed project. It should be developed by a recognized professional and approved by the regional manager of MoWLAP.

The following sections outline the topics and headings to be included in the site assessment document. The general content of each section has been

outlined with references to detailed guidelines and Best Management Practices. Provide a brief rationale that relates back to the objectives and/or standards as to why the BMP is recommended.

8.1.1 Project Overview

This section of the report will clearly describe why the tree removal project is being proposed. It will include a brief background of the project, where it is to take place, which type of treatment will occur, and what the expected impact will be on the ecosystem.

8.1.2 Management Objectives

Clearly state the objectives for the project in this section. These should be clear and concise with some measurable indicators that will determine the success of the project.

8.1.3 Consistency with Higher-level Plans and Legislation

In this section, describe how the project meets the objectives of all higher-level plans including BC Parks policy, resource management plans and landscape unit plans. Discuss the relevant components of these plans and policies as they relate to the proposed project.

8.1.4 Site Assessments

The feasibility of the project will be based on a number of site assessments. These will provide the necessary information to determine if and how the project should proceed. This information will also be used during the subsequent development of the tree removal prescription, as well as the design of roads and related access structures.

For each of the following factors, a comprehensive assessment should be completed, describing how they will be affected by the proposed tree removal project. Some of these factors may not be relevant based on the scope of the project and professional judgment should be used to determine the extent of detail required.

8.1.4.1 Wildlife

Describe the impacts of the proposed project on the existing wildlife in the area. Discuss not only immediate impacts, but also how the treatment may affect wildlife in the long term. The assessment should not be limited to a specific site but should examine how the project will affect adjacent areas and wildlife with more extensive habitat requirements. Describe how the tree removal project will affect critical wildlife habitat features such as canopy structure, tree species diversity, wildlife trees, coarse woody debris and understory vegetation.

8.1.4.2 Species at Risk

In addition to the wildlife assessment, all critical habitats for species at risk (an extirpated, endangered or threatened species, or a species of special concern) must be specifically identified and addressed. Examine how the

project will affect these species and their critical habitat features. Consult the Conservation Data Center of British Columbia (CDC) to determine if there are any Element Occurrences Records (an area of land and/or water in which a species or natural plant community is, or was, present) within or adjacent to the project area. The species addressed in this section should include those identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the CDC.

8.1.4.3 Plant Communities at Risk

The project area should be stratified into units based on the BC Biogeoclimatic Ecosystem Classification System (BEC) to the site series level. This mapping is used to identify all rare and endangered plant communities according to the Conservation Data Centre of British Columbia. If red or blue-listed plant communities are identified, examine the impact of the project on these plant communities and the effect in terms of forest succession.

8.1.4.4 Streams/Lakes/Wetlands and Associated Riparian Areas

In this section, all streams, lakes and wetlands in and adjacent to the project area should be identified and accurately mapped. These water features should be classified according to the Ministry of Forests' *Forest Practices Code Fish-Stream Identification* and *Riparian Management Area Guidebooks*. Based on this classification, appropriate riparian management and retention zones should be assigned for these features. The impacts of the project on these water features and their riparian areas should be discussed in detail, including all downstream water bodies.

8.1.4.5 Biodiversity and Natural Disturbance Patterns and Regimes

Describe the overall contributions of the project area to both stand and landscape-level biodiversity. This should include an examination of the current and historic seral stage distribution and natural disturbance patterns for the area. Discuss if and how the proposed tree removal project will mimic these natural disturbance patterns. A site-specific biodiversity analysis should include a discussion of critical ecological features, including stand structure and composition, coarse woody debris, water features and riparian areas, site productivity, etc. Discuss how the project will affect these critical factors.

8.1.4.6 Forest Health

In this section, identify all abnormal insect and disease incidences that are occurring in proximity to the proposed project area. Discuss the magnitude and trends of the infection(s) and the subsequent implications of, and for, the proposed tree removal project. This section should be completed in detail for projects whose primary objective is the management of insect and disease outbreaks.

8.1.4.7 Watershed Assessment

For large-scale tree removal projects, the project manager can request that a watershed assessment be completed. The Watershed Assessment Procedure (WAP) is a standard strategy required by the *Forest Practices Code-Operational*

Planning Regulation. The WAP is an analytical procedure used to help understand the type and extent of water-related problems that exist in a watershed, and to recognize the possible hydrological implications of the proposed project. This assessment should be completed for all projects with the potential to significantly alter the aquatic environment of a watershed.

8.1.4.8 Terrain Stability

This section should address any concerns regarding either mass wasting or soil surface erosion caused by the proposed project. A detailed terrain stability assessment should be completed by a professional where there is the potential for slope instability. If a watershed assessment is required, this topic can be incorporated into section 4.7.

8.1.4.9 Cultural/Archaeological Features

This section recognizes any identified cultural features to be protected. This should include features such as archaeological sites, culturally modified trees, traditional use area and historic trails. Consult the Ministry of Sustainable Resource Management's Archaeology Branch to determine if there are any of these occurrences within or adjacent to the project area. Once identified, a professional should complete an archaeological site assessment meeting the requirements of the minister responsible for the *Heritage Conservation Act*.

8.1.4.10 Fire Hazard

Any fire hazard existing on or around the site, in addition to the effects by the proposed project, must be examined. This should include an analysis of forest fuels, the fire behaviour potential, the risk of ignition, the constraints on suppression, and the cultural and natural values at risk. If one of the primary objectives of the project is to reduce the risk of wildfire, this section should provide explicit detail as to how this will be accomplished.

8.1.4.11 Recreation

Discuss the types of recreation provided by the project site and surrounding area, as well as the level of traffic it experiences. This section should include all existing trails and recreation facilities in addition to any planned developments. For all primary recreation uses, describe the short and long-term impacts of the proposed project.

8.1.4.12 Windthrow Assessment

A windthrow assessment should be completed for the project site and adjacent stands. The process outlined in the *Windthrow Handbook for British Columbia* (R.J. Stathers et al., 1994) should be followed to rate the stand based on tree, soil and site characteristics. Include the current hazard rating as well as the rating expected for the post-treatment stand.

8.1.4.13 Visuals/Aesthetics

This section should address how the project will affect the aesthetics of the project area in both the short and long term. All critical viewpoints should be identified around the project area, with an assessment of the traffic level and visual impacts from each. This section should consider and discuss the public perception of aesthetics and related public education opportunities.

8.1.5 Public safety

Discuss all public safety concerns related to the proposed project. This should include an analysis of the existing traffic levels, the safety concerns to be addressed during operational activities, as well as the long-term safety implications of the remaining stand. Where relevant, discuss the safety implications of not completing the project.

8.1.6 Public Consultation

There should be a public notification and consultation process for the proposed project. This consultation process targets both the public and affected stakeholders and adjacent property owners. This section should describe the date and location of the consultation, its attendees and a summary of the relevant input received. The extent of the required consultation period should reflect the size and scope of the proposed project.

8.1.7 First Nations Consultation

All First Nations land claims covering or adjacent to the project area should be identified, notified and consulted regarding the proposed project. This section should describe the date and location of the consultation with the First Nations people, its attendees and a summary of the relevant input received. The extent of the required consultation period should reflect the size and scope of the proposed project.

8.1.8 Feasibility Assessment

This section should present a comprehensive summary of all the critical factors identified during the above site assessments, along with the public/First Nations consultation process. A decision as to whether the project should proceed will be based on these findings. This decision will also depend on the compliance of the site assessments and consultation processes with BC Parks policy, all high-level planning and federal and provincial legislation.

8.1.9 Professional Signature and Seal

A qualified registered professional must review and approve this planning document.

8.1.10 Government Approval

The MoWLAP Regional Manager should review and approve or reject this document. The Regional Manager may request more information if they are not satisfied with the content of the site assessment. Once the site assessments have been completed and the document has been reviewed and approved, a detailed tree removal prescription will be developed.

8.2 BMP for Tree Removal Prescriptions

The second phase of the planning process is the development of a detailed tree removal prescription. This document must clearly describe the objectives of the project and the treatments proposed to meet those objectives. This document has been designed to closely follow the Silviculture Prescriptions developed for commercial forestry.

The following sections outline the topics and headings to be included in the tree removal prescription. The general content included in each section has been outlined with references to detailed guidelines and Best Management Practices. The required, specific content and detail for each prescription will depend on the size and scope of the individual project. Some requirements may be omitted at the discretion of the professional preparing the prescription.

8.2.1 Project Overview

This section of the report will clearly describe why the tree removal project is being proposed. Include a brief background of the project, where it is to take place, the proposed treatments, as well as the highlights from the project site assessments.

8.2.2 Management Objectives

State the objectives of the project. These should be clear and concise and have measurable indicators that will determine the success of the project.

8.2.3 Consistency with Higher-level Plans

In this section, describe how the project meets the objectives of all higher-level plans including BC Parks policy, resource management plans and landscape unit plans. Discuss the relevant components of these plans and policies, and the measures taken to ensure that the proposed project will be consistent with them.

8.2.4 Current Site and Stand Characteristics

This section of the document describes the project location and the ecological and physical site characteristics. It should include a detailed map illustrating the size and location of the project, treatment boundaries, access structures and critical physical and ecological features. Much of this information can be obtained from the site assessment document.

8.2.4.1 Project Area Description

Provide a detailed description of the location and impacted areas of the project. This includes references to all geographical locations as well as any relevant air photos.

8.2.4.2 Ecology

The project area will be stratified into units based on BEC to a site series level. These ecosystem units must be clearly illustrated on an accompanying map. Additionally, critical terrain and other ecological features of the site should be described for each treatment unit, including: elevation, aspect, slope, water features, soil and forest floor characteristics.

8.2.4.3 Treatment Units

Treatment units are areas relatively uniform in stand and ecological characteristics, such that they will be managed using a similar approach. This stratification is generally based on a combination of BEC, site physical features, stand characteristics and treatment objectives. These treatment units will be summarized by area and illustrated on an accompanying tree removal map. The designation of treatment units may be omitted for small-scale tree removal projects.

8.2.5 Access Planning

This section is used to describe the access requirements for the project including permanent and temporary access roads, skid roads and landings. These have traditionally been the source of the greatest ecological impacts among forest management practices. Therefore, extra care should be taken during the planning phase to prescribe a tree removal system that will minimize the length, width and impact of the roads, skid roads and landings.

This section of the document will be developed following the guidelines and Best Management Practices outlined in the accompanying *Road Engineering and Construction Guidebook*. In general, it should include a comprehensive access plan detailing all aspects of road management, including: design, layout, construction, maintenance and deactivation. This plan can be attached as an appendix to this document.

8.2.6 Tree Removal Planning**8.2.6.1 Tree Removal Treatment**

In commercial forestry, the term “silviculture systems” refers to tree harvesting, regeneration, and stand tending activities used to achieve a desired stand structure. The primary objective in commercial forestry is to produce a stand of trees with high commercial value. Tree removal projects within protected areas however, are not intended to produce a commercial forest crop. An ecological objective will be the basis for choosing a tree removal treatment plan that will best achieve the project objective while preserving the natural integrity of the site.

Best Management Practices

When selecting a treatment plan, choose one which will meet tree removal objectives for the project and:

- minimize the impact on the surrounding ecology
- mimic natural disturbances patterns
- create conditions that will encourage the desired succession path
- will preserve or restore both landscape level and site level biodiversity

8.2.6.2 Tree Removal System

This section of the prescription describes the harvesting system used to fall and transport logs to the landing or roadside where they can be loaded and transported from the site. When determining the tree removal system, productivity and cost should be considered secondary to minimizing ecological impacts. This section should specify the methods to be used, with explicit detail provided for specific areas of concern.

The first steps in all harvesting projects include the identification and actual falling, bucking and limbing of the trees to be removed. This should be done in such a way as to cause the least disturbance to the rest of the plant community, including both understory species and residual trees to be left standing. The method used will depend on the objectives of the project and the stand and terrain characteristics. In general, manual falling is preferred over mechanical falling as it requires less heavy machinery on the site and subsequently causes less site disturbance. Additionally, trees can usually be felled more accurately in order to avoid damaging any ecologically sensitive features. Although mechanical falling is more efficient and productive, it is limited by terrain characteristics and stem size.

The tree removal system involves transportation of the tree from where it was fallen to the landing or roadside. The three main types of treatment systems include the use of ground skidding, cable removal and aerial removal. The method prescribed will depend on a number of factors, such as the physical and ecological conditions of the site and the desired post-harvest conditions. In general, ground-based harvesting methods tend to cause the greatest site degradation and should be avoided if possible. Skyline systems provide the opportunity to remove logs without the presence of heavy machinery moving across the site. The logs can often be suspended vertically, causing less site degradation as compared to ground-based skidding. Helicopter removal should be implemented wherever possible as it causes the least amount of site disturbance and damage to the residual stand, and is especially effective for single standing stem selection.

This section should determine the type of tree removal system to be implemented. The system itself should be described along with equipment specifications. For ground-based systems, proposed skid road locations should be clearly illustrated. If there are terrain stability and soil degradation

concerns, the time of year for treatment should be specified and established rainfall thresholds should be set.

All critical site features, which affect tree removal operations, must be clearly marked on the tree removal plan map. This includes all sensitive ecological features such as riparian areas, critical wildlife habitat, unstable terrain, sensitive soils and archaeological features. Specific harvesting guidelines and limitations should be established to address these critical features.

8.2.7 Specific Management Measures

These sections describe the expected impacts of the project and subsequent management recommendations for significant natural and cultural attributes. Although most of these attributes were discussed in the Site Assessment section, this information should be repeated in the prescription so that it can be submitted as a complete document.

8.2.7.1 Wildlife

Discuss the short and long-term impacts of the proposed project on existing wildlife in the area. The assessment should not be limited to the site itself, but should also examine how the project will affect adjacent areas and wildlife with more extensive habitat requirements. Describe the effects that the tree removal project will have on critical wildlife habitat features such as tree canopy structure, tree species diversity, wildlife trees, coarse woody debris and understory vegetation.

Management recommendations should be made that will minimize or help to compensate for any detrimental impacts to critical wildlife habitat features. Some Best Management Practices include:

- Preserve or enhance the quantity of downed coarse woody debris. Specify the quantity and size of pieces to be distributed across the site. As an abundance of CWD is created during tree removal projects, specifications should include upper limits over which the quantities will inhibit some wildlife movement and present a significant fire hazard. Any additional CWD should be used for rehabilitation of access roads or enhancing CWD levels in other areas of the park.
- Identify and attempt to preserve all significant wildlife trees in the project area. Recommend treatments that will create new wildlife trees either by girdling existing trees or by planting logs on the site during rehabilitation.
- Recommend that fallers cut trees at a variety of heights to create some shorter wildlife trees.
- With the exception of projects aimed at restoring grasslands, residual stands should be retained whenever possible. Post-harvest stand conditions should provide a diverse horizontal and vertical stand structure as well as a diversity of tree species.

- If the proposed project will be detrimental to important wildlife habitats, recommend habitat enhancement strategies for adjacent areas in order to compensate for these losses.

8.2.7.2 Species at Risk

This section should focus specifically on the management of any species at risk. Identify all critical habitats for red and blue-listed wildlife and plant species in or adjacent to the project area. Discuss how the project will affect these critical habitat features and recommend special measures for their preservation. If the impacts are uncertain, a long-term program should be established to monitor the population. If there will be significant loss of critical habitat, recommendations should be made for habitat enhancement strategies in adjacent areas to compensate for this loss.

8.2.7.3 Plant Communities at Risk

All plant communities at risk will have been identified during the site assessment. If red or blue-listed plant communities are identified they should be avoided. If unavoidable however, examine the expected impacts of the project on these plant communities and how it will affect them in terms of forest succession. In these areas, recommend harvesting techniques that will cause the least damaging impact to the stand and understory vegetation.

8.2.7.4 Streams/Lakes/Wetlands and Associated Riparian Areas

In this section, all streams, lakes and wetlands in and adjacent to the project area should be identified, accurately mapped and classified according to the Ministry of Forests' *Forest Practices Code Fish Stream Identification Guidebook*. The consequences of the project on these water features and their riparian areas, as well as on all downstream water bodies, should be discussed here. Special measures to minimize the impact on these water features and to rehabilitate them to their previous state should be proposed and described in detail.

Using professional judgment and following the recommended riparian management zones from the *Riparian Management Area Guidebooks*, each of these water bodies should be assigned appropriate riparian reserve and management zones. These recommendations will protect an area ensuring the integrity of the stream channel and banks, as well as the functioning of the associated riparian vegetation. Some necessary treatments within riparian areas can include tree hazard management and windfirming of edges. Furthermore, other riparian area enhancement strategies, such as stand thinning to increase biodiversity, creating wildlife trees through girdling and improving coarse woody debris levels, can be considered in this section.

8.2.7.5 Forest Health

In this section, all abnormal insect and disease incidences in proximity to the project area should be identified. Discuss the magnitude of the infection and the subsequent implications of the proposed tree removal project. For projects whose primary objective is to control insect and disease outbreaks, this section should explain how the prescription will accomplish this goal as well as the expected outcomes of the project.

8.2.7.6 Cultural/Archaeological Features

Discuss all cultural and archaeological features to be protected, including archaeological sites, culturally modified trees, traditional use areas and historic trails. Describe which measures will be taken to protect these features, such as establishing “no-treatment zones” around them.

8.2.7.7 Terrain Stability and Soils

This section includes an examination of the terrain stability concerns identified in the site assessment. Where terrain instabilities or sources of surface erosion are identified, explain how the project will mitigate these problems. General measures should be implemented to minimize soil erosion. The Tree Removal System section (8.2.6.2) outlines suggested techniques for tree falling and transportation. In addition, recommendations should be made regarding the timing of harvesting so that the ground is dry, frozen or covered in snow in order to minimize the impacts to understory vegetation and sensitive soils. Identify specific areas likely to be heavily disturbed by the operational activities and suggest measures to alleviate this effect. Also, provide recommendations for rehabilitation following harvesting.

8.2.8 Post-Treatment Stand Condition

This section includes a detailed description of the desired stand condition that is to remain following the removal of trees. For each treatment unit, describe the desired stand structure characteristics, species mixture and stocking density. In general, the post-stand conditions should mimic expected natural disturbance patterns and enhance biodiversity where possible.

Standing and downed coarse woody debris is a critical contributor to stand level biodiversity. A portion of the woody debris should remain on the site as long as it does not create a significant fire hazard or impede wildlife movement. The materials should be strategically distributed to enhance wildlife habitat and to provide long-term forest floor organic input. The desired distribution of downed coarse woody debris should be described by size-class and distribution. Additionally, it may be possible to increase the number of wildlife trees by girdling trees instead of removing them. The height, preferred species, location and number of wildlife trees to be created should be specified in this section.

One of the priorities of all tree removal projects is to minimize site impacts resulting from operational activities. Based on the tree removal system to be used, a maximum allowable site degradation should be specified. If site degradation exceeds this level, appropriate site rehabilitation efforts should be undertaken.

8.2.9 Site Rehabilitation

This section should specify any treatments required to ensure that the preferred post-treatment stand establishes itself. This may include mechanical treatments, the management of slash and debris, and the planting of trees and understory species.

Many of the planting guidelines developed for commercial forestry have been established to promote commercially preferred species. Planting prescriptions for these projects however, should favour tree and understory species ecologically suited to the plant community and which follow the expected natural succession. Planting densities and target stocking standards should be specified for each treatment unit, along with species mix and seedling characteristics. Examine the expected natural regeneration survival rate and target levels under which replanting will be necessary.

This section should also describe any other rehabilitation measures required for the site. The rehabilitation of roads and landings will be covered in the road design to be submitted with this document. Woody debris should be left on the site except where it becomes a fire hazard or hinders wildlife movement. If possible, excess woody debris should be used for other rehabilitation projects. Finally, any exposed mineral soil should be stabilized to prevent soil erosion until a native plant community can establish itself.

8.2.10 Mapping Requirements

A detailed map or series of maps should be developed in accompaniment to the tree removal prescription. Based on the *Silviculture Prescription Guidebook's* mapping requirements, each map should include the following elements: an accurate visual representation of physical features, ecological units, cultural elements, treatment units and other resource features referred to in, or with a bearing on, the prescription. The number of maps, extent of detail and scale is dependent on the scope of the project.

8.2.11 Safety Plan

Tree removal comprises activities involving a high risk of injury. All operations, from the planning phase through to rehabilitation, should emphasize the safety of workers and the public. A comprehensive safety program should be developed which includes pre-work safety meetings, personnel training, equipment preparation and supervision. The safety standards for all workers should be consistent with the regulations and guidelines outlined in the *Workers Compensation Act* and the *Occupational Health and Safety Regulation*. All contractors should be in good standing with the Workers Compensation Board of British Columbia, and the level training and certification required by all workers must be clearly specified. All safety meetings, inspections and any incidences should be documented and recorded.

8.2.12 Public Awareness and Safety

Tree removal projects within BC Parks will be heavily scrutinized by the public. This section should detail a public awareness and education program. The planned treatments should be publicized prior to harvesting in local newspapers and on the BC Parks website. Public notifications should outline the proposed activities, emphasizing the primary objectives of the project. If the project is located in a high-traffic area, it is recommended that educational signs be posted at strategic locations three months prior to harvesting activities. During operational activities, signage should be posted at viewpoints around the project and a BC Parks representative should be present during times of high use to answer any questions or concerns about the project.

This section should also enumerate public safety measures. These include: closing off portions of the park, posting signs along trails and roads and, if necessary, having a BC Parks representative present during times of high use.

8.2.13 Monitoring and Adaptive Management

A monitoring program should be established for all aspects of the tree removal project. A qualified professional will be on site to monitor all operational activities from initial road construction through to final site rehabilitation. The monitor will document all activities, evaluate the effectiveness of the treatments and make ongoing recommendations for the reduction of ecological impacts.

The monitor will produce a weekly Environmental Monitoring Report which will include:

- The date, time and weather conditions of each inspection.
- A summary of the operational activities completed since the previous inspection.
- A description of any unanticipated incidents or emergencies, the impacts on the environment and the steps taken to mitigate the effects of the incident.
- A discussion of whether the treatments are achieving the objectives of the project.
- Recommendations for implementing adaptive management to treatments which will help meet project objectives and further minimize environmental impacts.
- Any relevant photographs or figures.
- The signature of the monitor and the project manager.

In addition to regular site inspections, a comprehensive monitoring program should be established for a period of time following the treatment to determine whether the objectives were achieved and whether any additional treatments or rehabilitation efforts may be required. This may involve as little as periodic site inspections or the establishment of permanent long-term sample plots.

8.2.14 Professional Signature and Seal

A qualified registered professional must sign the tree removal prescription.

8.2.15 Government Approval

The regional manager should review and approve or reject the planning process, assuring that it has been completed in accordance with applicable legislation, regulations and standards. The regional manager may request that more information be provided.

8.3 Closing Remarks and Future Recommendations

This document has been prepared as a summary of the planning process that should be implemented for all tree removal projects within BC Parks. The size, scope, and location of tree removal projects vary across the province and it is therefore not possible to develop a detailed and definitive set of Best Management Practices. This guidebook is designed as a general guide to help managers prepare plans consistent with the policies of BC Parks.

This guidebook should act as a foundation upon which future recommendations can be built, such as: the development of a site assessment and tree removal prescription template. This could be created as an electronic document to be processed over the internet. The software program would lead the planner through all the required steps, highlighting areas of concern along the way and, once completed, the form would be formatted and submitted electronically. This would ensure consistency and would accelerate the submission and approval process.

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Access management plan: An operational plan that shows how road construction, modification and deactivation will be carried out to protect, or mitigate impacts on known resources or sensitive areas while maximizing the efficacy of forest resource development. (MOF Web Glossary).

Adaptive management: adaptive management rigorously combines management, research, monitoring, and means of changing practices so that credible information is gained and management activities are modified by experience. (MOF Web Glossary).

Archaeological site: a location that contains physical evidence of past human activity and that derives its primary documentary and interpretive information through archaeological research techniques. These resources are generally associated with both the pre-contact and post-contact periods in British Columbia. These resources do not necessarily hold direct associations with living communities. (MOF Web Glossary).

Best management practices: methods, measures, or practices designed to prevent or reduce water pollution. Not limited to structural and non-structural controls, and procedures for operations and maintenance. Usually, BMPs are applied as a system of practices rather than a single practice. (Dunster and Dunster 1996).

Biodiversity (biological diversity): the diversity of plants, animals, and other living organisms in all their forms and levels of organization, including genes, species, ecosystems, and the evolutionary and functional processes that link them. (MOF Web Glossary).

Biogeoclimatic classification system: a hierarchical classification system of ecosystems that integrates regional, local and chronological factors and combines climatic, vegetation and site factors. (MOF Web Glossary).

Buffer strip: a strip of land (often including undisturbed vegetation) where disturbance is not allowed or is closely monitored to preserve or enhance aesthetic and other qualities along or adjacent to roads, trails, watercourses and recreation sites. (MOF Web Glossary).

Cable logging: a yarding system employing winches, blocks, and cables. (MOF Web Glossary).

Clearcutting silvicultural system: Defined as a silvicultural system that removes an entire stand of trees from an area of one hectare or more, and greater than two tree heights in width, in a single harvesting operation. A new even-aged stand is obtained by planting, natural or advanced regeneration or direct seeding. The opening size and dimensions created are generally large

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enough to limit significant microclimatic influence from the surrounding stand. (MOF Web Glossary).

Coarse Woody Debris (CWD): sound and rotting logs and stumps that provide habitat for plants, animals, and insects and a source of nutrients for soil development. (MOF Web Glossary).

Compliance monitoring: Measures performance against some environmental standard to establish a compliance record. May include audits, assessments, and reviews. Legal Defn: measurement of performance against practices required by law (e.g. regulations under the Fish Protection Act, Wildlife Act, etc.). Practices Defn: Measurement of performance against environmental standards, policies, best management practices or plans that are recommended but not required by law. CAUTION: In some BC ministries, the term “compliance” refers exclusively to performance against legal standards. (Quayle 2003).

Cutblock: Defined in the *Forest Practices Code of British Columbia Act* as a specific area of land identified on a forest development plan, or in a licence to cut, road permit, or Christmas tree permit, within which timber is to be or has been harvested. (MOF Web Glossary).

Deactivation: measures taken to stabilize roads and logging trails during periods of inactivity, including the control of drainage, the removal of sidecast where necessary, and the re-establishment of vegetation for permanent deactivation. (MOF Web Glossary).

Degradation: the diminution of biological productivity or diversity. (MOF Web Glossary).

Detrimental soil disturbance: changes caused by forest practices in the physical, chemical, or biological properties of the soil, including the organic forest floor and the mineral soil extending from the surface to the depth at which the unweathered parent material is encountered. Such changes may result in a loss of productive growing site, reduced site productivity, or adverse impacts on resource values. (MOF Web Glossary).

Ecological integrity: the quality of a natural unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic, species and ecosystem diversity assured for the future. (MOF Web Glossary).

Ecologically suitable species: coniferous or deciduous tree species that are naturally adapted to a site's environmental conditions, including the variability in these conditions that may occur over time. (MOF Web Glossary).

Ecosystem: a functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size—a log, pond, field,

forest, or the earth's biosphere-but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation, for example, forest ecosystem, old-growth ecosystem, or range ecosystem. (MOF Web Glossary).

Effectiveness monitoring: Measures environmental condition in the context of a program, policy, plan or activity to gauge progress towards its desired outcomes or effects. Different from compliance monitoring in that rather than addressing whether people are complying with environmental standards, effectiveness monitoring attempts to uncover whether those standards are having an effect in the environment. (Quayle 2003).

Environmentally sensitive areas (ESAs): areas requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, and other natural systems or processes. ESAs for forestry include potentially fragile, unstable soils that may deteriorate unacceptably after forest harvesting, and areas of high value to non-timber resources such as fisheries, wildlife, water, and recreation. (MOF Web Glossary).

Even-aged silvicultural system: a silvicultural system that is designed to regenerate and maintain an even-aged stand. Clearcutting, seed tree, and shelterwood are even-aged systems. (MOF Web Glossary).

Fire hazard: the potential fire behavior for a fuel type, regardless of the fuel type's weather-influenced fuel moisture content or its resistance to fireguard construction. Assessment is based on physical fuel characteristics, such as fuel arrangement, fuel load, condition of herbaceous vegetation, and presence of elevated fuels. (MOF Web Glossary).

Fisheries-sensitive zones: side and back channels, valley wall ponds, swamps, seasonally flooded depressions, lake littoral zones and estuaries that are seasonally occupied by over- wintering anadromous fish. (MOF Web Glossary).

Forest health: a forest condition that is naturally resilient to damage; characterized by biodiversity, it contains sustained habitat for timber, fish, wildlife, and humans, and meets present and future resource management objectives. (MOF Web Glossary).

Fuel management: the planned manipulation and/or reduction of living or dead forest fuels for forest management and other land use objectives (such as hazard reduction, silvicultural purposes, wildlife habitat improvement) by prescribed fire, mechanical, chemical or biological means and/or changing stand structure and species composition. (MOF Web Glossary).

Girdling: to kill a tree by severing or damaging the cambium layer and interrupting the flow of food between the leaves and the rest of the tree. A method of 'brushing' carried out using a hatchet or special tool to cut through the bark and cambium of the tree. (MOF Web Glossary).

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Goal: goals provide general purpose and direction. They are the end result of ultimate accomplishment toward which an effort is directed. They generally should reflect perceived present and future need. They must be capable of being effectively pursued. (MOF Web Glossary). An ideal; a desired endpoint; frequently defined in abstract terms. Goals are qualitative and are achieved by means of objectives. (Dunster and Dunster 1996).

Ground-based systems: logging systems that employ ground-based equipment such as feller-bunchers, hoe chuckers, skidders, and forwarders. (MOF Web Glossary).

Guidebooks: Guidebooks are guidelines and recommendations on how to best achieve the requirements of the *Forest Practices Code of British Columbia Act*. The guidebooks are not legally enforceable. However, specifications and procedures recommended by the guidebooks may be incorporated into plans, prescriptions and contracts in which case those specifications and procedures may become legally enforceable. (MOF Web Glossary).

Guidelines: a set of recommended or suggested methods or actions that should be followed in most circumstances to assist administrative and planning decisions, and their implementation in the field. Guidelines may consist of policy statements, procedures, or checklists. They are provided as a broad framework of recommended actions to be taken and, therefore, provide some flexibility for decision making. Note that guidelines cannot, by definition, be mandatory; such actions are prescribed by regulations or rules. (Dunster and Dunster 1996).

Habitat: the place where an organism lives and/or the conditions of that environment including the soil, vegetation, water, and food. (MOF Web Glossary).

Habitat enhancement: any manipulation of habitat that improves its value and ability to meet specified requirements of one or more species. (MOF Web Glossary).

Hazardous or danger tree: a tree or any component of a tree that has sufficient structural infirmity to be identified as having a high risk of falling and causing personal or property damage. (MOF Web Glossary).

Heritage trail: a trail having cultural significance by reason of established aboriginal use or use by early immigrants. (MOF Web Glossary).

Impact assessment: A study of the potential future effects of resource development on other resources and on social, economic and/or environmental conditions. (MOF Web Glossary).

Landscape level: a watershed, or series of interacting watersheds or other natural biophysical (ecological) units, within the larger Land and Resource Management Planning areas. This term is used for conservation planning and is not associated with visual landscape management and viewscape management. (MOF Web Glossary).

Large woody debris: a large tree part, conventionally a piece greater than 10 cm in diameter and 1 m in length. (MOF Web Glossary).

Mass wasting: movement of soil and surface materials by gravity. (MOF Web Glossary).

Mitigation: measures implemented to control, reduce or eliminate a potential adverse impact of a project, including restorative measures. (EAO 2003).

Monitoring: repeated, systematic measurements done with a specific purpose in mind. Monitoring is focused on measurements over time in order to detect the change toward, or away from, a stated standard or objective. Monitoring is part of the cycle of assessment and evaluation that is linked to management activities. (Quayle 2003).

Natural disturbance regimes: the historic patterns (frequency and extent) of fire, insects, wind, landslides and other natural processes in an area. (MOF Web Glossary).

No-work zones: areas in which equipment and people are not allowed during forestry operations, usually for safety or ecological reasons. (MOF Web Glossary).

Objective: a quantifiable, measurable and defined target, capable of attainment within a defined period of time. Objectives are the means by which goals are achieved and should include four main components: 1. They must state the desired outcome (i.e., what is to be accomplished.); 2. They must indicate the time period within which the expected outcome is to be achieved; 3. They must include measurement factors, such as quantity, quality, or cost, so that the fulfilment of the objective can be verified; 4. They must indicate who is responsible for achieving the indicated result. Desirable (but not absolutely essential) elements of objectives are a description of how they will be achieved and an indication of who will determine whether the results have been achieved. Objectives are typically narrower and shorter in range than goals, and serve as milestones toward goal achievement. (Dunster and Dunster 1996).

Partial cutting: Refers generically to stand entries, under any of the several silvicultural systems, to cut selected trees and leave desirable trees for various stand objectives. Partial cutting includes harvest methods used for seed tree, shelterwood, selection, and clearcutting with reserves systems. (MOF Web Glossary).

Pest: any forest health agent designated as detrimental to effective resource management. (MOF Web Glossary).

Planning: the determination of the goals and objectives of an enterprise and the selection, through a systematic consideration of alternatives, of the policies, programs and procedures for achieving them. An activity devoted to clearly identifying, defining, and determining courses of action, before their

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initiation, necessary to achieve predetermined goals and objectives. (MOF Web Glossary).

Plant community: an assemblage of plants occurring together at any point in time, thus designating no particular ecological status. (MOF Web Glossary).

Policies: statements on how the authority is to achieve its goals and objectives with regard to a specific subject area or class of subject areas, e.g., a policy for development on floodplains. (MOF Web Glossary).

Prescription: a course of management action prescribed for a particular area after specific assessments and evaluations have been made. (MOF Web Glossary).

Protected areas: areas such as provincial parks, federal parks, wilderness areas, ecological reserves, and recreation areas that have protected designations according to federal and provincial statutes. Protected areas are land and freshwater or marine areas set aside to protect the province's diverse natural and cultural heritage. (MOF Web Glossary).

Recreation: any physical or psychological revitalization through the voluntary pursuit of leisure time. Forest recreation includes the use and enjoyment of a forest or wildland setting, including heritage landmarks, developed facilities, and other biophysical features. (MOF Web Glossary).

Rehabilitation: the restoration of ecosystem functions and processes in a degraded system or habitat. (Dunster and Dunster 1996).

Reporting: the process of effectively communicating the results of monitoring and their potential implications to a target audience. (Quayle 2003).

Residuals (residual trees): trees left standing after harvesting. (MOF Web Glossary).

Restoration: a process of returning ecosystems or habitats to their original structure and species composition. Restoration requires a detailed knowledge of the (original) species, ecosystem functions, and interacting processes involved. (Dunster and Dunster 1996).

Results-based performance standards: Typically define a maximum permissible disposal or impact threshold. For example, the concentration of a particular chemical in waste water discharge or a receiving environment; minimum in-stream flow levels; forest age class distribution within a defined zone. Requiring users of the environment to stay within the established threshold is presumed will achieve the environmental goal that the standard relates to. Results-based performance standards must be scientifically supported, as locally-relevant as possible, accepted by the public and stakeholders, enforceable by being capable of being measured, and affordable and feasible to implement (Brown, 2002)

Riparian: an area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas. (MOF Web Glossary).

Riparian Management Area (RMA): Defined in the *Forest Practices Code of British Columbia Act* Operational Planning Regulation as an area, of width determined in accordance with Part 10 or the regulation, that is adjacent to a stream, wetland or lake with a riparian class of L2, L3 or L4; and, consists of a riparian management zone and, depending on the riparian class of the stream, wetland or lake, a riparian reserve zone. (MOF Web Glossary).

Riparian Reserve Zone: Defined in the *Forest Practices Code of British Columbia Act* Operational Planning Regulation as that portion, if any, of the riparian management area or lakeshore management area located adjacent to a stream, wetland or lake of a width determined in accordance with Part 10 of the regulation. (MOF Web Glossary).

Risk: the probability that an undesirable event will or will not occur. It is the product of the probability of the event taking place, the probability of being exposed to the event, and the probability of certain outcomes occurring if exposure did take place. Risk can be statistically quantified in a risk assessment. (Dunster and Dunster 1996).

Road deactivation: measures taken to stabilize roads and logging trails during periods of inactivity, including the control of drainage, the removal of sidecast where necessary, and the re-establishment of vegetation for permanent deactivation. (MOF Web Glossary).

Sedimentation: the process of subsidence and deposition by gravity of suspended matter carried in water; usually the result of the reduction of water velocity below the point at which it can transport the material in suspended form. (MOF Web Glossary).

Selection silvicultural system: a silvicultural system that removes mature timber either as single scattered individuals or in small groups at relatively short intervals, repeated indefinitely, where the continual establishment of regeneration is encouraged and an uneven-aged stand is maintained. As defined in the *Forest Practices Code of British Columbia Operation Planning Regulation*, group selection removes trees to create openings in a stand less than twice the height of mature trees in the stand. (MOF Web Glossary).

Sensitive soils: forest land areas that have a moderate to very high hazard for soil compaction, erosion, displacement, mass wasting or forest floor displacement. (MOF Web Glossary).

Silvicultural system: a planned program of treatments throughout the life of the stand to achieve stand structural objectives based on integrated resource management goals. A silvicultural system includes harvesting, regeneration and stand-tending methods or phases. It covers all activities for the entire length of a rotation or cutting cycle.

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Silviculture prescription: a site-specific operational plan that describes the forest management objectives for an area. It prescribes the method for harvesting the existing forest stand, and a series of silviculture treatments that will be carried out to establish a free growing stand in a manner that accommodates other resource values as identified. (MOF Web Glossary).

Site preparation: the treatment of the soil and ground vegetation to prepare the soil surface as a favorable seedbed for either naturally or artificially disseminated seed or for planted seedlings. (MOF Web Glossary).

Site rehabilitation: the conversion of the existing unsatisfactory cover on highly productive forest sites to a cover of commercially valuable species. (MOF Web Glossary).

Site sensitivity: an assessment of the susceptibility of a site to soil-degrading processes, such as soil compaction, erosion, mass wasting, and forest floor displacement. (MOF Web Glossary).

Skid road: a bladed or backhoe-constructed pathway where stumps are removed within the running surface as necessary. Skid roads are suitable only for tracked or rubber-tired skidders bringing trees or logs from the felling site to a landing. (MOF Web Glossary).

Skid trail: a random pathway travelled by ground skidding equipment while moving trees or logs to a landing. A skid trail differs from a skid road in that stumps are cut very low and the ground surface is mainly untouched by the blades of earth moving machines. (MOF Web Glossary).

Slash: the residue left on the ground as a result of forest and other vegetation being altered by forest practices or other land use activities. (MOF Web Glossary).

Slope stability: susceptibility of a slope to erosion and slides. (MOF Web Glossary).

Soil disturbance: disturbance caused by a forest practice on an area covered by a silviculture prescription or stand management prescription including areas occupied by excavated or bladed trails of a temporary nature, areas occupied by corduroyed trails, compacted areas, and areas of dispersed disturbance. (MOF Web Glossary).

Soil erosion: the wearing away of the earth's surface by water, gravity, wind, and ice. (MOF Web Glossary).

Species at risk:

a) any wildlife species that, in the opinion of the Deputy Minister of Environment, Lands and Parks, or a person authorized by that deputy minister, is threatened, endangered, sensitive or vulnerable,

b) any threatened and endangered plants or plant communities identified by the Deputy Minister of Environment, Lands and Parks, or any person authorized by that deputy minister, as requiring protection and

c) regionally important wildlife as determined by the Deputy Minister of Environment, Lands and Parks or a person authorized by that deputy minister. (MOF Web Glossary).

Stand structure: the distribution of trees in a stand, which can be described by species, vertical or horizontal spatial patterns, size of trees or tree parts, age, or a combination of these. (MOF Web Glossary).

Standard: quantifiable and measurable thresholds that are typically defined in law or regulation, and are mandatory. A statement that outlines how well something should be done, rather than how it should be done. A standard does not necessarily imply fairness or equity, nor an absolute knowledge of cause-and-effect linkages. Standards are typically established using a combination of best available scientific knowledge, tempered by cautious use of an established safety (caution) factor. (Dunster and Dunster 1996).

Stewardship: caring for the land and associated resources so that healthy ecosystems can be passed on to future generations. (Dunster and Dunster 1996).

Stream: a watercourse, having an alluvial sediment bed, formed when water flows on a perennial or intermittent basis between continuous definable banks. (MOF Web Glossary).

Succession: the gradual supplanting of one community of plants by another, the sequence of communities being termed a sere and each stage seral. (MOF Web Glossary).

Surface soil erosion: means for an area where a forest practice has been carried out, the movement of soil particles from the area by wind, gravity or water at a rate that is greater than that which would have occurred had the forest practice not been carried out. (MOF Web Glossary).

Sustainability: the ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time. (Dunster and Dunster 1996).

Sustainable development: a conceptual ideal where development (in whatever form that might be) meets the needs of the present generations without compromising the ability of future generations to meet their own needs...(Dunster and Dunster 1996).

Terrain hazard assessment: an assessment or characterization of unstable or potentially unstable slopes on forested lands. A determination of the relative potential of landslide initiation and the type of landslide that may occur on different types of terrain, based on the data obtained from a review

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of available maps, photos, site data, and field observations. (MOF Web Glossary).

Threatened or endangered plant communities: ecosystems, as listed by the Conservation Data Center, that:

are restricted in their distribution over a natural landscape (e.g., freshwater wetlands within certain biogeoclimatic) or are restricted to a specific geographic area or a particular type of local environment; or were previously widespread or common but now occur over a much smaller area due to extensive disturbance or complete destruction by such practices as intensive harvesting or grazing by introduced species, hydro projects, dyking, and agricultural conversion. (MOF Web Glossary).

Threatened or endangered species: threatened or endangered species as identified by the Ministry of Environment, Lands and Parks. The taxa on the red list are either Extirpated, Endangered or Threatened, or are being considered for such status. Any indigenous taxon (species or sub-species) threatened with imminent extinction or extirpation throughout all or a significant portion of its range in British Columbia is Endangered. Threatened taxa are those indigenous species or sub-species that are likely to become endangered in British Columbia if factors are not reversed. (MOF Web Glossary).

Understorey: any plants growing under the canopy formed by other plants, particularly herbaceous and shrub vegetation under a tree canopy. (MOF Web Glossary).

Uneven-aged silvicultural system: a silvicultural system designed to create or maintain and regenerate an uneven-aged stand structure. Single-tree and group selection are uneven-aged silvicultural systems. (MOF Web Glossary).

Visual quality: the character, condition, and quality of a scenic landscape or other visual resource and how it is perceived, preferred, or otherwise valued

Watercourse: a natural stream or source or supply of water, whether usually containing water or not, such as a lake, river, creek, spring, ravine swamp, and gulch. (MOF Web Glossary).

Wildlife: raptors, threatened species, endangered species, game, and other species of vertebrates prescribed as wildlife by regulation. (MOF Web Glossary).

Wildlife habitat: areas of land and water that support specific wildlife or groups of wildlife. (MOF Web Glossary).

Wildlife tree: defined in the *Forest Practices Code of British Columbia Act* Operational Planning Regulation as a tree or group of trees that are identified in an operational plan to provide present or future wildlife habitat. (MOF Web Glossary).

A wildlife tree is a standing live or dead tree with special characteristics that provide valuable habitat for the conservation or enhancement of wildlife. Characteristics include arge diametre and height for the site, current use by wildlife declining or dead condition, value as a species, valuable location and relative scarcity. (MOF Web Glossary).

Watershed assessment: evaluates the present state of watersheds and the cumulative impact of proposed development on peak flows, suspended sediment, bedload, and stream channel stability within the watershed. (MOF Web Glossary).

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11 Appendices

Acts and Regulations

Standards are quantifiable and measurable thresholds typically defined by laws or regulations, and as such are mandatory. The *Park Act* is the main legislation governing Protected Areas in British Columbia. It provides for the designation and administration of provincial parks, recreation areas and nature conservancy areas. The *Park Act* specifies that all trees cut on or removed from any park must be disposed of in accordance with the *Forest Act*. There are no stipulations regarding the *Forest Practices Code of BC Act*, however BC Parks recognizes in this Act the minimum standards to be followed.

It is important to note that the *Forest Practices Code* is in a state of transition toward new legislation called the *Forest and Range Practices Act*. This new act and its regulations took effect January 31, 2004. Any activities already approved under the existing Forest Practices Code may continue until December 31, 2005. After that, all planning and on-the-ground work must comply with the *Forest and Range Practices Act* and regulations.

There are also a number of other federal and provincial acts which must be abided by. The planning process recommended for tree removal projects in parks must be consistent with all of these acts and regulations.

Table A1 - Relevant Provincial and Federal Acts

Provincial	Federal
<ul style="list-style-type: none"> • <i>Park Act</i> • <i>Forest Act</i> • <i>Forest Practices Code of BC Act</i> • <i>Protected Areas of BC Act</i> • <i>Ecological Reserves Act</i> • <i>Range Act</i> • <i>Wildlife Act</i> • <i>Water Act</i> • <i>Drinking Water Protection Act</i> • <i>Environment and Land Use Act</i> • <i>Heritage Conservation Act</i> 	<ul style="list-style-type: none"> • <i>Fisheries Act</i> • <i>Species at Risk Act</i> • <i>Navigable Waters Protection Act</i>

Numerous regulations, contracts, administrative documents and guidebooks are associated with these acts. For the purposes of this guidebook, the main acts have been summarized with references to the complete acts and their associated regulations.

The Park Act

http://www.qp.gov.bc.ca/statreg/stat/P/96344_01.htm

The Park Act is the main legislation governing Protected Areas in British Columbia. It provides for the designation and administration of provincial parks, recreation areas and nature conservancy areas. Regarding tree removal, this Act states that:

“All timber cut on or removed from any park or recreation area must be disposed of in accordance with the *Forest Act*.”

Highlights from the *Park Act* include:

- Parks are dedicated to the preservation of their natural environments for inspiration, use and enjoyment [Section 5(3)].
- A park use or a resource permit is required to authorize an action or a course of behavior or conduct, or the occupancy, use, development, exploitation or extraction of a natural feature in a park or recreation area [Sections 8, 16, and 20].
- Natural features in a Class A, Class B or Class C park are protected from consumptive use (except fish and wildlife in accordance with the *Wildlife Act*) [Section 9(1)].
- BC Parks has jurisdiction over all matters concerning parks and recreation areas, including natural features in parks and recreation areas [Section 3(1)].
- Park use permits may be issued for existing use (except commercial logging, mining or hydroelectric development) for new parks listed in Schedules D and E [Section 30].

The Forest Act

http://www.qp.gov.bc.ca/statreg/stat/F/96157_00.htm

This Act specifies the disposition of timber from Crown land, and provides for:

- the classification and management of forests and forest land, and the regulation of cutting rates;
- the disposition of timber by the government;
- the rights and obligations of tenure holders;

- timber marking and scaling;
- payment for timber;
- roads and rights of way;
- marine log salvage;
- log and wood residue export controls;
- the creation of designated areas.

The *Park Act* specifies that all timber removed from parks must be disposed of in accordance with the *Forest Act*. The following represent the most relevant sections of this Act to tree removal projects:

Part 3: Disposition of Timber by the Government

Part 5: Timber Marking

Part 6: Timber Scaling

Part 7: Payments to the Government

Part 10: Manufacture in British Columbia

The Forest Practices Code Act

http://www.qp.gov.bc.ca/statreg/stat/F/96159_00.htm

This act regulates the sustainable use of provincial forests. It was brought into force in 1995 and is currently being replaced by the *Forest and Range Practices Act*. The transition is expected to be complete by the end of 2005. The Preamble to the *Forest Practices Code Act* reveals that its purpose is to provide for sustainable use of the forests and thus:

- provides for strategic planning;
- requires operational planning;
- specifies forest practices requirements;
- provides for protection of forest resources;
- provides for compliance and enforcement;
- establishes a Forest Practices Board;
- establishes a Forest Appeals Commission.

Appendices

Highlights from the *Forest Practices Code Act* include:

Part 2: Strategic Planning, Objectives and Standards

Part 3: Operational Planning Requirements for Government and for Forest and Range Tenure Agreements

Part 4: Forest Practices Specific to Forest and Range Tenure Agreements and the Government

Part 5: Protection of Forest Resources

Forest and Range Practices Act

(http://www.qp.gov.bc.ca/statreg/stat/F/02069PH_01.htm)

This Act and its regulations took effect January 31, 2004. Any activities already approved under the existing *Forest Practices Code* may continue until December 31, 2005. After that, all planning and on-the-ground work must comply with the *Forest and Range Practices Act* and regulations. The new act is similar to the *Forest Practices Code Act* but is results-based, less regulated and relies more on professional judgment. It also carries heavy penalties for non-compliance.

This new Act accomplishes the same objectives of the *Forest Practices Code Act*. The most important sections include:

Part 2 – Forest Stewardship Plan, Site Plan and Woodlot License Plan

Part 3 – Forest Practices

Part 5 – Protection of Resources

Protected Areas of BC Act

(http://www.qp.gov.bc.ca/statreg/stat/P/00017_00.htm)

This Act provides for the maintenance of existing, and the creation of new, Ecological Reserves and parks.

Ecological Reserves Act

(http://www.qp.gov.bc.ca/statreg/stat/E/96103_01.htm)

This Act provides for the protection and management of Ecological Reserves on Crown land. It regulates scientific research carried out in its natural ecosystems and accommodates preservation areas for endangered plants and animals.

Range Act

(http://www.qp.gov.bc.ca/statreg/stat/R/96396_01.htm)

This Act is administered by the Ministry of Forests and regulates grazing activities; including existing tenures listed in Schedules D and E of the *Park Act*.

Wildlife Act

http://www.qp.gov.bc.ca/statreg/stat/W/96488_01.htm

The Wildlife Act regulates the impacts to wildlife and their habitat. It provides the power to acquire land for habitat and designate land as wildlife management areas. It provides protection to rare and endangered species through the designation of critical wildlife areas. Additionally it regulates trapping, hunting and fishing.

Water Act

http://www.qp.gov.bc.ca/statreg/stat/W/96483_01.htm

This Act deals with the licensing and regulation of surface waters, and includes water quality diversion, storage and use.

Drinking Water Protection Act

http://www.qp.gov.bc.ca/statreg/stat/D/01009_01.htm

This Act provides for the protection of drinking water in British Columbia. It enables the creation of drinking water protection plans which can eventually be implemented in higher level plans under the Forest Practices Code – this can ultimately lead to influencing forestry operations and practices.

Environment and Land Use Act

http://www.qp.gov.bc.ca/statreg/stat/E/96117_01.htm

This Act is a broad piece of legislation which empowers the Land Use Committee of the provincial Cabinet in its mandate to ensure that all aspects of preservation and maintenance of the natural environment are fully considered in the administration of land use and resource development.

Heritage Conservation Act

http://www.qp.gov.bc.ca/statreg/stat/H/96187_01.htm

This Act encourages and facilitates the protection and conservation of heritage property.

Species at Risk Act

<http://laws.justice.gc.ca/en/s-15.3/100178.html>

This federal Act provides for the assessment of species at risk, their listing, recovery and stewardship.

Fisheries Act

http://www.qp.gov.bc.ca/statreg/stat/F/96149_01.htm

This federal Act provides for the protection and enhancement of fish habitat. It prohibits the destruction of fish habitats and the deposit of “deleterious substances” into waters inhabited by fish. Non-compliance may result in penalties of up to \$1 million and three years of imprisonment

Navigable Waters Protection Act

<http://laws.justice.gc.ca/en/N-22/85906.html>

This Act is federal, and regulates the construction of crossings over navigable waters, such as logging road bridges.

Waste Management Act

http://www.qp.gov.bc.ca/statreg/stat/W/96482_01.htm

This Act governs the introduction of waste to the environment. Through the Special Waste Regulation, it establishes conditions under which waste pesticide containers and other products can be disposed of.

Ministry of Water, Land and Air Protection Policy

BC Parks Conservation Program Policies

<http://wlapwww.gov.bc.ca/bcparks/conserv/consprog.htm>

http://wlapwww.gov.bc.ca/bcparks/conserv/cpp_p1/vegman.pdf

The BC Parks Conservation Program Policies document was developed to provide a comprehensive guide for BC Parks' managers, ensuring that consistent standards are adhered to in all planning and operational activities. The most relevant section of the BC Parks Conservation Program Policies covers vegetation management. These policies emphasize that British Columbia's park and ecological reserve systems are managed so as to maintain representative native vegetation types, recognizing their dynamic nature and interdependence on other ecosystem components. The following policies are included under vegetation management and are most relevant to tree removal projects.

Management for Representation

British Columbia's park and ecological reserve systems will be managed so as to maintain representative native vegetation types, recognizing their dynamic nature and interdependence on other ecosystem components.

Management for Biological Diversity

British Columbia's park and ecological reserve systems will be managed so as to ensure a natural level of vegetation diversity on the genetic, species and ecosystem levels.

Management of Ecosystem Processes

Natural ecosystem processes affecting vegetation, including fire, insects, disease, weather, herbivory by wildlife and tree mortality due to age, are recognized as natural occurrences shaping vegetation. Ecosystems will be managed so as to maintain ecological processes in as natural a state as possible.

Management of Special Features

Management priority will be given to special or unique vegetation communities, and rare, threatened and/or endangered species.

Management for Restoration

Restoration of natural ecosystem processes and major vegetative and landscaping projects within British Columbia's park and ecological reserve systems will use native plant species appropriate to the site and ecosystem.

Collection of Vegetation

Scientific collecting, picking and gathering of botanical material from British Columbia's park and ecological reserve systems will be directed and regulated where necessary.

Ecosystem Manipulation of Vegetation

Deliberate manipulation of vegetation may occur in parks and ecological reserves under special circumstances. This policy is highly relevant to tree removal. Highlights from this policy include:

- BC Parks recognizes the role that dead and/or downed vegetative material plays in ecosystem structural diversity, microclimatic habitat characteristics and nutrient cycling.
- BC Parks recognizes that removal or modification of vegetation may be necessary in order to restore natural ecosystem processes/functioning.
- Under certain conditions, removal or modification of vegetation may be necessary to:
 1. enhance visitor safety, facility security, or rare plant and animal habitat;
 2. preserve or maintain recreational values in intensive use zones within parks;
 3. combat insect or disease conditions when other controls are ineffective;
 4. undertake site development in pre-determined areas;
 5. accommodate pre-existing rights (within the terms of existing provincial standards).

Appendices

- Situations amenable to manipulation of habitat include those where:
 1. lack of action is expected to cause adverse effects to the natural features of the Protected Area or to the broader ecosystem values of which the Protected Area is a part;
 2. habitats of endangered, threatened or vulnerable plants or animals are at risk;
 3. natural processes put irreplaceable forest stands, species or specimens of plants at risk;
 4. an individual successional stage is to be maintained to preserve key conservation or recreation features;
 5. interim, non-conforming rights must be accommodated;
 6. park facilities are to be developed or maintained;
 7. mineral extraction is approved within a recreation area;
 8. restoration of natural processes is desirable (i.e.: reintroduction or fire);
 9. fire suppression has altered the natural vegetation pattern over the landscape.

BC Parks Guiding Principles for Conservation

<http://wlapwww.gov.bc.ca/bcparks/conserves/consprin1.htm>

A set of conservation management principles has been developed to guide BC Parks in its management of the natural and cultural values in British Columbia's Protected Areas system. These include:

1. Conserving and managing representative examples of British Columbia's ecosystems within the provincial Protected Area system as designated by government.
2. Maintaining essential ecological processes and variety in nature through the conservation and management of complete and functioning ecosystems.
3. Conserving variety in nature (biological diversity) at all levels, giving rare, threatened and/or endangered species special management attention.
4. Showing leadership in cooperation and coordination with other agencies, aboriginal people and the public in order to protect and manage lands and natural and cultural values within, and adjacent to, the province's parks and ecological reserve boundaries.

5. Recognizing a limited knowledge and understanding of ecosystems, natural processes will be allowed to predominate whenever possible.
6. Encouraging environmental learning and the sharing of knowledge within and between BC Parks staff and the public, and working toward the resolution of issues through conservation.
7. Giving priority to conservation in BC Parks' planning and management plans through: environmental evaluation, sound decision-making, and the encouragement and support of research and education.
8. Respecting aboriginal peoples' traditional harvesting and cultural activities in parks and ecological reserves, and seeking a special relationship honouring their cultural heritage.
9. Practicing the recycling, re-using and reducing of consumable goods and products in all aspects of parks and ecological reserves operations, and selecting environmentally friendly products and practices whenever possible.

Tree Removal Policy for Parks and Protected Areas

http://wlapwww.gov.bc.ca/bcparks/conserve/cpp_p1/tree_removal_policy_for_ppa.pdf

This Policy has been developed as a general overview of tree removal, and specifies:

“Tree removal is an acceptable management option in parks and Protected Areas when required for human health and safety, to facilitate approved development, to protect infrastructure or for ecological restoration or forest health management projects. In all cases, tree removals will be conducted with minimal environmental impacts. While tree removal may be an acceptable management activity in parks and Protected Areas, commercial logging is prohibited”.

This Policy emphasizes the importance of ecologically sensitive prescriptions for all tree removal projects. In addition, it clearly states that trees cannot be removed for commercial gain. Highlights from this document include:

General Policy

- All tree removal projects are subject to the BC Parks Impact Assessment Process.
- All tree removal projects (outside single tree removal) must be identified in, and subject to, an ecosystem restoration, ecosystem management or vegetation management plan.

Appendices

- Tree removal will be undertaken using the most environmentally sensitive approaches, and sites disturbed by tree removal will be rehabilitated.
- Tree removal will not be considered to finance infrastructure development or for use in facility construction, maintenance or repair.

Single Tree Removal – Wildlife/Danger Tree

- Trees in developed areas may be removed if they present an identified risk to human health and safety, or to facilities. Determination of danger trees will be consistent with the BC Parks Wildlife/Danger Tree Assessment Process.

Multiple Tree Removal

- Multiple or large-scale tree removals may be considered if there is an identified risk to human health and safety, or to park or adjacent values. All multiple or large-scale tree removal projects must be determined through assessments from independent, accredited professionals.
- Multiple or large-scale tree removals for human health and safety should be part of an overall restoration strategy whenever possible.
- Where re-introduction of natural processes for ecological restoration is constrained due to human health and safety or facility protection reasons, the sole use of multiple or large-scale tree removal may be acceptable.

Ecological Restoration

- Returning natural processes to areas with impaired ecological function will be a priority for restoration.
- Where appropriate, fallen trees should be left within the area of the removal.
- In some cases, tree removals may be necessary to ensure environmental conditions are suitable to reintroducing natural processes.
- Tree removal alone can not be used to mimic natural processes; tree removal can be used to enable the reintroduction of natural processes such as fire.

Forest Health

- Returning natural variability to areas with forest health issues will be a restoration objective.
- Treatments emulating natural processes will be used whenever possible.

- If treatments emulating natural processes can not be used and the park forest health situation presents a high risk to adjacent values, affected tree removal may be considered as a treatment option.

Tree Disposal

- Funds resulting from tree disposal may be retained by the Ministry and applied to project costs including: planning, inventory, tree removal, site restoration, and monitoring.
- Funds not expended on project costs may be managed through the British Columbia Parks Fund and applied to high priority provincial parks and protected areas conservation projects.
- Generation of funds will not be considered as a reason for tree removal and/or disposal.